To all our customers

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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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HD29026A/HD29027/HD29028

Dual CCD Drivers

ADE-205-001 (Z)
1st. Edition
Jul. 1990

Description

HD29026A, HD29027 and HD29028 include two on-chip drivers on a single chip, making it the optimal choice as a CCD driver. Operation is provided with a TTL level input, and output current of 1 A is available for both sink and source.

Features

- High speed output rise and fall (20 ns typ) at load capacitance (C_L) of 1000 pF
- Direct drive of input block by TTL eliminates the need for external components
- Output swing voltage of 12 V; output current of 1 A available for both sink and source
- Output wave cross point 50% typ

Ordering Information

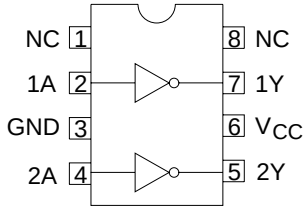
Product name	Supply voltage	Package
HD29026AP	12 V	300 mil 8-pin plastic DIP (DP-8)
HD29026AFP		225 mil 8-pin plastic SOP (FP-8D)
HD29027P	6 V	300 mil 8-pin plastic DIP (DP-8)
HD29027FP		225 mil 8-pin plastic SOP (FP-8D)
HD29028P	12 V	300 mil 8-pin plastic DIP (DP-8)
HD29028FP		225 mil 8-pin plastic SOP (FP-8D)

Function Table

Input A	Output Y
H	L
L	H

Note: H: High level
L: Low level

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item		Symbol		Rating	Unit
Supply voltage	HD29026A	V_{CC}*1		15	V
	HD29027			10	
	HD29028			15	
Input voltage		VI		7	V
Output peak current		$I_{O(peak)}$		±1	A
Operating temperature range		Ta		–20 to +75	°C
Storage temperature range		Tstg		–65 to +150	°C
Junction temperature		Tj		150	°C
Total dissipation		P_T*2	DP-8	1	W
			FP-8D	0.735	

Notes: 1. If no value is specified, the voltage is defined by the GND pin.
2. Value when Ta = 25°C. Heat dissipation is required for large-capacitance, high-frequency drivers, so derating of 8 mW/°C (DP-8) and 5.9 mW/°C (FP-8D) are required.

