

## Description

The EST6105 is designed with a pulse-width-modulation control circuit, 2 sets of TL431 and a complete power supervisor for use in the switched mode power supply. It contains various functions, like under voltage protection (UVP), over voltage protection (OVP), power good output (PG) and ON/OFF control (REM).

UVP (Under voltage protection) function is for +3.3V, +5V, +12V voltages.

OVP (Over voltage protection) function is for +3.3V, +5V, +12V voltages.

OPP (Over power protection), NVP (Negative voltage protection) are over power and negative voltages.

UVAC (Under voltage AC protection) is for the main AC under voltage check or fail detection.

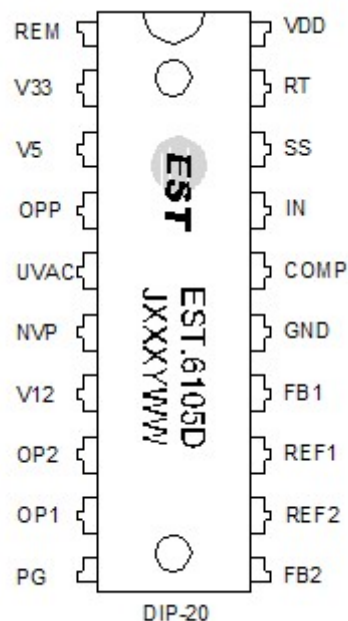
PG (Power good signal) is a safe operation signal to inform the external parts.

REM (Remote on/off) is used to control the SMPS on/off.

The REM control signal has the on/off transferred debounce time.

2 sets of TL431 shunt regulators are for stable reference voltage outputs. Push-pull PWM output and soft start function are supported.

## Pin Configuration (Top View)



## Features

- 3-channel under voltage protection (UVP)
- 3-channel over voltage protection (OVP)
- 1-channel over voltage protection (OPP)
- 1-channel negative voltage protection (NVP)
- 1-channel under voltage AC protection (UVAC)
- Remote on/off control function with debounce time (REM)
- Dual output for push-pull operation (OP1/OP2)
- Soft start capability by external capacitor (SS)
- 2 sets of internal TL431 shunt regulators

