General Description

The CD40106 provides six inverting buffers. Each input has a Schmitt trigger circuit. The inverting buffer switches at different points for positive-going and negative-going signals. The difference between the positive voltage (V_{T+}) and the negative voltage (V_{T-}) is defined as hysteresis voltage (V_H).

The CD40106 may be used for enhanced noise immunity or to "square up" slowly changing waveforms. It operates over a recommended V_{DD} power supply range of 3V to 15V referenced to V_{SS} (usually ground). Unused inputs must be connected to V_{DD}, V_{SS}, or another input.

Features

- Wide supply voltage range from 3V to 15V
- Schmitt trigger input discrimination
- Fully static operation
- 5V, 10V, and 15V parametric ratings
- Standardized symmetrical output characteristics
- Specified from -40℃ to +105℃
- Packaging information: DIP14/SOP14/TSSOP14

ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing QTY
CD40106BE	DIP–14	CD40106BE	Tube	1000/Box
CD40106BDTR	SOP–14	CD40106B	Tape	2500/Reel
CD40106BTDTR	TSSOP–14	CD40106B	Tape	3000/Reel

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Block Diagram And Pin Description

Block Diagram
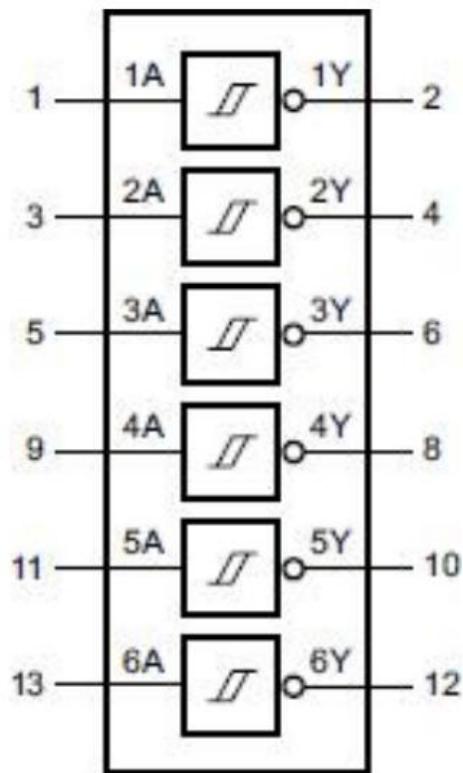


Figure 1. Functional diagram
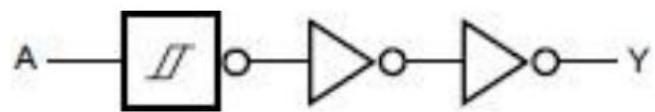
Figure 2. Logic diagram(one gate)

Pin Configurations
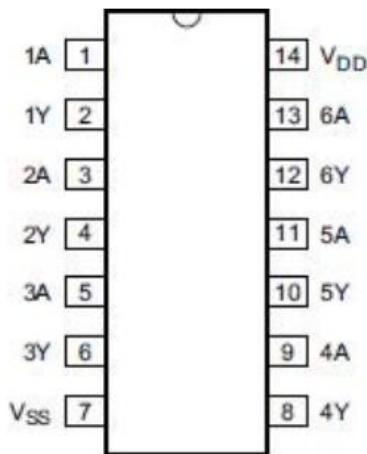
Pin Description

Pin No.	Pin Name	Description
1	1A	data input
2	1Y	data output
3	2A	data input
4	2Y	data output
5	3A	data input
6	3Y	data output
7	V_{SS}	ground (0V)
8	4Y	data output
9	4A	data input
10	5Y	data output
11	5A	data input
12	6Y	data output
13	6A	data input
14	V_{DD}	supply voltage

Function Table

Input	Output
nA	nY
L	H
H	L

Note: H=HIGH voltage level; L=LOW voltage level

Electrical Parameter

Absolute Maximum Ratings (Voltages are referenced to V_{SS} (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Max.	Unit
supply voltage	V_{DD}	-		-0.5	+18	V
DC input current	I_{IK}	any one input		-	± 10	mA
input voltage	V_I	all inputs		-0.5	$V_{DD} +0.5$	V
storage temperature	T_{stg}	-		-65	+150	℃
total power dissipation	P_{tot}	-		-	500	mW
device dissipation	P	per output transistor		-	100	mW
Soldering temperature	T_L	10s	DIP	245		℃
			SOP	250		℃

Note:

[1] For DIP14 packages: above 70℃ the value of P_{tot} derates linearly with 12mW/K.

