

### Features

- Operating voltage: 2.4V~12V
- Low power and high noise immunity CMOS technology
- Low standby current
- Three words transmission
- Built-in oscillator needs only 5% resistor
- Easy interface with an RF or infrared transmission media
- Minimal external components
- Pair with Holtek's 3<sup>18</sup> series of decoders
- HT600/HT6207: 20-pin DIP/SOP package  
HT680: 18-pin DIP/SOP package

### Applications

- Burglar alarm system
- Smoke and fire alarm system
- Garage door controllers
- Car door controllers
- Car alarm system
- Security system
- Cordless telephones
- Other remote control systems

### General Description

The 3<sup>18</sup> encoders are a series of CMOS LSIs for remote control system applications. They are capable of encoding 18 bits of information which consists of N address bits and 18-N data bits. Each address/data input is externally trinary programmable if bonded out. It is otherwise set floating internally. Various packages of the 3<sup>18</sup> encoders offer flexible combinations of programmable

address/data to meet various application needs. The programmable address/data is transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal. The capability to select a TE trigger type or a DATA trigger type further enhances the application flexibility of the 3<sup>18</sup> series of encoders.

### Selection Table

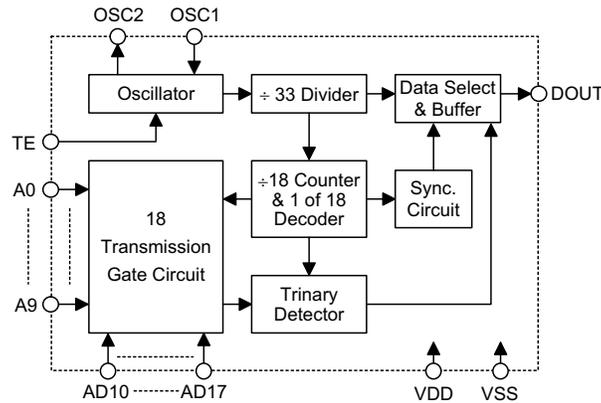
Function Part No.	Address No.	Address/ Data No.	Data No.	Dummy Code No.	Oscillator	Trigger	Package
HT600	9	5	0	4	RC oscillator	TE	20DIP/SOP
HT680	8	4	0	6	RC oscillator	TE	18DIP/SOP
HT6207	10	0	4	4	RC oscillator	D12~D15	20DIP/SOP

Note: Address/Data represents pins that can be either address or data according to the application requirement.

**Block Diagram**

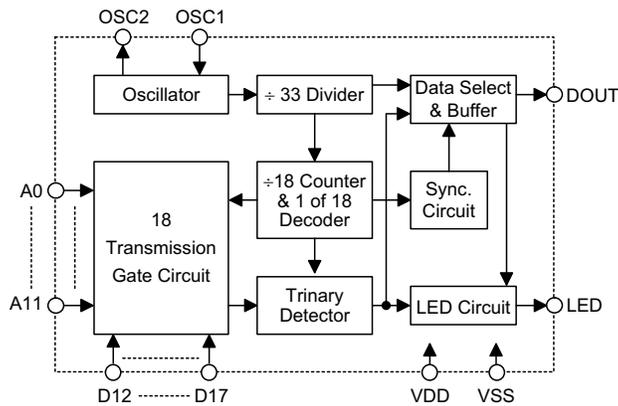
**TE Trigger**

HT600/HT680



**DATA Trigger**

HT6207



Note: The address/data pins are available in various combinations.