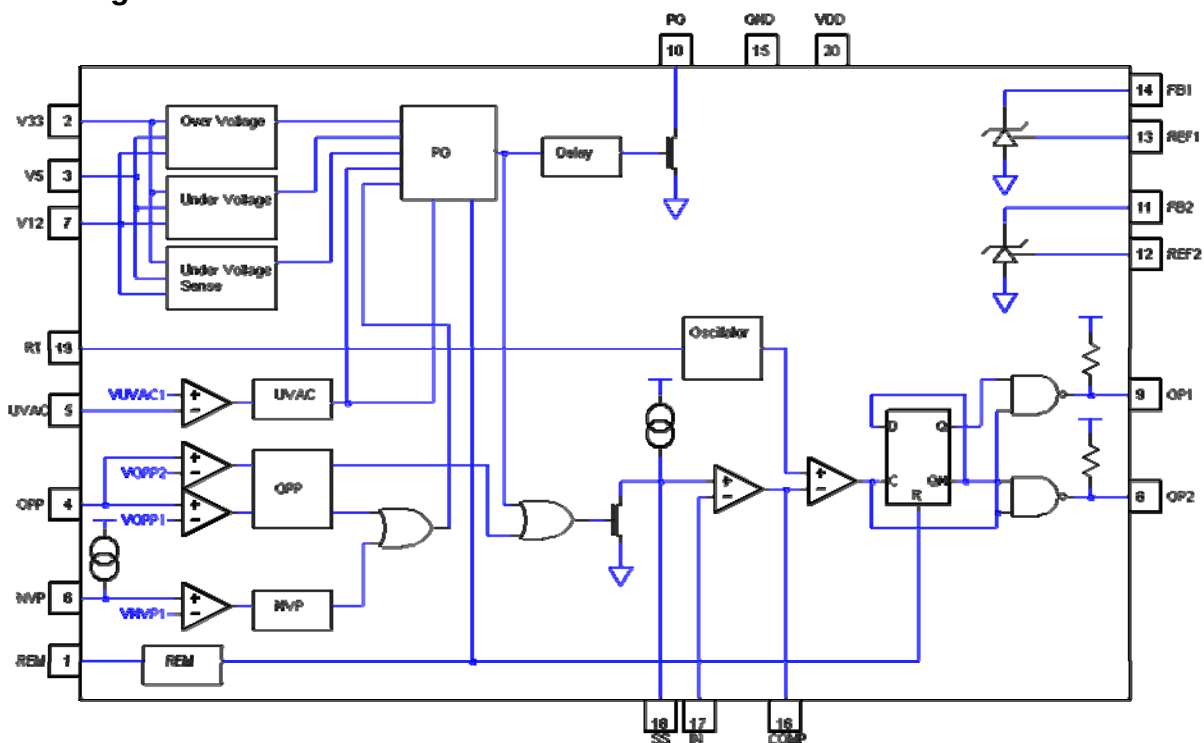
## Ordering Information

| Order Number | Package        | Packing | Top Marking |
|--------------|----------------|---------|-------------|
| EST6105D20   | PDIP-20 (RoHS) | Tube    | EST6105D    |

## Pin Description

| Pin | Symbol | Type   | Function                                                                                                    |
|-----|--------|--------|-------------------------------------------------------------------------------------------------------------|
| 1   | REM    | Input  | Remote ON/OFF control input                                                                                 |
| 2   | V33    | Input  | OVP, UVP sense input for +3.3V                                                                              |
| 3   | V5     | Input  | OVP, UVP sense input for +5V                                                                                |
| 4   | OPP    | Input  | Over power protection sense input                                                                           |
| 5   | UVAC   | Input  | AC Under voltage or fail detection sense input                                                              |
| 6   | NVP    | Input  | Negative voltage detection sense input                                                                      |
| 7   | V12    | Input  | OVP, UVP sense input for +12V                                                                               |
| 8   | OP2    | Output | Push-pull PWM output-2 and are enabled low                                                                  |
| 9   | OP1    | Output | Push-pull PWM output-1 and are enabled low                                                                  |
| 10  | PG     | Output | Power good output (open-drain). PG=1 means the power is good to work.                                       |
| 11  | FB2    | Output | Cathode2 of 2 <sup>nd</sup> TL431-2                                                                         |
| 12  | REF2   | Input  | Reference2 of 2 <sup>nd</sup> TL431-2                                                                       |
| 13  | REF1   | Input  | Reference1 of 1 <sup>st</sup> TL431-2                                                                       |
| 14  | FB1    | Output | Cathode1 of 1 <sup>st</sup> TL431                                                                           |
| 15  | GND    | Power  | Ground                                                                                                      |
| 16  | COMP   | Output | Error amplifier output                                                                                      |
| 17  | IN     | Input  | Error amplifier (-) input                                                                                   |
| 18  | SS     | Input  | Error amplifier (+) input clamped at 2.5V and the Soft start function is setting through external capacitor |
| 19  | RT     | Input  | Oscillation frequency is setting through external resistor                                                  |
| 20  | VDD    | Power  | Supply voltage                                                                                              |

## Block Diagram



**Absolute Maximum Ratings**

| Parameter                   | Symbol                                      | Min. | Max. | Units |
|-----------------------------|---------------------------------------------|------|------|-------|
| Supply Voltage              | V <sub>DD</sub>                             | -0.3 | 7    | V     |
| Input Voltage               | V33,V5,REMB,OPP,NVP,UVAC,RT,SS,IN,REF1,REF2 | -0.3 | 7    | V     |
| Input Voltage               | V12                                         | -0.3 | 15   | v     |
| Output Voltage              | OP1,OP2,PG,COMP                             | -0.3 | 7    | V     |
| Output Voltage              | FB1,FB2                                     | -0.3 | 15   | V     |
| Operating Temperature Range | T <sub>O</sub>                              | -25  | +85  | °C    |
| Storage Temperature Range   | T <sub>S</sub>                              | -65  | 150  | °C    |

**Recommend Operation Conditions**

| Parameter                   | Symbol          | Min. | Max. | Units |
|-----------------------------|-----------------|------|------|-------|
| Supply Voltage              | V <sub>DD</sub> | 4.5  | 5.5  | V     |
| Shunt Regulator Cathode     | FB1,FB2         | 4    | 16   | V     |
| Operating Temperature Range | T <sub>A</sub>  | -25  | +85  | °C    |