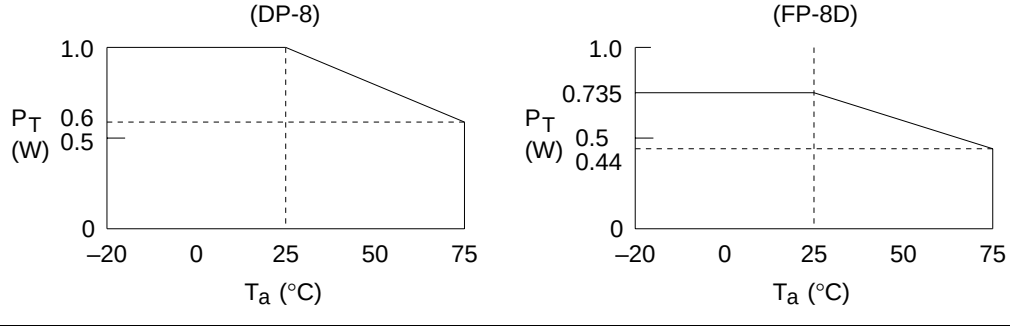


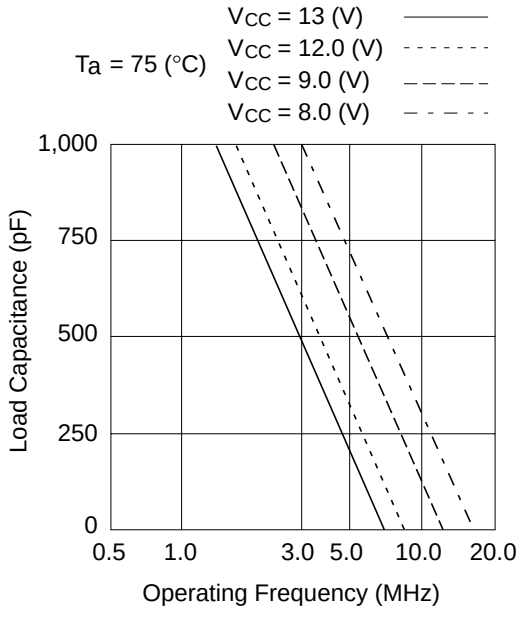
Figure 1 Package Derating Curves

Recommended Operating Conditions

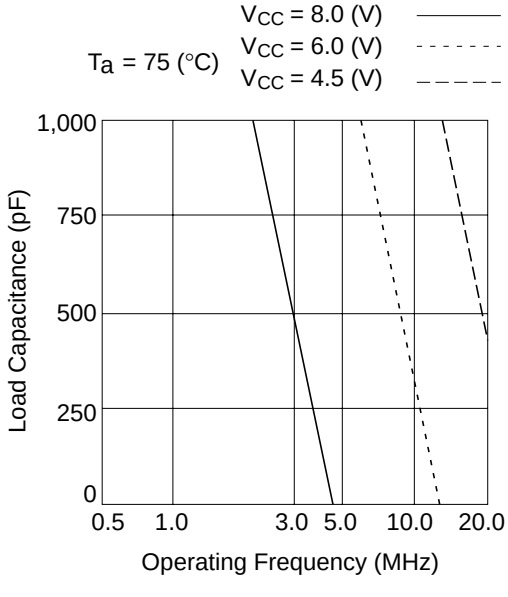
Item		Symbol	Min	Typ	Max	Unit
Supply voltage	HD29026A	V_{CC}	8	12	13	V
	HD29027	V_{CC}	4.5	6	8	
	HD29028	V_{CC}	8	9	13	
Operating temperature		Ta	–20	25	75	°C

Recommonded Operating Frequency Area

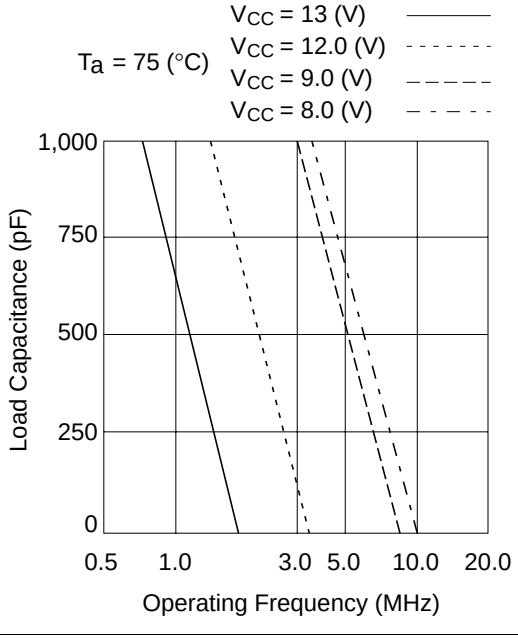
HD29026A



HD29027



HD29028



Electrical Characteristics (Ta = –20 to +75°C)

Item		Symbol	Min	Typ	Max	Unit	Test Conditions
Input voltage		V_{IH}	2.0	—	—	V	
		V_{IL}	—	—	0.6		
Output voltage		V_{OH}	V_{CC}–1	—	—	V	V_{IL} = 0.6 V, I_{OH} = –1 mA
		V_{OL}	—	—	0.5		V_{IH} = 2.0 V, I_{OL} = 1 mA
Input current		I_{IH}	—	—	20	µA	V_I = 2.7 V
	HD29026A/28	I_{IL}	—	—	–100		V_I = 0.4 V
	HD29027		—	—	–200		
Supply current	HD29026A	I_{CCH}	—	—	12	mA	
	HD29027		—	—	20		
	HD29028		—	—	15		
	HD29026A	I_{CCL}	—	—	20		
	HD29027		—	—	30		
	HD29028		—	—	25		
Input current		I_I	—	—	100	µA	V_I = 7 V
Input clamp voltage		V_{IK}	—	—	–1.5	V	I_{IN} = –18 mA

Note: HD29026A/28: V_{CC} = 8 to 13 V
HD29027: V_{CC} = 4.5 to 8 V

Switching Characteristics (Ta = 25°C)

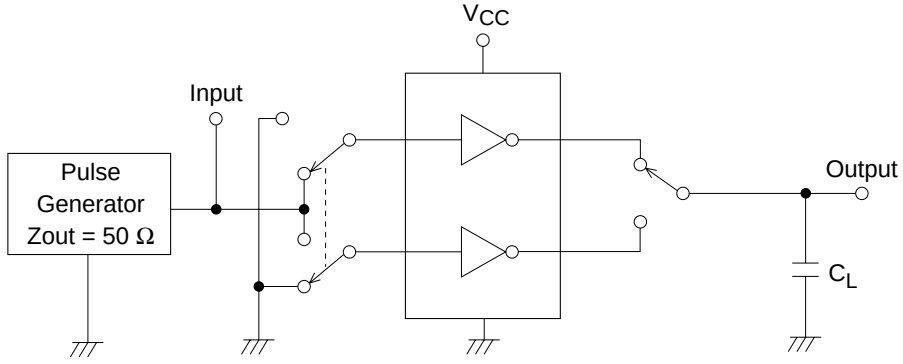
Item		Symbol	Min	Typ	Max	Unit	Test Conditions	
Fall propagation	HD29026A	t_{PHL}	—	16	20	ns	C_L = 1000 pF	V_{CC} = 8 V
delay time			—	11	15			V_{CC} = 12 V
	HD29027		—	10	15			V_{CC} = 6 V
	HD29028		—	10	15			V_{CC} = 9 V
			—	8	13			V_{CC} = 12 V
Rise propagation	HD29026A	t_{PLH}	—	18	25	ns	C_L = 1000 pF	V_{CC} = 8 V
delay time			—	13	20			V_{CC} = 12 V
	HD29027		—	10	15			V_{CC} = 6 V
	HD29028		—	10	15			V_{CC} = 9 V
			—	8	13			V_{CC} = 12 V

