



DC Input 4-Pin Phototransistor Optocoupler

Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- External Creepage $\geq 7.5\text{mm}$ (S/SL Type)
- External Creepage $\geq 8.0\text{mm}$ (SLM Type)
- Operating temperature range - 55 °C to 100 °C
- Regulatory Approvals
 - UL - UL1577 (E364000)
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC – GB4943.1, GB8898
 - IEC60065, IEC60950

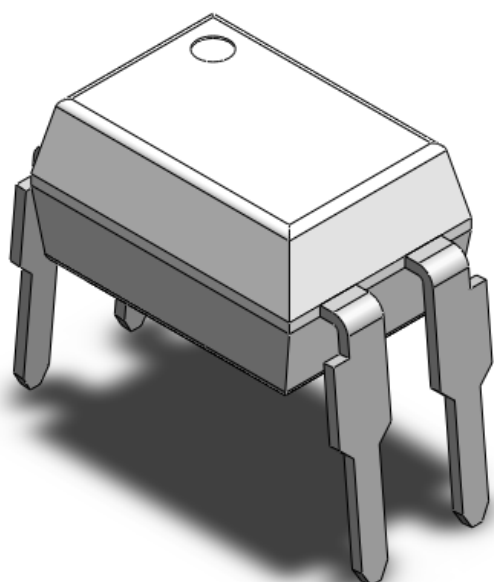
Description

The CT851 series consists of a high power transistor optically coupled to a gallium arsenide Infrared-emitting diode in a 4-lead DIP package different lead forming options.

Applications

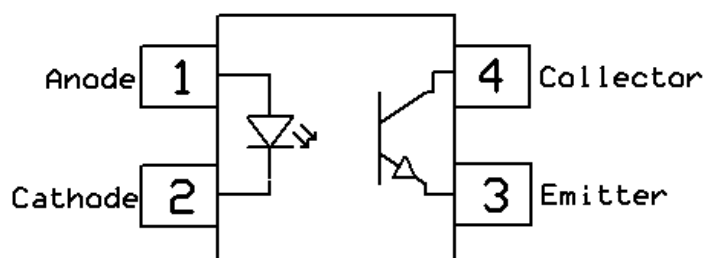
- Switch mode power supplies
- Computer peripheral interface
- Microprocessor system interface

Package Outline



Note: Different lead forming options available. See package dimension.

Schematic



**Absolute Maximum Rating at 25°C**

| Symbol | Parameters | Ratings | Units | Notes |
|-----------------------|--|----------------|------------------|--------------|
| V _{ISO} | Isolation voltage | 5000 | V _{RMS} | |
| P _{TOT} | Total power dissipation | 260 | mW | |
| T _{OPR} | Operating temperature | -55 ~ +100 | °C | |
| T _{STG} | Storage temperature | -55 ~ +150 | °C | |
| T _{SOL} | Soldering temperature | 260 | °C | |
| Emitter | | | | |
| I _F | Forward current | 80 | mA | |
| I _{F(TRANS)} | Peak transient current (≤1μs P.W,300pps) | 1 | A | |
| V _R | Reverse voltage | 6 | V | |
| P _D | Emitter power dissipation | 150 | mW | |
| Detector | | | | |
| P _D | Detector power dissipation | 300 | mW | |
| B _{VCEO} | Collector-Emitter Breakdown Voltage | 350 | V | |
| B _{VECO} | Emitter-Collector Breakdown Voltage | 7 | V | |
| I _C | Collector Current | 100 | mA | |

**Electrical Characteristics** $T_A = 25^\circ\text{C}$ (unless otherwise specified)**Emitter Characteristics**

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|----------|-------------------|-------------------|-----|-----|-----|---------------|-------|
| V_F | Forward voltage | $I_F=10\text{mA}$ | - | 1.2 | 1.4 | V | |
| I_R | Reverse Current | $V_R = 6\text{V}$ | - | - | 5 | μA | |
| C_{IN} | Input Capacitance | $f=1\text{MHz}$ | - | 30 | - | pF | |

Detector Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|---------------|--------------------------------|--|-----|-----|-----|-------|-------|
| $B_{V_{CEO}}$ | Collector-Emitter Breakdown | $I_C = 0.1\text{mA}$ | 350 | - | - | V | |
| $B_{V_{ECO}}$ | Emitter-Collector Breakdown | $I_E = 0.1\text{mA}$ | 7 | - | - | V | |
| I_{CEO} | Collector-Emitter Dark Current | $V_{CE} = 200\text{V}, I_F = 0\text{mA}$ | - | - | 100 | nA | |

Transfer Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|---------------|--------------------------------------|--|--------------------|-----|-----|----------|-------|
| CTR | Current Transfer Ratio | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$ | 50 | - | 600 | % | |
| $V_{CE(SAT)}$ | Collector-Emitter Saturation Voltage | $I_F = 20\text{mA}, I_C = 1\text{mA}$ | - | - | 0.4 | V | |
| R_{IO} | Isolation Resistance | $V_{IO} = 500\text{V}_{DC}$ | 5×10^{10} | - | - | Ω | |
| C_{IO} | Isolation Capacitance | $f = 1\text{MHz}$ | - | 0.5 | 1 | pF | |

Switching Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|--------|------------|---|-----|-----|-----|---------------|-------|
| t_r | Rise Time | $I_C = 2\text{mA}, V_{CE} = 2\text{V}, R_L = 100\Omega$ | - | 6 | - | μs | |
| t_f | Fall Time | | - | 8 | - | | |