**Pin Assignment**

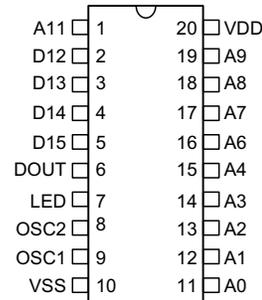
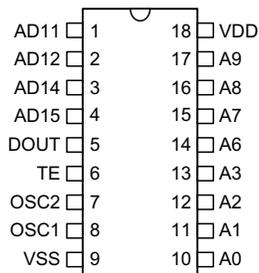
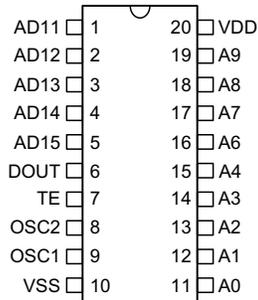
**TE trigger type**

**DATA trigger type**

**9-Address  
5-Address/Data**

**8-Address  
4-Address/Data**

**10-Address  
4-Data**



**HT600**  
– 20 DIP-A/SOP-A

**HT680**  
– 18 DIP-A/SOP-A

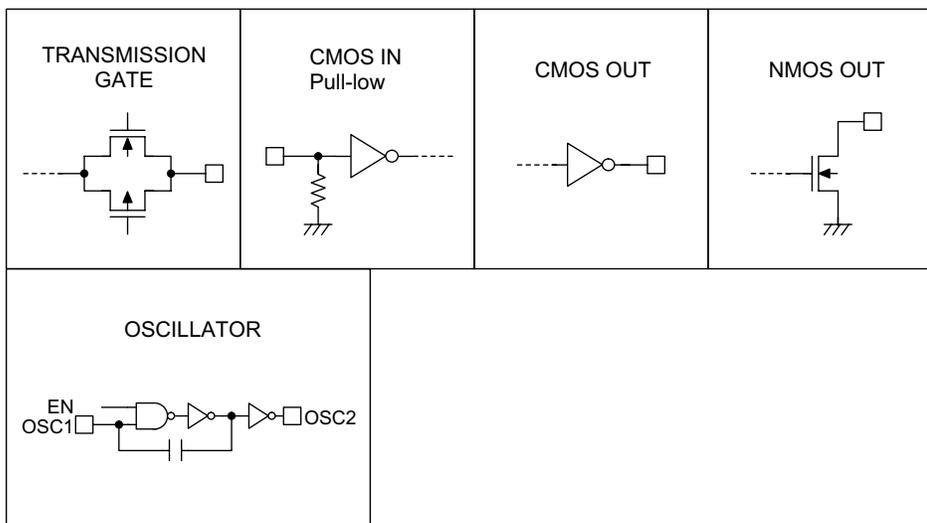
**HT6207**  
– 20 DIP-A/SOP-A

**Pin Description**

Pin Name	I/O	Internal Connection	Description
A0~A11	I	TRANSMISSION GATE	Input pins for address A0~A11 setting They can be externally set to VDD, VSS, or left open.
AD10~AD17	I	TRANSMISSION GATE	Input pins for address/data (AD10~AD17) setting They can be externally set to VDD, VSS, or left open.
D12~D15	I	CMOS IN Pull-low	Input pins for data (D12~D15) setting and transmission enable (active high) They can be externally set to VDD or left open (see Note).
DOUT	O	CMOS OUT	Encoder data serial transmission output
LED	O	NMOS OUT	LED transmission enable indicator
TE	I	CMOS IN Pull-low	Transmission enable, active high (see Note).
OSC1	I	OSCILLATOR	Oscillator input pin
OSC2	O	OSCILLATOR	Oscillator output pin
VSS	—	—	Negative power supply, ground
VDD	—	—	Positive power supply

Note: D12~D15 are data input and transmission enable pins of the HT6207.

TE is the transmission enable pin of the HT600/HT680.