Switching Characteristics (Ta = 25°C) (cont)

Item		Symbol	Min	Typ	Max	Unit	Test Conditions	
Fall (transition) time	HD29026A	t_{THL}	—	17	21	ns	C_L = 250 pF	V_{CC} = 8 V
			—	12	16			V_{CC} = 12 V
	HD29027		—	9	14			V_{CC} = 6 V
	HD29028		—	9	13			V_{CC} = 9 V
			—	7	14			V_{CC} = 12 V
	HD29026A		—	20	23		CL = 500 pF	V_{CC} = 8 V
			—	15	18			V_{CC} = 12 V
	HD29027		—	12	17			V_{CC} = 6 V
	HD29028		—	12	17			V_{CC} = 9 V
			—	10	15			V_{CC} = 12 V
	HD29026A		—	25	40		C_L = 1000 pF	V_{CC} = 8 V
			—	20	35			V_{CC} = 12 V
	HD29027		—	20	25			V_{CC} = 6 V
	HD29028		—	20	25			V_{CC} = 9 V
			—	18	23			V_{CC} = 12 V
Rise (transition) time	HD29026A	t_{TLH}	—	15	20	ns	CL = 250 pF	V_{CC} = 8 V
			—	10	15			V_{CC} = 12 V
	HD29027		—	9	14			V_{CC} = 6 V
	HD29028		—	9	14			V_{CC} = 9 V
			—	7	12			V_{CC} = 12 V
	HD29026A		—	21	25		C_L = 500 pF	V_{CC} = 8 V
			—	16	20			V_{CC} = 12 V
	HD29027		—	12	17			V_{CC} = 6 V
	HD29028		—	12	17			V_{CC} = 9 V
			—	10	15			V_{CC} = 12 V
	HD29026A		—	22	30		C_L = 1000 pF	V_{CC} = 8 V
			—	17	25			V_{CC} = 12 V
	HD29027		—	20	25			V_{CC} = 6 V
	HD29028		—	20	25			V_{CC} = 9 V
			—	18	23			V_{CC} = 12 V

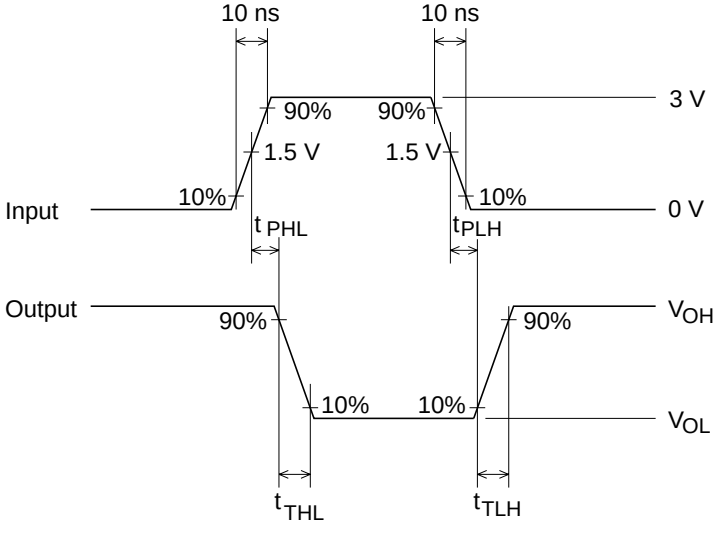
Switching Time Test Method

Test circuit



Note: C_L includes stray capacitance of probe and other tools

Waveforms



Note: Input waveform: f = 1 MHz, duty cycle = 50%

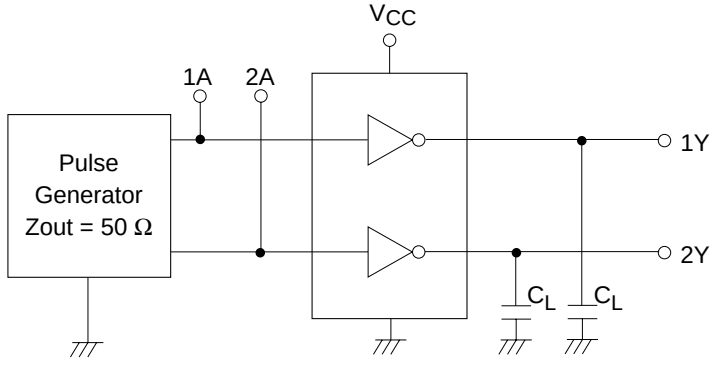
Output Timing Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Output wave cross point	V_X	30	50	70	%	C_L = 250 pF
		30	50	70		C_L = 500 pF
		30	50	70		C_L = 1000 pF