[2] For SOP14 packages: above 70℃ the value of P_{tot} derates linearly with 8mW/K.

[3] For (T)SSOP14 packages: above 60℃ the value of P_{tot} derates linearly with 5.5mW/K.

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{DD}	-	3	-	15	V
ambient temperature	T_{amb}	in free air	-40	-	+105	℃

Electrical Characteristics

DC Characteristics 1 (Tamb=25℃, voltages are referenced to V_{SS} (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions(V)			$T_{amb}=25℃$			Unit
		V_O	V_{IN}	V_{DD}	Min.	Typ.	Max.	
supply current	I_{DD}	-	0, 5	5	-	0.02	1	µA
		-	0, 10	10	-	0.02	2	µA
		-	0, 15	15	-	0.02	4	µA
LOW-level output current	I_{OL}	0.4	0, 5	5	0.51	1	-	mA
		0.5	0, 10	10	1.3	2.6	-	mA
		1.5	0, 15	15	3.4	6.8	-	mA
HIGH-level output current	I_{OH}	4.6	0, 5	5	-0.51	-1	-	mA
		2.5	0, 5	5	-1.6	-3.2	-	mA
		9.5	0, 10	10	-1.3	-2.6	-	mA
		13.5	0, 15	15	-3.4	-6.8	-	mA
LOW-level output voltage	V_{OL}	-	5	5	-	0	0.05	V
		-	10	10	-	0	0.05	V
		-	15	15	-	0	0.05	V
HIGH-level output voltage	V_{OH}	-	0	5	4.95	5	-	V
		-	0	10	9.95	10	-	V
		-	0	15	14.95	15	-	V
input leakage current	I_I	-	0, 15	15	-	$\pm10^{-5}$	±0.1	µA

DC Characteristics 2

(Tamb=-40℃ to +105℃, voltages are referenced to V_{SS} (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions(V)			T_{amb}=-40℃		T_{amb}=+85℃		T_{amb}=+105℃		Unit
		V_O	V_{IN}	V_{DD}	Min.	Max.	Min.	Max.	Min.	Max.	
supply current	I_{DD}	-	0, 5	5	-	1	-	30	-	30	μA
		-	0, 10	10	-	2	-	60	-	60	μA
		-	0, 15	15	-	4	-	120	-	120	μA
LOW-level output current	I_{OL}	0.4	0, 5	5	0.61	-	0.42	-	0.36	-	mA
		0.5	0, 10	10	1.5	-	1.1	-	0.9	-	mA
		1.5	0, 15	15	4	-	2.8	-	2.4	-	mA
HIGH-level output current	I_{OH}	4.6	0, 5	5	-0.61	-	-0.42	-	-0.36	-	mA
		2.5	0, 5	5	-1.8	-	-1.3	-	-1.15	-	mA
		9.5	0, 10	10	-1.5	-	-1.1	-	-0.9	-	mA
		13.5	0, 15	15	-4	-	-2.8	-	-2.4	-	mA
LOW-level output voltage	V_{OL}	-	5	5	-	0.05	-	0.05	-	0.05	V
		-	10	10	-	0.05	-	0.05	-	0.05	V
		-	15	15	-	0.05	-	0.05	-	0.05	V
HIGH-level output voltage	V_{OH}	-	0	5	4.95	-	4.95	-	4.95	-	V
		-	0	10	9.95	-	9.95	-	9.95	-	V
		-	0	15	14.95	-	14.95	-	14.95	-	V
input leakage current	I_I	-	0, 15	15	-	±0.1	-	±1.0	-	±1.0	μA

AC Characteristics (Tamb=25℃, V_{SS}=0V, t_r, t_f=20ns, C_L=50pF, RL=200KΩ, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay time	t_{PHL}, t_{PLH}	see Figure 4	V_{DD}=5V	-	140	280	ns
			V_{DD}=10V	-	70	140	ns
			V_{DD}=15V	-	60	120	ns
transition time	t_{THL}, t_{TLH}	see Figure 4	V_{DD}=5V	-	100	200	ns
			V_{DD}=10V	-	50	100	ns
			V_{DD}=15V	-	40	80	ns
input capacitance	C_I	any input		-	5	7.5	pF

Transfer Characteristics1(T_{amb}=25℃, voltages are referenced to V_{SS}(ground=0V) , unless otherwise specified.)