**Approximate Internal Connections**

**Absolute Maximum Ratings**

Supply Voltage .....	$V_{SS}-0.3V$ to $V_{SS}+13V$	Storage Temperature .....	$-50^{\circ}C$ to $125^{\circ}C$
Input Voltage .....	$V_{SS}-0.3$ to $V_{DD}+0.3V$	Operating Temperature .....	$-20^{\circ}C$ to $75^{\circ}C$

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

**Electrical Characteristics**

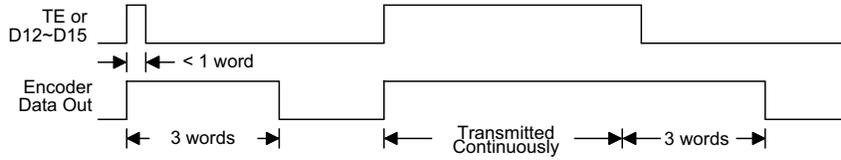
Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>DD</sub>	Conditions				
V <sub>DD</sub>	Operating Voltage	—	—	2.4	—	12	V
I <sub>STB</sub>	Standby Current	3V	Oscillator stops	—	0.1	1	μA
		12V		—	2	4	μA
I <sub>DD</sub>	Operating Current	5V	No load, f <sub>OSC</sub> =100kHz	—	250	500	μA
		12V		—	1200	2400	μA
I <sub>LED</sub>	LED Sink Current	5V	V <sub>LED</sub> =0.5V	1.5	3	—	mA
I <sub>DOUT</sub>	Output Drive Current	5V	V <sub>OH</sub> =0.9V <sub>DD</sub> (Source)	-0.6	-1.2	—	mA
		5V	V <sub>OL</sub> =0.1V <sub>DD</sub> (Sink)	0.6	1.2	—	mA
V <sub>IH</sub>	"H" Input Voltage	—	—	0.8V <sub>DD</sub>	—	V <sub>DD</sub>	V
V <sub>IL</sub>	"L" Input Voltage	—	—	0	—	0.2V <sub>DD</sub>	V
f <sub>OSC</sub>	Oscillator Frequency	10V	R <sub>OSC</sub> =330kΩ	—	100	—	kHz
R <sub>TE</sub>	TE Pull-low Resistance	5V	V <sub>TE</sub> =5V	—	1.5	3	MΩ
R <sub>DATA</sub>	D12~D17 Pull-low Resistance	5V	V <sub>DATA</sub> =5V	—	1.5	3	MΩ

**Functional Description**

**Operation**

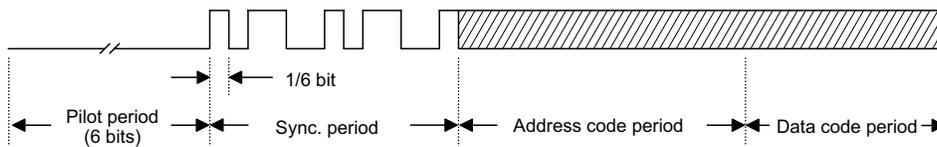
The 3<sup>18</sup> series of encoders begins a three-word transmission cycle upon receipt of a transmission enable (TE for the HT600/HT680 or D12~D15 for the HT6207, active high). This cycle will repeat itself as long as the transmission enable (TE or D12~D15) is held high. Once the transmission enable falls low, the encoder output completes its final cycle and then stops as shown below.



Transmission timing

**Information Word**

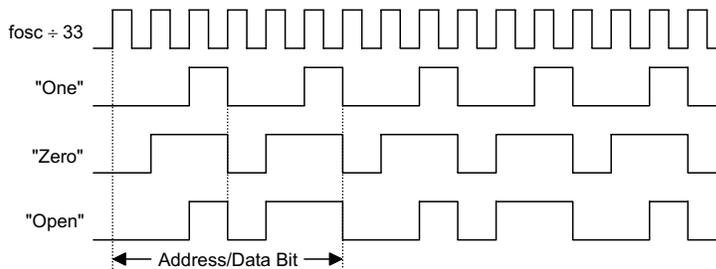
An information word consists of four periods as shown:



Composition of information

**Address/Data Waveform**

Each programmable address/data pin can be externally set to one of the following three logic states:



Address/Data bit waveform

The "Open" state data input is interpreted as logic low by the decoders since the decoder output only have two states.