HD29027; V_{CC} = 6 V, HD29028; V_{CC} = 9, 12 V

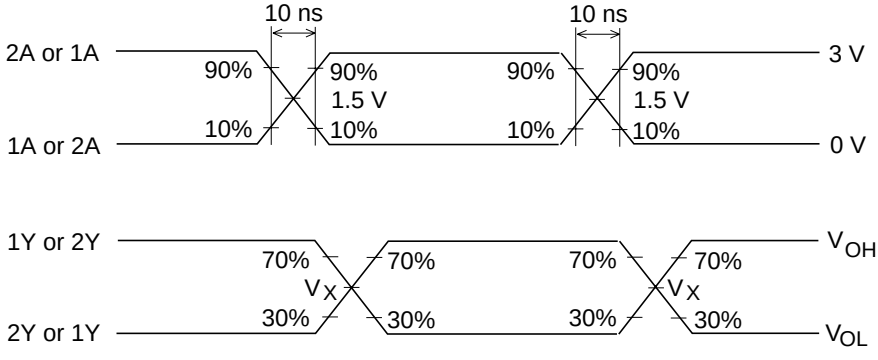
Output Timing Characteristics Test Method (HD29027/28)

Test circuit



Note: C_L includes stray capacitance of probe and other tools

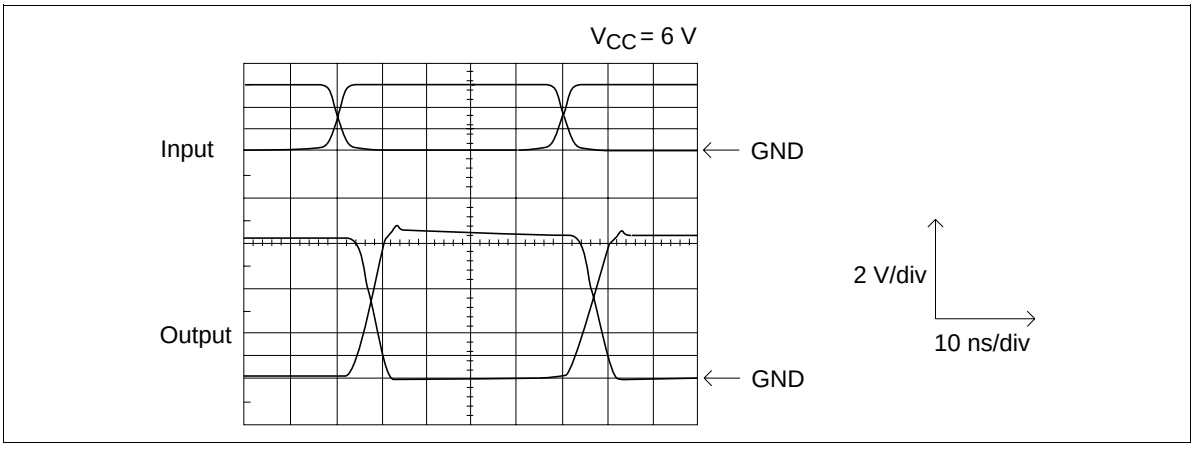
Waveform



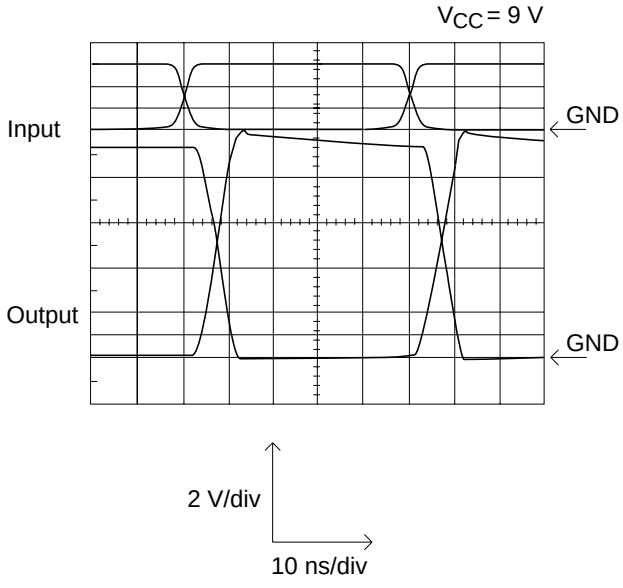
Note: Input waveform: f = 1 MHz, duty cycle = 50%