**Electrical Characteristics** (For V<sub>DD</sub> = 5V and T<sub>j</sub> = 25 °C)

| Parameter                                           | Symbol          | Conditions | Min. | Typ. | Max. | Units |
|-----------------------------------------------------|-----------------|------------|------|------|------|-------|
| <b>Over Voltage Protection (OVP- V33, V5, V12)</b>  |                 |            |      |      |      |       |
| Over Voltage Threshold                              | OV33            |            | 3.8  | 4.1  | 4.4  | V     |
|                                                     | OV5             |            | 5.8  | 6.2  | 6.6  | V     |
|                                                     | OV12            |            | 13.8 | 14.6 | 15.0 | V     |
| Noise Debounce Time                                 | Tg.ovp          |            | -    | 0.5  | -    | ms    |
| <b>Under Voltage Protection (UVP- V33, V5, V12)</b> |                 |            |      |      |      |       |
| Under Voltage Threshold                             | UV33            |            | 1.9  | 2.6  | 2.9  | V     |
|                                                     | UV5             |            | 2.9  | 3.6  | 4.0  | V     |
|                                                     | UV12            |            | 5.9  | 7.2  | 8.0  | V     |
| Noise Debounce Time                                 | Tg.uvp          |            | -    | 2.0  | -    | ms    |
| <b>Under Voltage Sense (UVS- V33, V5, V12)</b>      |                 |            |      |      |      |       |
| Under Voltage Sense                                 | US33            |            | 2.4  | 2.8  | 3.1  | V     |
|                                                     | US5             |            | 3.9  | 4.3  | 4.6  | V     |
|                                                     | US12            |            | 9.3  | 10.1 | 10.5 | V     |
| Noise Debounce Time                                 | Tg.uvs          |            | -    | 1.0  | -    | ms    |
| <b>Over Power Protection (OPP)</b>                  |                 |            |      |      |      |       |
| Over Power Protection                               | OPP             |            | 2.0  | 2.4  | 2.7  | V     |
| Noise Debounce Time                                 | Tg.opp          |            | 3    | 8    | 12   | ms    |
| <b>Negative Voltage (NVP)</b>                       |                 |            |      |      |      |       |
| Negative Voltage Protection                         | NVP             |            | 2.0  | 2.1  | 2.2  | V     |
| NVP Source Current                                  | Invp            |            | 55   | 64   | 74   | uA    |
| Noise Debounce Time                                 | Tg.nvp          |            | 3    | 8    | 12   | ms    |
| <b>REM Input Pin (REM)</b>                          |                 |            |      |      |      |       |
| High Level Input Voltage                            | V <sub>IH</sub> |            | 1.8  | -    | -    | V     |
| Low Level Input Voltage                             | V <sub>IL</sub> |            | -    | -    | 0.7  | V     |
| REM ON Delay Time                                   | Td.on           | RT=75 KΩ   | -    | 33   | -    | ms    |
| REM OFF Delay Time                                  | Td.off          | RT=75 KΩ   | -    | 16   | -    | ms    |
| PG Low to Power Off                                 | Td.pf           |            | -    | 5    | -    | ms    |
| <b>Power Good (PG) and AC Detect (UVAC)</b>         |                 |            |      |      |      |       |
| PG Delay Time                                       | REM on vs. PG   | RT=75 KΩ   | 180  | 280  | 380  | ms    |
| UVAC Sense Voltage                                  | Vuvac           |            | 0.64 | 0.7  | 0.76 | V     |
| Output Load Resistor                                | Rload           |            | 0.5  | 1    | 2    | KΩ    |
| <b>Oscillation Frequency</b>                        |                 |            |      |      |      |       |
| PWM Frequency                                       | Fosc            | RT=75KΩ    | 60   | 65   | 70   | KHz   |