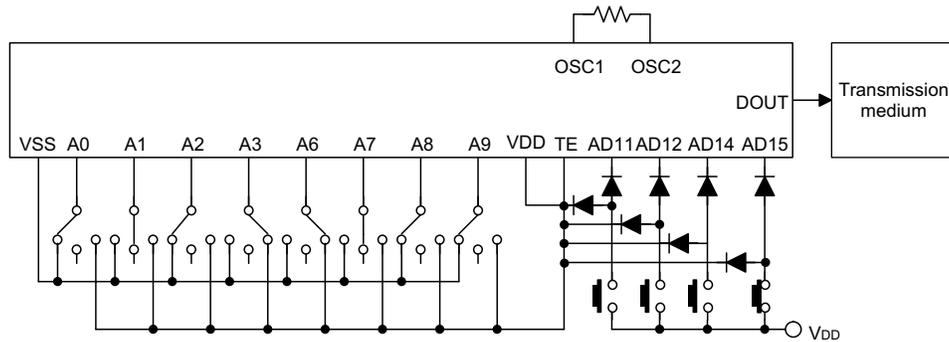
**Address/Data Programming (Preset)**

The status of each address/data pin can be individually preset to logic "high", "low", or "floating". If a transmission enable signal is applied, the encoder scans and transmits the status of the 18 bits of address/data serially in the order A0 to AD17 for the HT600/HT680 and A0 to D15 for the HT6207.

There are some packaging limitations. For example the 18-pin DIP HT680, offers four external data bits and eight external address bits. The remaining unpackaged bits or dummy codes are treated as floating for A0~AD17 or as pull-low for D12~D15. During an information transmission these bits are still located in their original position. But if the trigger signal is not applied, the chip only consumes a standby current which is less than 1μA.

The address pins are usually preset to transmit data codes with particular security codes by the DIP switches or PCB wiring, while the data is selected using push buttons or electronic switches.

The following figure shows an application using the HT680:



The transmitted information is as shown:

<b>Pilot &amp; Sync.</b>	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	AD10	AD11
	0	Z	0	1	Z	Z	1	Z	0	0	Z	Z
—	AD12	AD13	AD14	AD15	AD16	AD17						
	Z	Z	Z	1	Z	Z						

Z: floating

#### Address/Data Sequence

The following provides a table of address/data sequence for various models of the 3<sup>18</sup> series encoders.

Part No.	Address/Data Bits											
	0~3	4	5	6~9	10	11	12	13	14	15	16	17
HT600	A0~A3	A4	—	A6~A9	—	AD11	AD12	AD13	AD14	AD15	—	—
HT680	A0~A3	—	—	A6~A9	—	AD11	AD12	—	AD14	AD15	—	—
HT6207	A0~A3	A4	—	A6~A9	—	A11	D12	D13	D14	D15	==	==

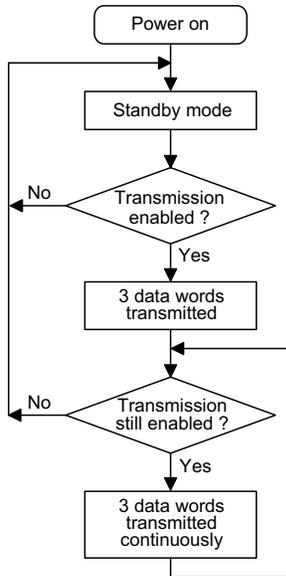
Note: "—" is a dummy code which is left "open" and not bonded out.

"==" is a dummy code which is set low and not bonded out.

#### Transmission Enable

For the TE trigger type of encoders, transmission is enabled by applying a high signal to the TE pin. But for the Data trigger type of encoders, it is enabled by applying a high signal to one of the data pins D12~D15.