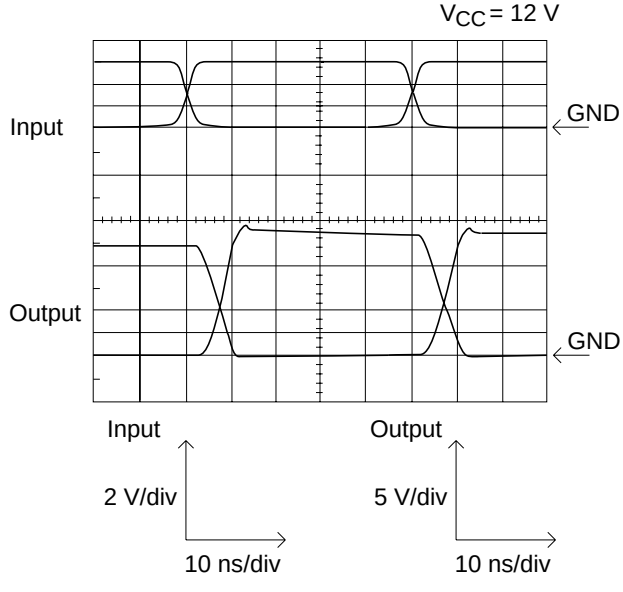
Output Timing Characteristics

HD29027



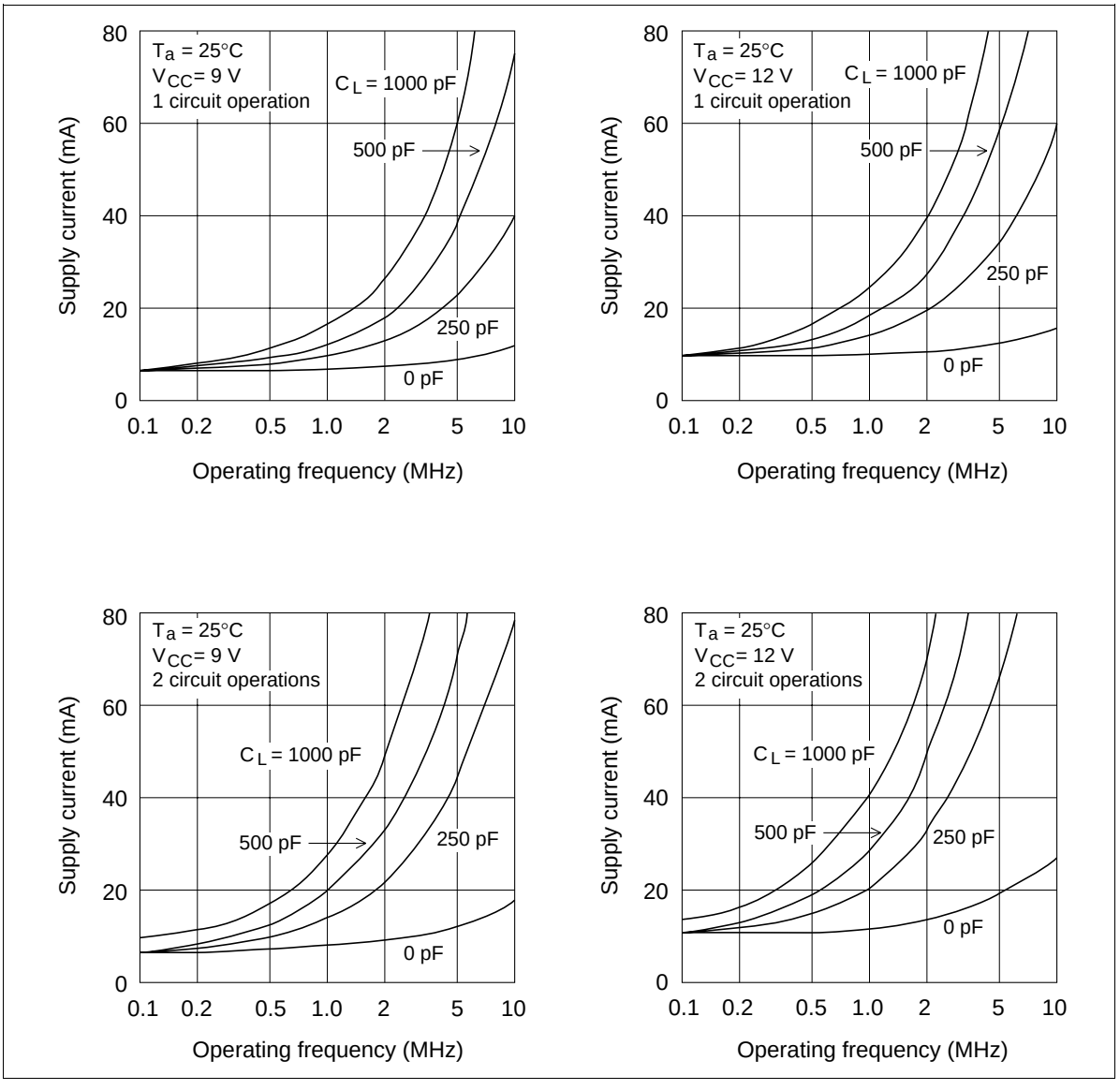
HD29028


V_{CC} = 9 V
Input
Output
GND
GND
2 V/div
10 ns/div

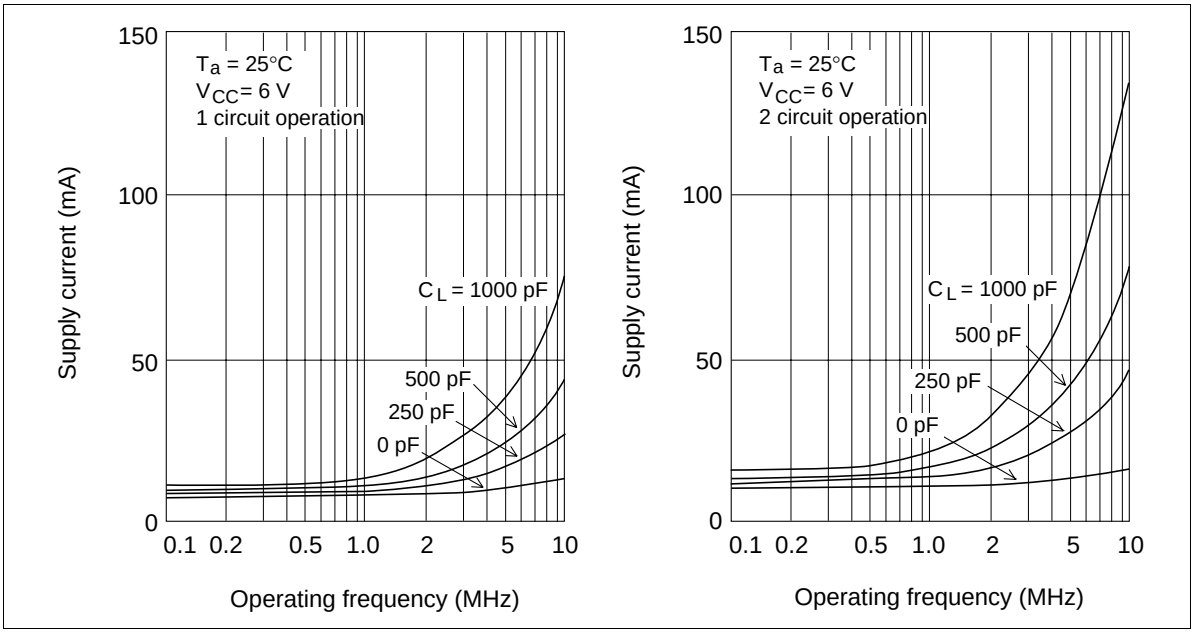