| Parameter                                     | Symbol          | Conditions | Min.  | Typ. | Max.  | Units |
|-----------------------------------------------|-----------------|------------|-------|------|-------|-------|
| Duty Cycle                                    | %               |            | 85    | -    | 92    | %     |
| <b>Error Amplifier (SS, IN, COMP)</b>         |                 |            |       |      |       |       |
| Reference Voltage                             | Vref            |            | 2.47  | 2.5  | 2.53  | V     |
| Open Loop Gain                                | Avo             |            | 55    | 65   | -     | dB    |
| Unity Gain Bandwidth                          | BW              | 0dB        | -     | 0.6  | -     | MHz   |
| Power Supply Rejection Ratio                  | PSRR            |            | 40    | -    | -     | dB    |
| <b>Soft Start (SS)</b>                        |                 |            |       |      |       |       |
| Source Current                                | Isource         | RT=75 KΩ   | -     | 8.5  | -     | uA    |
| <b>PWM Output (OP1, OP2)</b>                  |                 |            |       |      |       |       |
| Output Voltage Low                            | V <sub>OL</sub> |            | -     | -    | 0.5   | V     |
| Output Voltage High                           | V <sub>OH</sub> |            | 4     | -    | -     | V     |
| <b>Shunt Regulator (FB1, REF1, FB2, REF2)</b> |                 |            |       |      |       |       |
| Reference Voltage                             | Vref1, Vref2    |            | 2.475 | 2.5  | 2.525 | V     |
| Open Loop Gain                                | Avo_431         |            | -     | 48   | -     | dB    |
| Output Sink Current                           | Isink           | VFB>2.5    | 10    | -    | -     | mA    |
| <b>Total Device</b>                           |                 |            |       |      |       |       |
| Supply Current                                | I <sub>DD</sub> | REM = 5V   | -     | 4    | -     | mA    |