Parameter	Symbol	Conditions (V)			Tamb=25℃			Unit
		V_O	V_{IN}	V_{DD}	Min.	Typ.	Max.	
positive-going threshold voltage	V_{T+}	-	-	5	2.2	2.9	3.6	V
		-	-	10	4.6	5.9	7.1	V
		-	-	15	6.8	8.8	10.8	V
negative-going threshold voltage	V_{T-}	-	-	5	0.9	1.9	2.8	V
		-	-	10	2.5	3.9	5.2	V
		-	-	15	4	5.8	7.4	V
hysteresis voltage	V_H	-	-	5	0.3	0.9	1.6	V
		-	-	10	1.2	2.3	3.4	V
		-	-	15	1.6	3.5	5	V

Note: See Figure 5 and Figure 6.

Transfer Characteristics2

(T_{amb}=-40℃~105℃, voltages are referenced to GND(ground=0V) , unless otherwise specified.)

Parameter	Symbol	Conditions (V)			Tamb=-40℃		Tamb=+85℃		Tamb=+105℃		Unit
		V_O	V_{IN}	V_{DD}	Min.	Max.	Min.	Max.	Min.	Max.	
positive-going threshold voltage	V_{T+}	-	-	5	2.2	3.6	2.2	3.6	2.2	3.6	V
		-	-	10	4.6	7.1	4.6	7.1	4.6	7.1	V
		-	-	15	6.8	10.8	6.8	10.8	6.8	10.8	V
negative-going threshold voltage	V_{T-}	-	-	5	0.9	2.8	0.9	2.8	0.9	2.8	V
		-	-	10	2.5	5.2	2.5	5.2	2.5	5.2	V
		-	-	15	4	7.4	4	7.4	4	7.4	V
hysteresis voltage	V_H	-	-	5	0.3	1.6	0.3	1.6	0.3	1.6	V
		-	-	10	1.2	3.4	1.2	3.4	1.2	3.4	V
		-	-	15	1.6	5	1.6	5	1.6	5	V

Note: See Figure 5 and Figure 6.

Testing Circuit

AC Testing Circuit
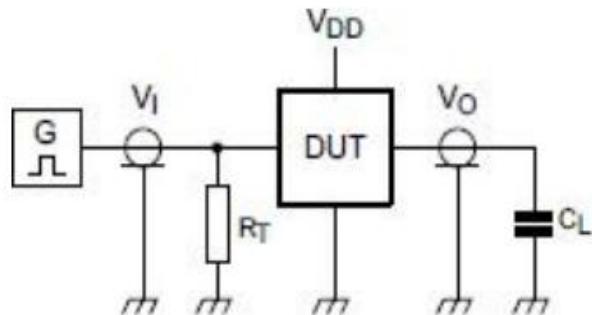
Figure 3. Test circuit for switching times

Definitions for test circuit:

DUT=Device Under Test

C_L=Load capacitance including jig and probe capacitance.

R_T=Termination resistance should be equal to the output impedance Z_o of the pulse generator.