V_{CC} = 12 V
Input
Output
GND
GND
Input
Output
2 V/div
5 V/div
10 ns/div
10 ns/div

Typical Characteristic Curves

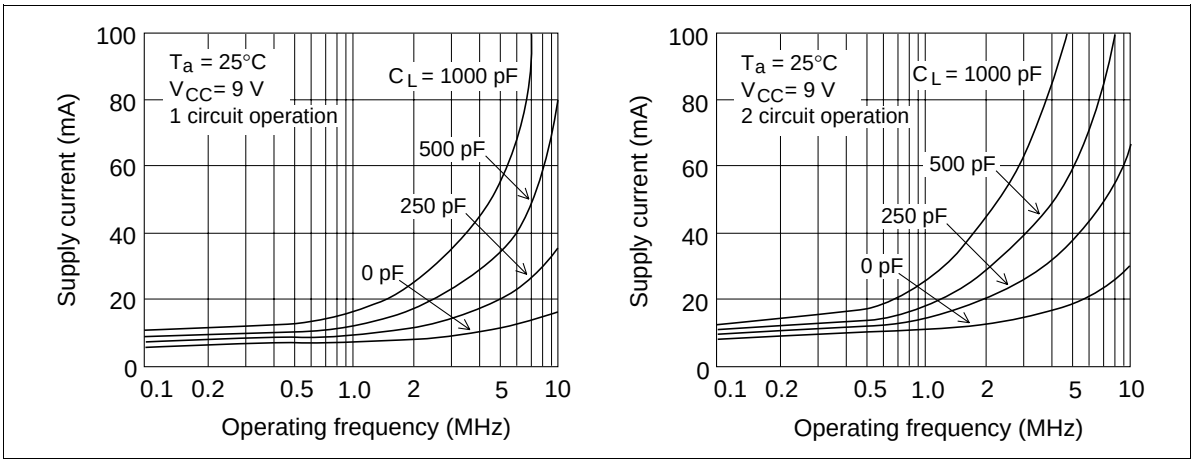
Supply current vs. operating frequency (HD29026A)