Fig 1. Cathode Current vs. Cathode Voltage

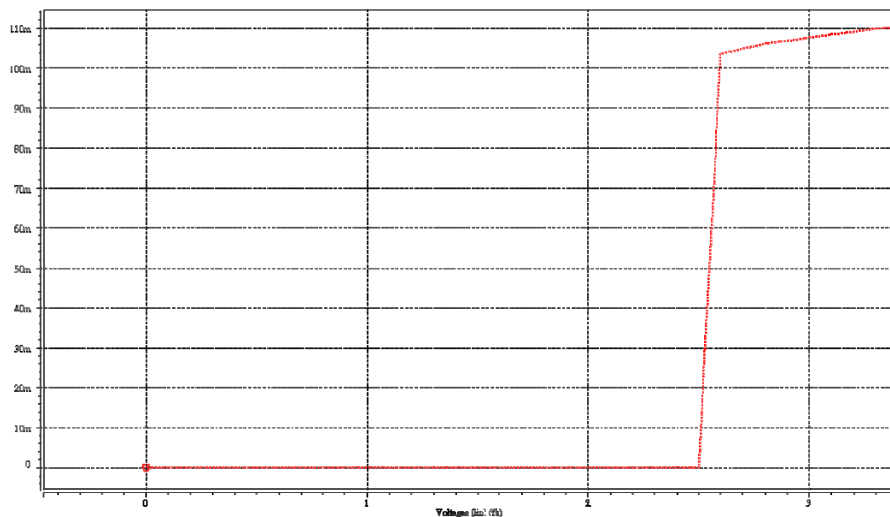


Fig2. Test Circuit 1

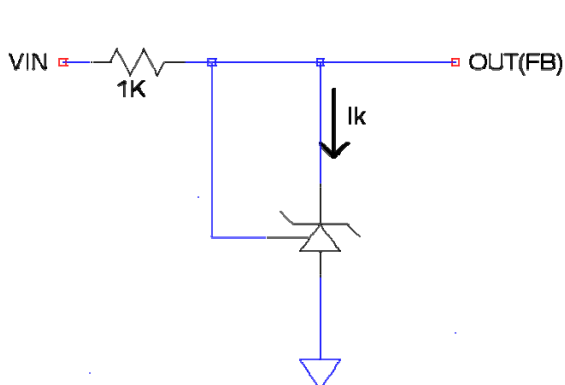
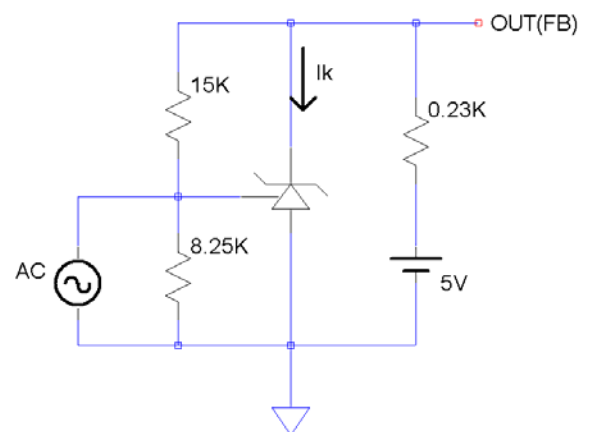
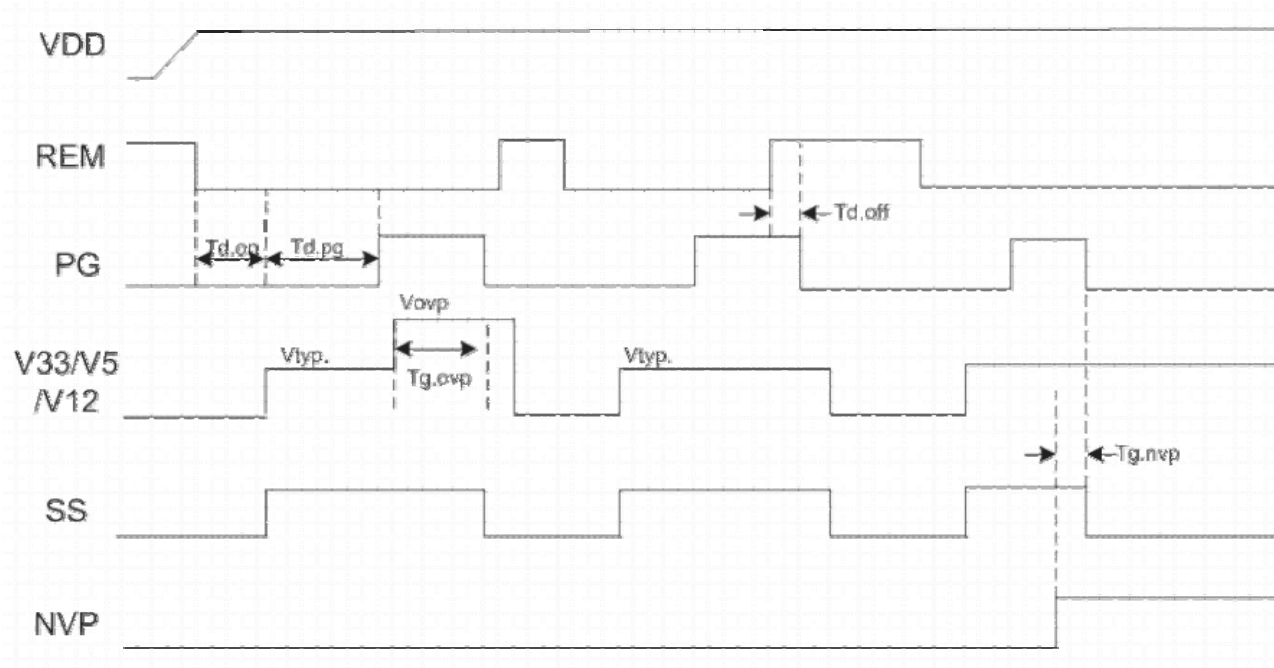