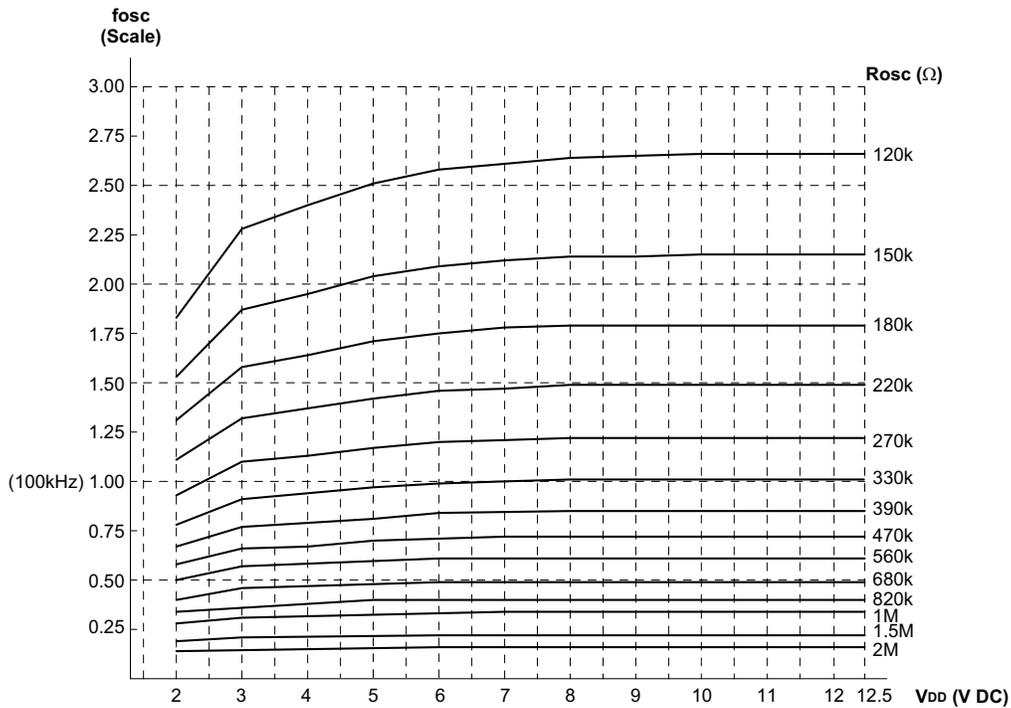
Flowchart



Note: D12~D15 are transmission enables of the HT6207.

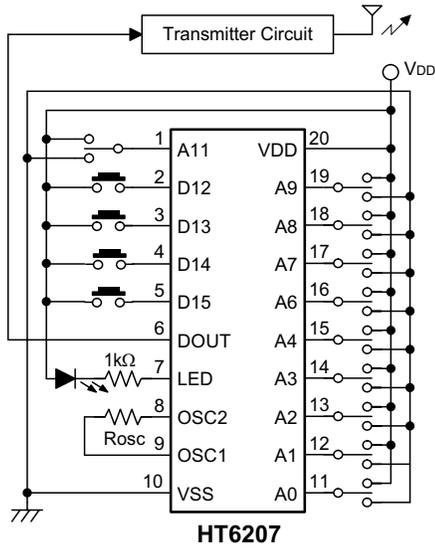
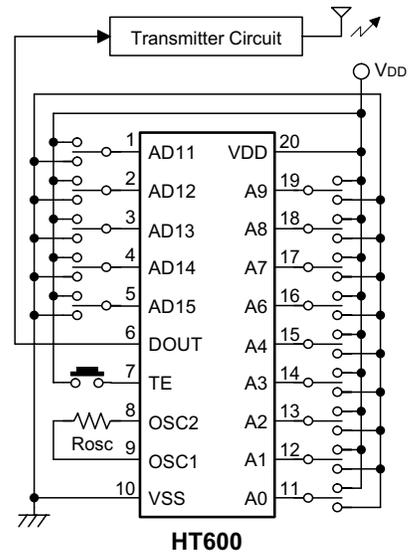
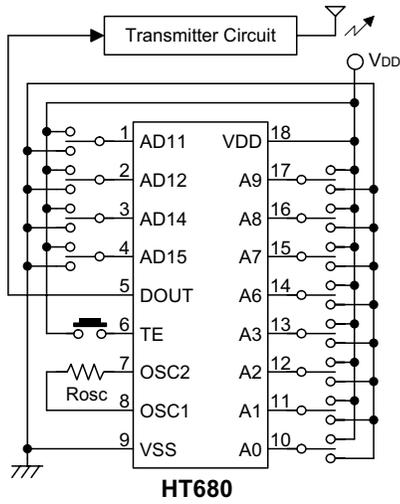
TE is the transmission enable of the HT600/HT680.