AC Testing Waveforms
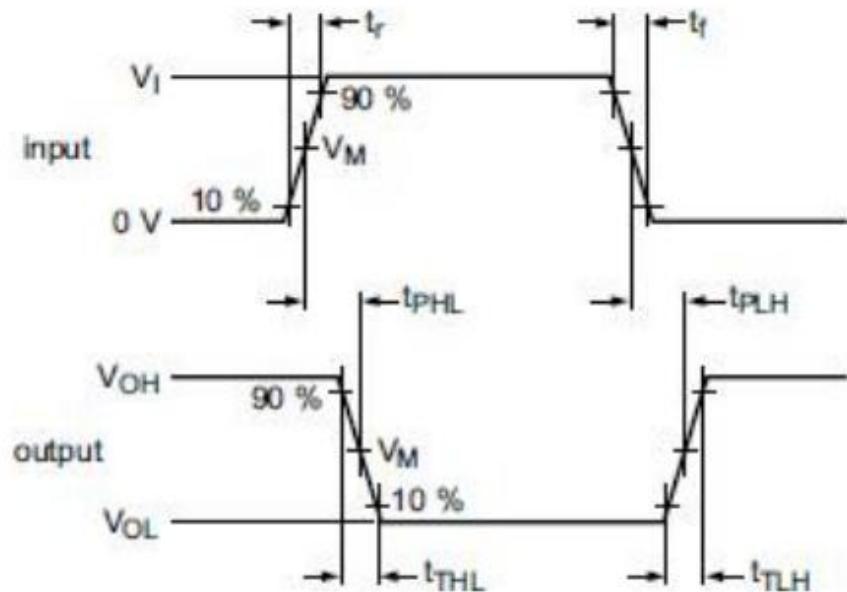
Figure 4. Propagation delay and output transition time

Transfer Characteristics Waveforms
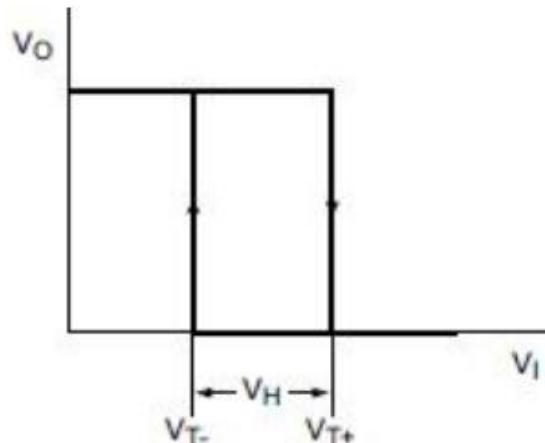

Figure 5. Transfer characteristic
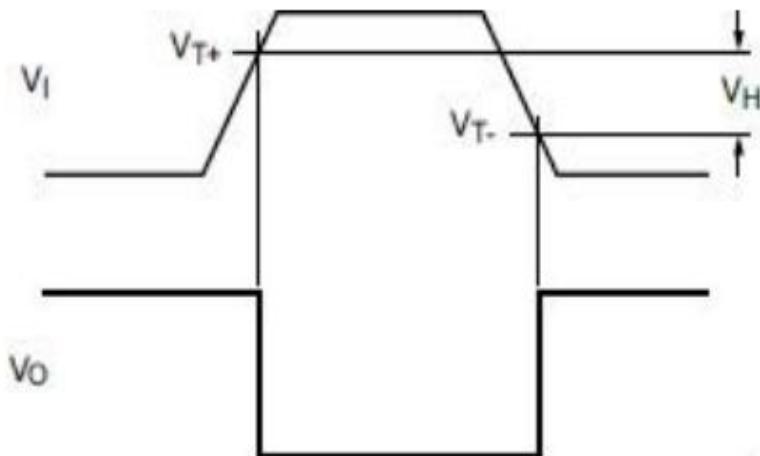
Figure 6. Waveforms showing definition of V_{T+} and V_{T-} (between limits at 30% and 70%) and V_H
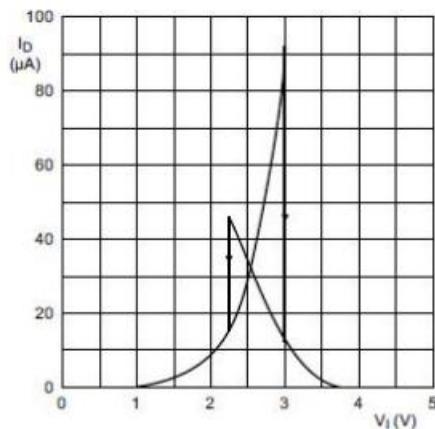
a. V_{DD} = 5 V; T_{amb} = 25 °C
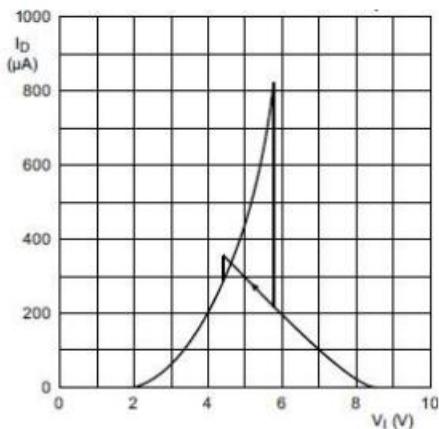
b. V_{DD} = 10 V; T_{amb} = 25 °C
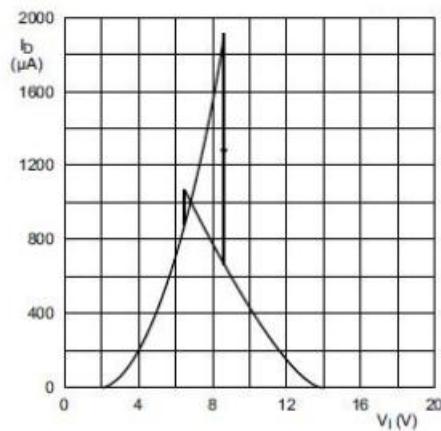
c. V_{DD} = 15 V; T_{amb} = 25 °C