Fig3. Test Circuit 2

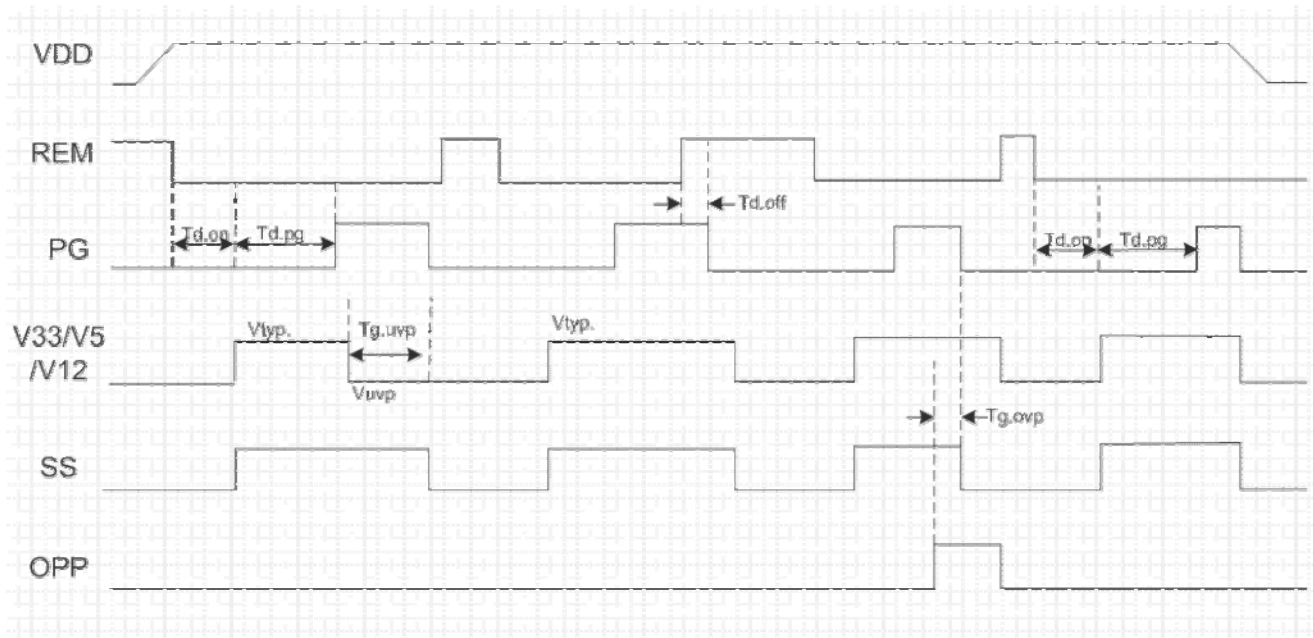


## Timing Diagram

### 1.OVP & NVP



### 2.UVP & OPP



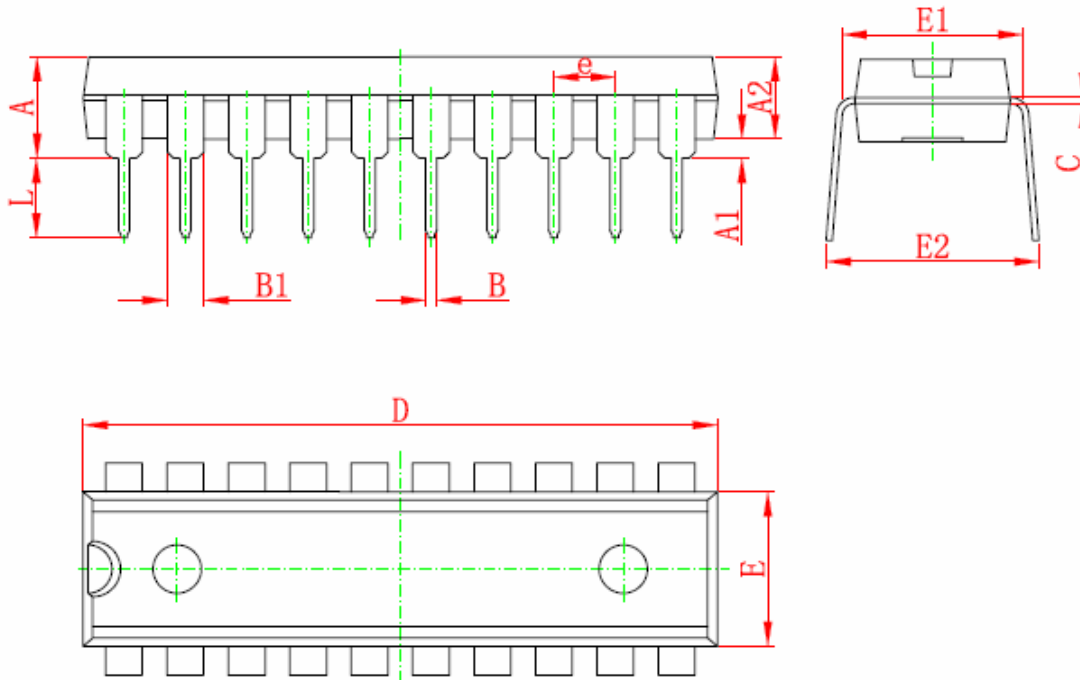
## Package Outlines

Package Dimension

PDIP-20

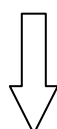
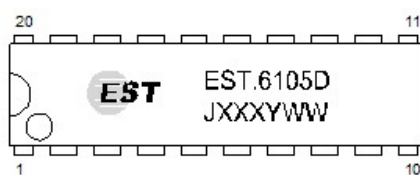
Plastic Dual In-line Package