Oscillator Frequency vs. Supply Voltage



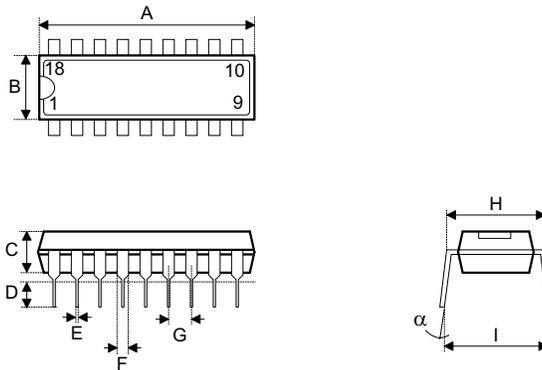
The recommended oscillator frequency is  $f_{OSC D} \text{ (decoder)} \cong f_{OSC E} \text{ (encoder)}$

**Application Circuits**



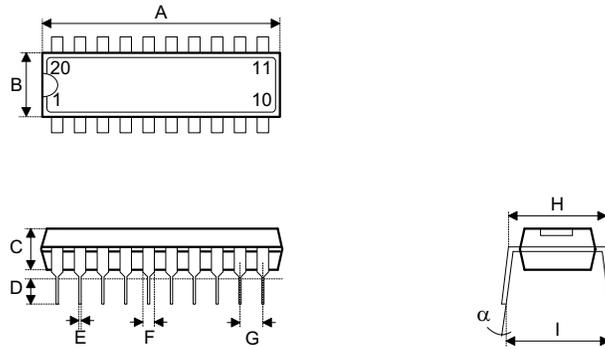
**Package Information**

**18-pin DIP (300mil) Outline Dimensions**



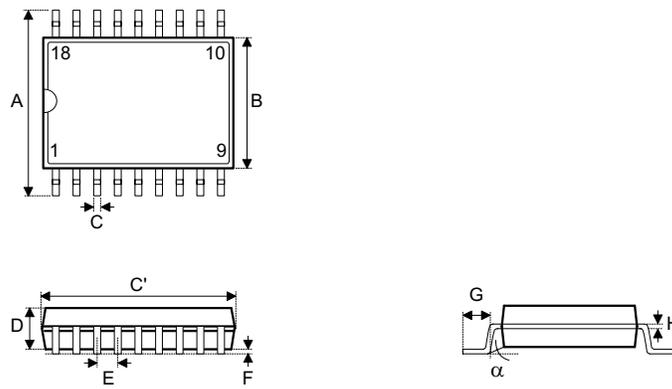
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	895	—	915
B	240	—	260
C	125	—	135
D	125	—	145
E	16	—	20
F	50	—	70
G	—	100	—
H	295	—	315
I	335	—	375
$\alpha$	0°	—	15°