Figure 7. Typical drain current as a function of input

Measurement Points

Supply voltage	Input	Output
V_{DD}	V_M	V_M
5V to 15V	$0.5 \times V_{DD}$	$0.5 \times V_{DD}$

Test Data

Supply voltage	Input		Load
V_{DD}	V_I	t_r, t_f	C_L
5V to 15V	V_{SS} or V_{DD}	≤20ns	50pF

Package Information

DIP14
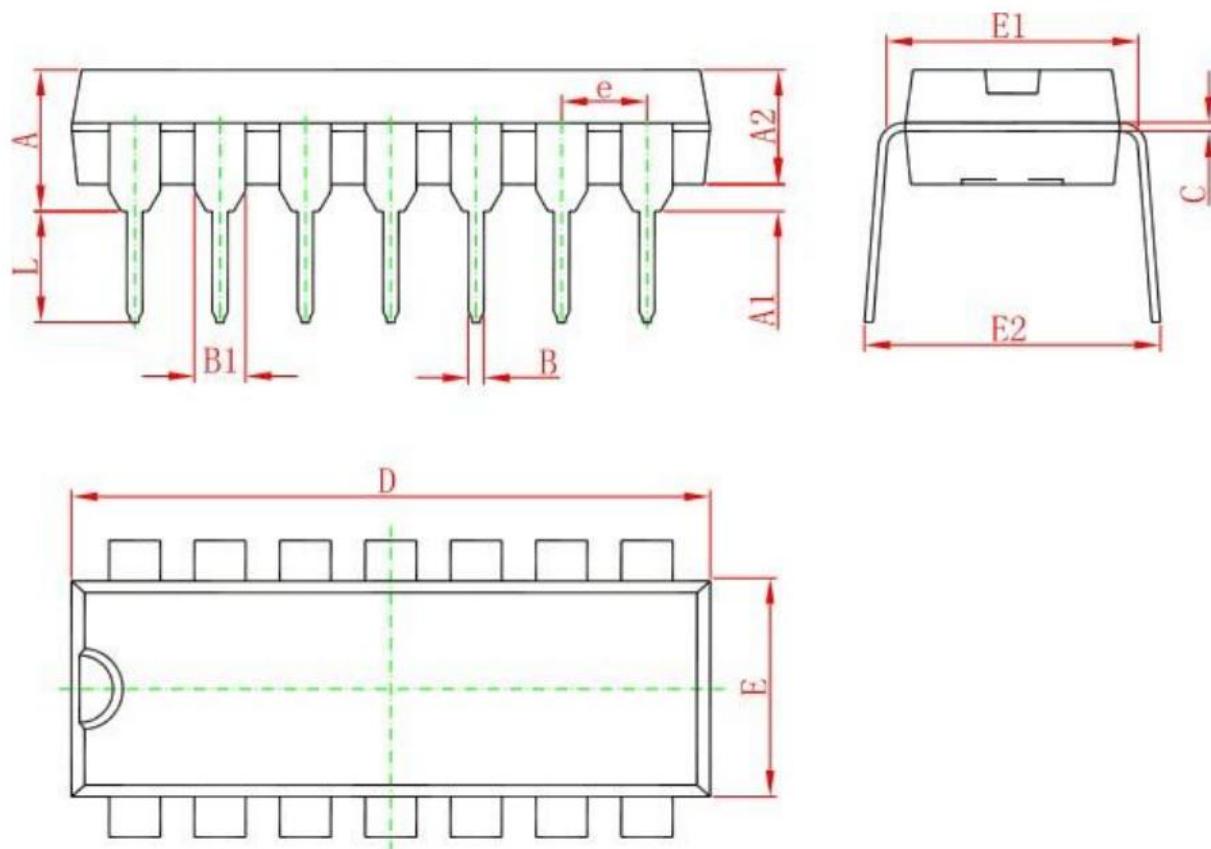
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	18.800	19.200	0.740	0.756
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540(BSC)		0.100(BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354