Unit : inch / mm

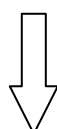
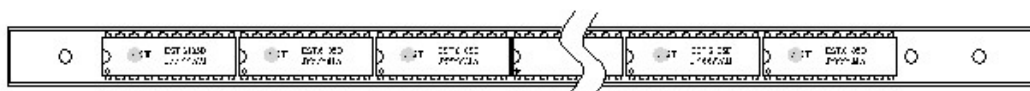


| Symbols | Dimensions In inches |       | Dimensions In millimeters |        |
|---------|----------------------|-------|---------------------------|--------|
|         | Min.                 | Max.  | Min.                      | Max.   |
| A       | -----                | 0.184 | -----                     | 4.674  |
| A1      | 0.014                | ----- | 0.356                     | -----  |
| A2      | 0.119                | 0.150 | 3.023                     | 3.810  |
| B       | 0.013                | 0.023 | 0.330                     | 0.584  |
| B1      | 0.060 (TYP)          |       | 1.524 (TYP)               |        |
| c       | 0.008                | 0.015 | 0.203                     | 0.381  |
| D       | 0.961                | 1.097 | 24.409                    | 27.864 |
| E       | 0.232                | 0.273 | 5.893                     | 6.934  |
| E1      | 0.300 (TYP)          |       | 7.620 (TYP)               |        |
| e       | 0.100 (TYP)          |       | 2.540 (TYP)               |        |
| L       | 0.112                | 0.149 | 2.845                     | 3.785  |
| E2      | 0.307                | 0.393 | 7.798                     | 9.982  |

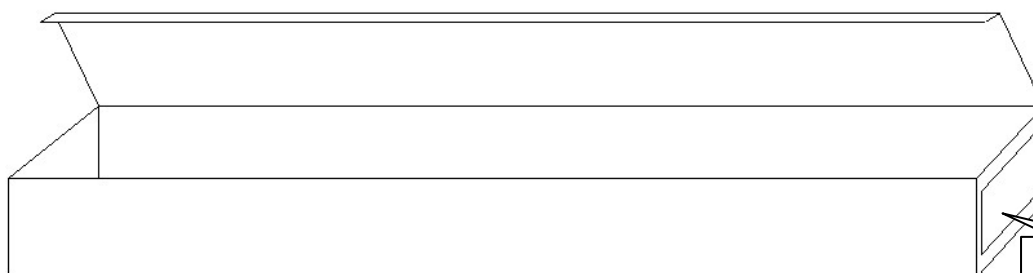
### Packing Sketch Map



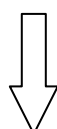
每 18PCS 装 1 管 (18Pcs/管)



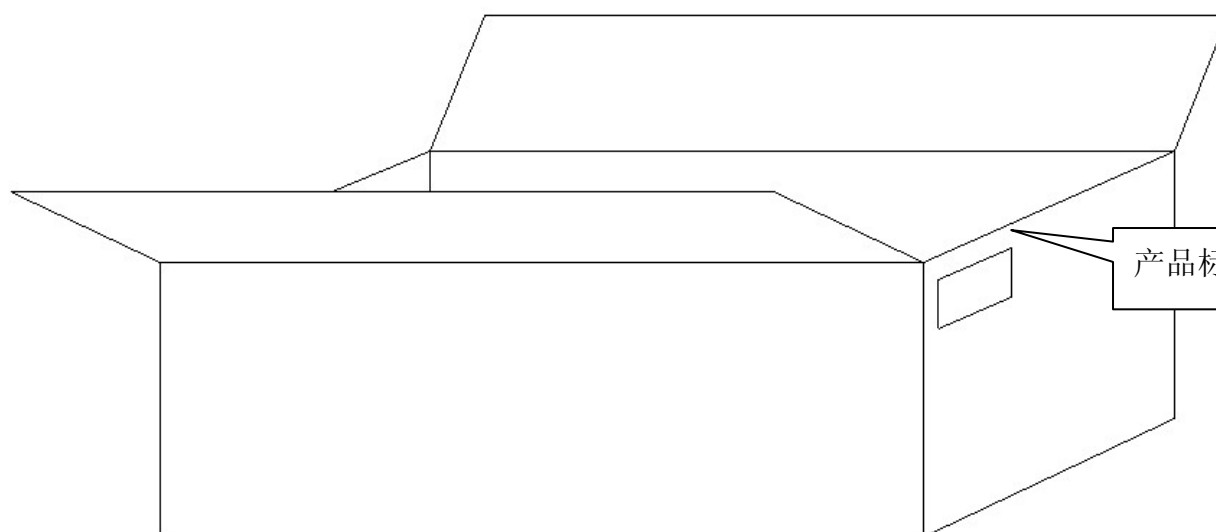
每 40 管装 1 盒 (720Pcs/盒)



产品标贴



每 10 盒装 1 箱 (7,200Pcs/箱)



产品标贴