**20-pin DIP (300mil) Outline Dimensions**



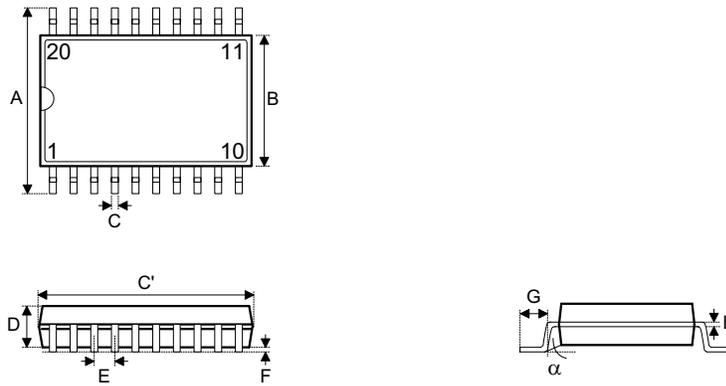
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	1020	—	1045
B	240	—	260
C	125	—	135
D	125	—	145
E	16	—	20
F	50	—	70
G	—	100	—
H	295	—	315
I	335	—	375
$\alpha$	0°	—	15°

**18-pin SOP (300mil) Outline Dimensions**



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	394	—	419
B	290	—	300
C	14	—	20
C'	447	—	460
D	92	—	104
E	—	50	—
F	4	—	—
G	32	—	38
H	4	—	12
$\alpha$	0°	—	10°

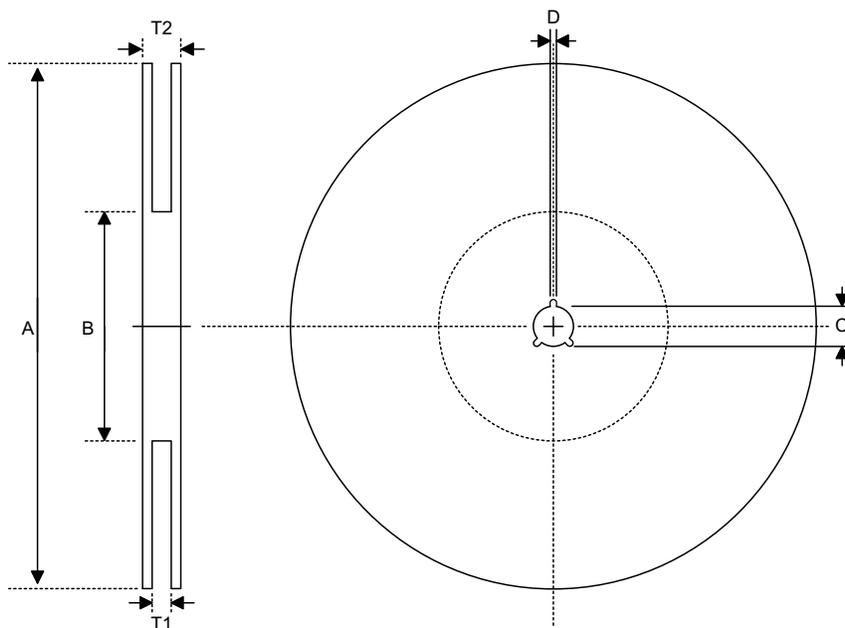
**20-pin SOP (300mil) Outline Dimensions**



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	394	—	419
B	290	—	300
C	14	—	20
C'	490	—	510
D	92	—	104
E	—	50	—
F	4	—	—
G	32	—	38
H	4	—	12
$\alpha$	0°	—	10°