SOP14

TSSOP14
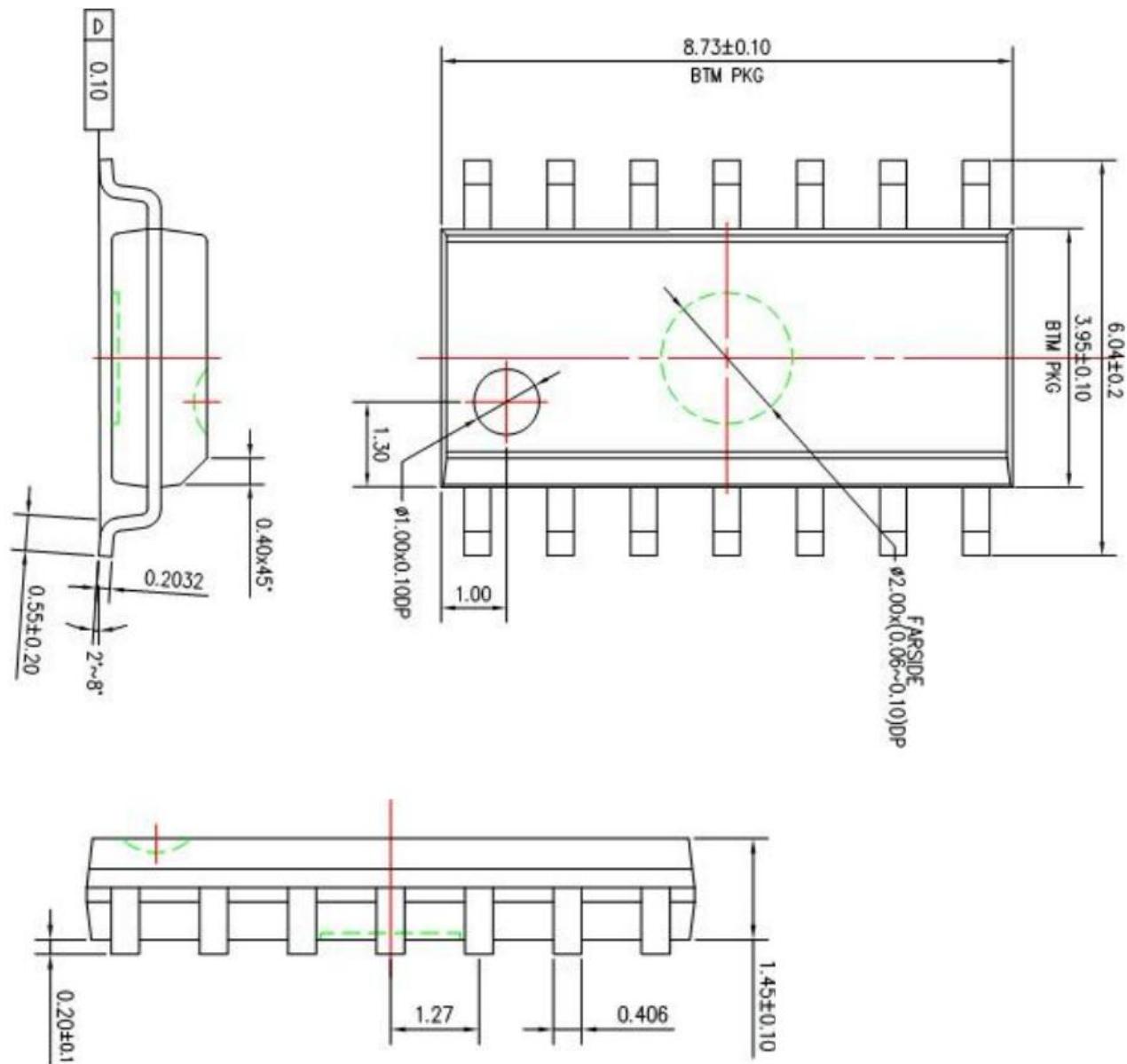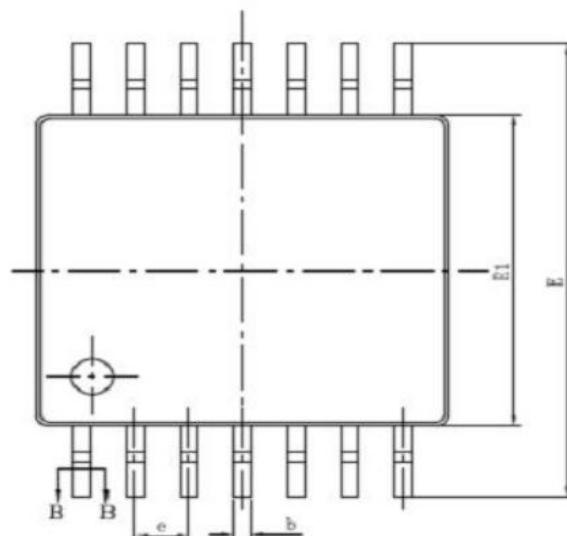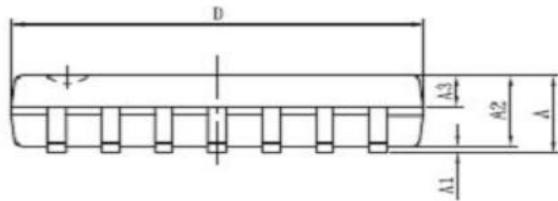
SYMBOL	MILLIMETER	
	MIN	MAX
A	-	1.20
A1	0.05	0.15
A2	0.90	1.05
A3	0.39	0.49
b	0.20	0.30
b1	0.19	0.25
c	0.13	0.19
c1	0.12	0.14
D	4.86	5.06
E1	4.30	4.50
E	6.20	6.60
e	0.65BSC	
L	0.45	0.75
L1	1.00BSC	
θ	0°	8°

BASE METAL

WITH PLATING
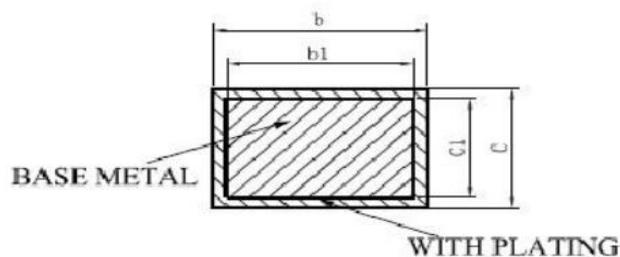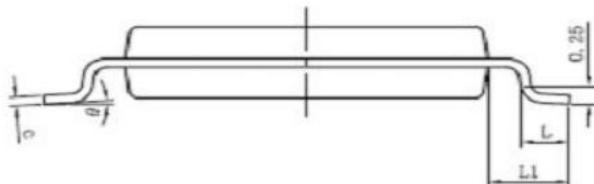
SECTION B-B

Statements And Notes

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butyl benzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements									

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