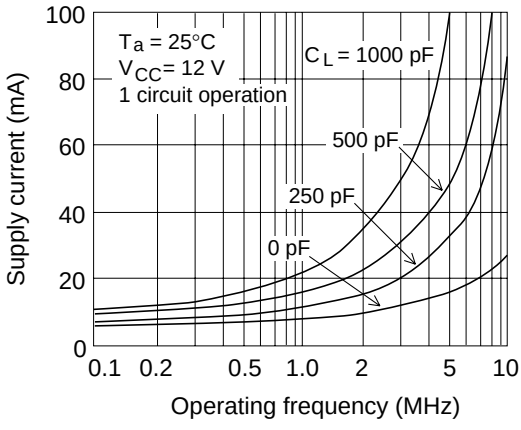


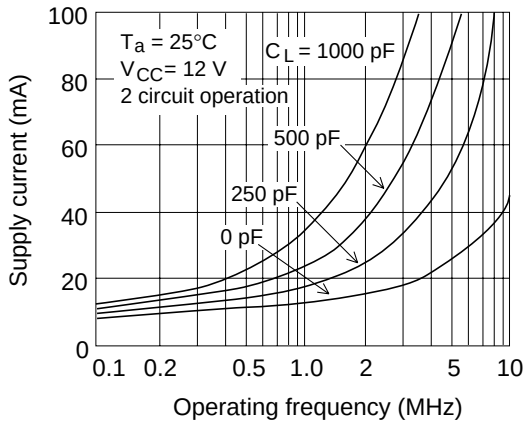
Supply current vs. operating frequency (HD29027)



Supply current vs. operating frequency (HD29028)



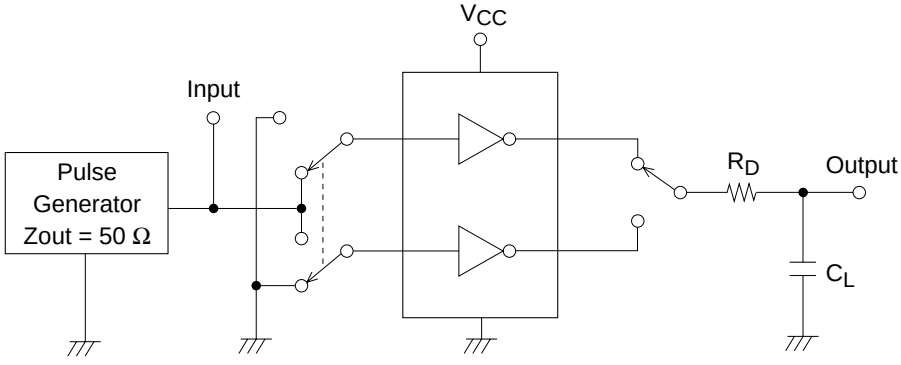




Cautions (HD29026A only)

The short output rise and fall time, as well as the large output amplitude of this product tends to generate overshooting and undershooting. The connection of 5 to 15 Ω damping resistance (R_D) to the output as illustrated in figure 2 serves to

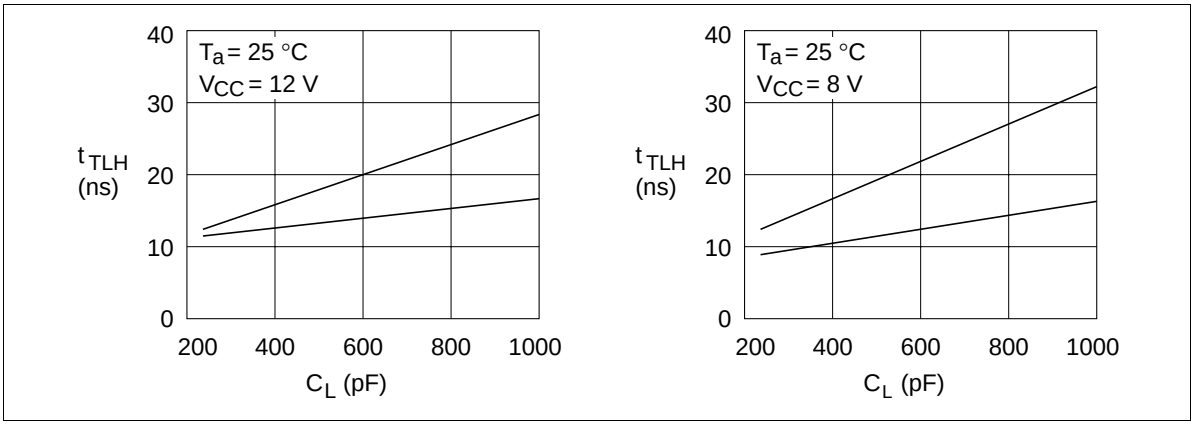
increase the output rise and fall time, making it possible to reduce the chance of overshooting and undershooting. Figure 3 shows the characteristics that result for a damping resistance (R_D) of 10 Ω.