**Product Tape and Reel Specifications**

**Reel Dimensions**

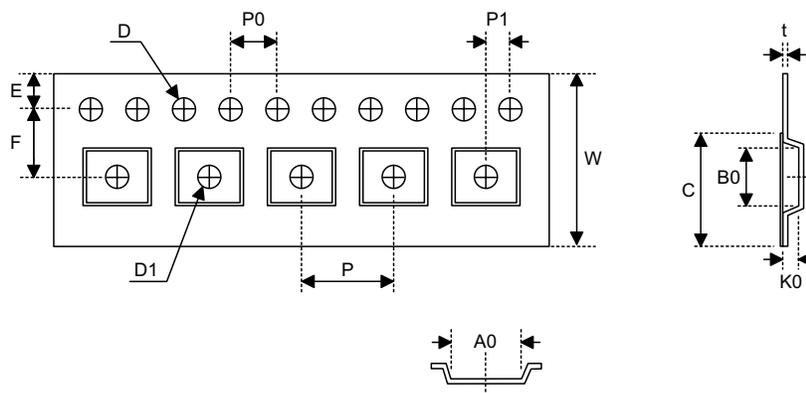


**SOP 18W**

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	330±1.0
B	Reel Inner Diameter	62±1.5
C	Spindle Hole Diameter	13.0+0.5 -0.2
D	Key Slit Width	2.0±0.5
T1	Space Between Flange	24.8+0.3 -0.2
T2	Reel Thickness	30.2±0.2

**SOP 20W**

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	330±1.0
B	Reel Inner Diameter	62±1.5
C	Spindle Hole Diameter	13.0+0.5 -0.2
D	Key Slit Width	2.0±0.5
T1	Space Between Flange	24.8+0.3 -0.2
T2	Reel Thickness	30.2±0.2

**Carrier Tape Dimensions**

**SOP 18W**

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	24.0+0.3 -0.1
P	Cavity Pitch	16.0±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	11.5±0.1
D	Perforation Diameter	1.5±0.1
D1	Cavity Hole Diameter	1.5+0.25
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.1
A0	Cavity Length	10.9±0.1
B0	Cavity Width	12.0±0.1
K0	Cavity Depth	2.8±0.1
t	Carrier Tape Thickness	0.3±0.05
C	Cover Tape Width	21.3

**SOP 20W**

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	24.0+0.3 -0.1
P	Cavity Pitch	12.0±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	11.5±0.1
D	Perforation Diameter	1.5±0.1
D1	Cavity Hole Diameter	1.5+0.25
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.1
A0	Cavity Length	10.8±0.1
B0	Cavity Width	13.3±0.1
K0	Cavity Depth	3.2±0.1
t	Carrier Tape Thickness	0.3±0.05
C	Cover Tape Width	21.3

**Holtek Semiconductor Inc. (Headquarters)**

No.3, Creation Rd. II, Science Park, Hsinchu, Taiwan  
Tel: 886-3-563-1999  
Fax: 886-3-563-1189  
<http://www.holtek.com.tw>

**Holtek Semiconductor Inc. (Taipei Sales Office)**

4F-2, No. 3-2, YuanQu St., Nankang Software Park, Taipei 115, Taiwan  
Tel: 886-2-2655-7070  
Fax: 886-2-2655-7373  
Fax: 886-2-2655-7383 (International sales hotline)

**Holtek Semiconductor Inc. (Shanghai Sales Office)**

7th Floor, Building 2, No.889, Yi Shan Rd., Shanghai, China 200233  
Tel: 021-6485-5560  
Fax: 021-6485-0313  
<http://www.holtek.com.cn>

**Holtek Semiconductor Inc. (Shenzhen Sales Office)**

43F, SEG Plaza, Shen Nan Zhong Road, Shenzhen, China 518031  
Tel: 0755-8346-5589  
Fax: 0755-8346-5590  
ISDN: 0755-8346-5591

**Holtek Semiconductor Inc. (Beijing Sales Office)**

Suite 1721, Jinyu Tower, A129 West Xuan Wu Men Street, Xicheng District, Beijing, China 100031  
Tel: 010-6641-0030, 6641-7751, 6641-7752  
Fax: 010-6641-0125

**Holmate Semiconductor, Inc. (North America Sales Office)**

46712 Fremont Blvd., Fremont, CA 94538  
Tel: 510-252-9880  
Fax: 510-252-9885  
<http://www.holmate.com>

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