Note: C_L includes stray capacitance of probe and other tools

Figure 2

t_{TLH} vs C_L



t_{THL} vs C_L

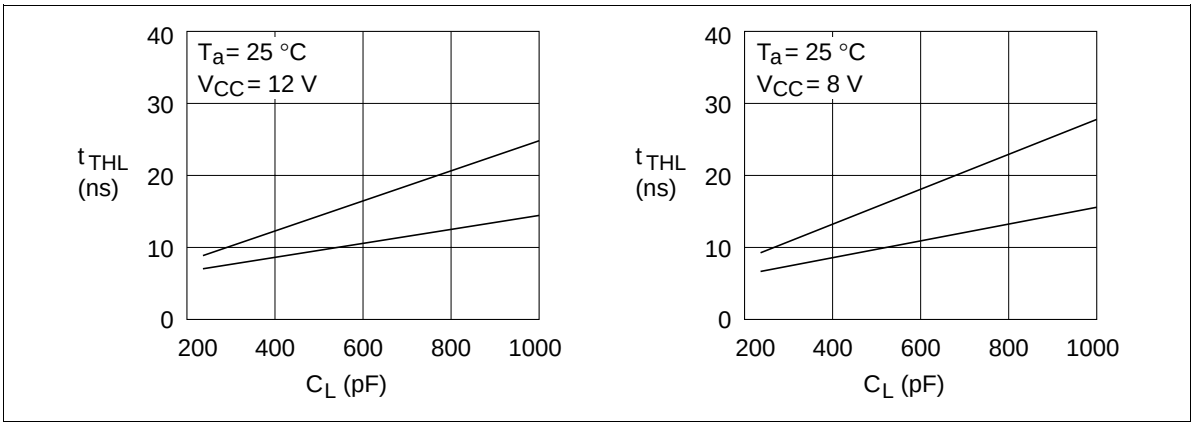
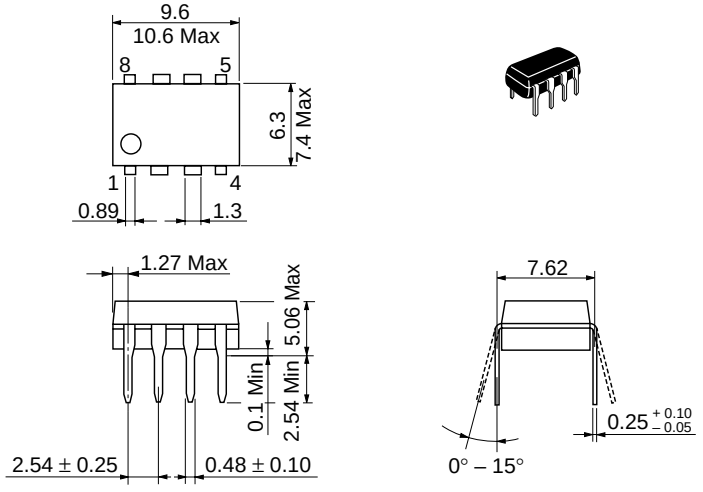


Figure 3

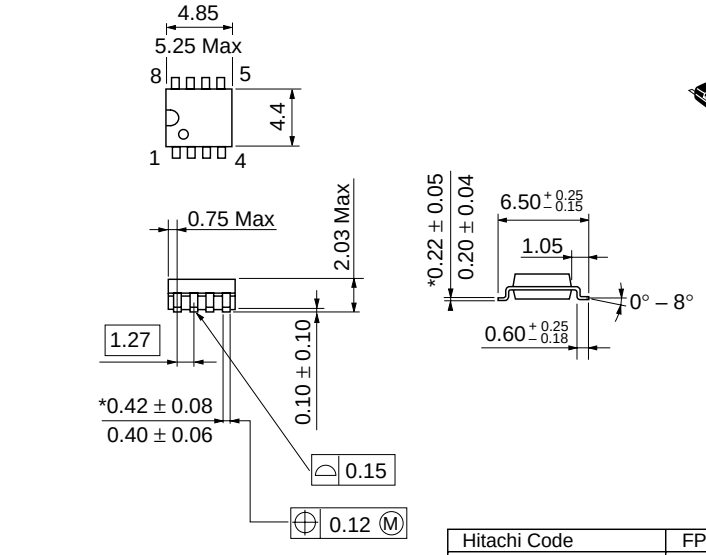
Package Dimensions

Unit: mm



Hitachi Code	DP-8
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.54 g

Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-8D
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.10 g

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