Typical Characteristic Curves

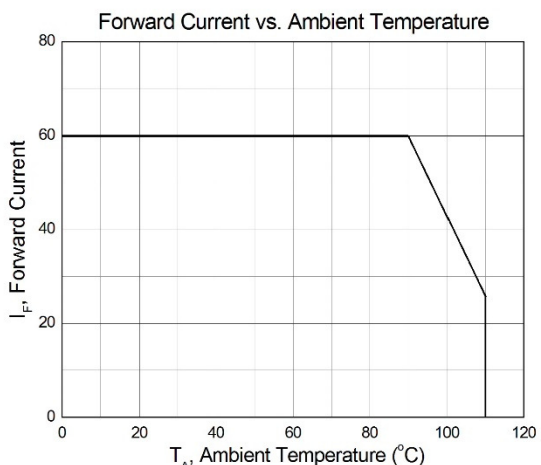


Figure 1

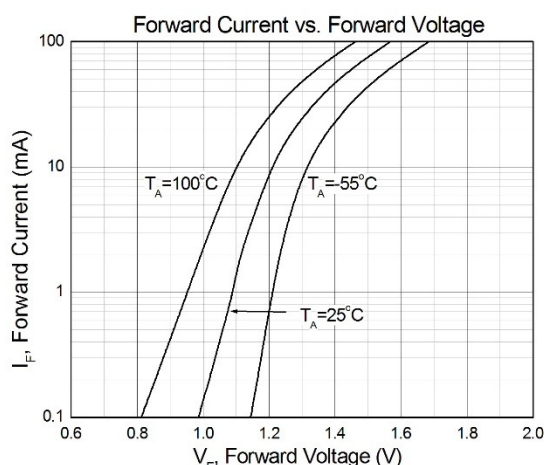


Figure 2

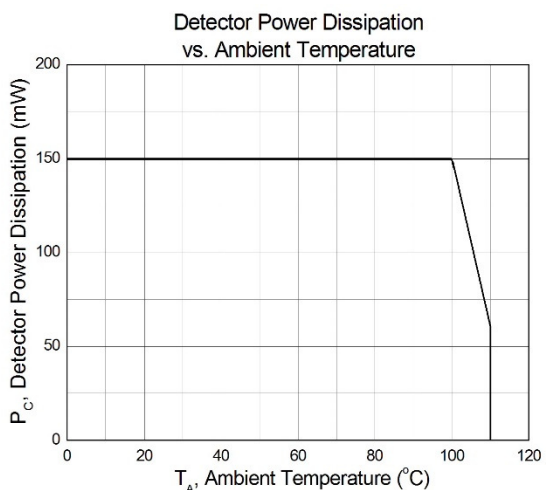


Figure 3

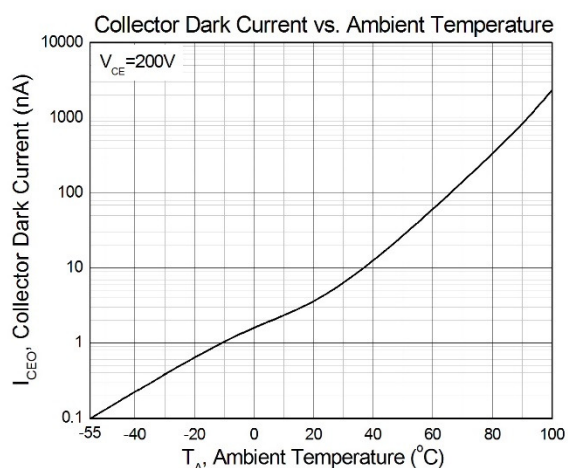


Figure 4

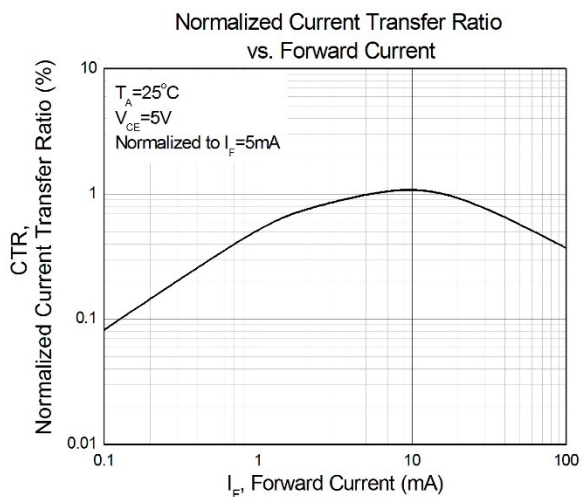


Figure 5

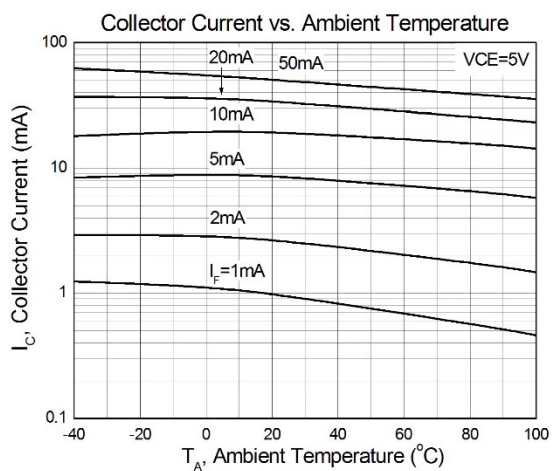


Figure 6

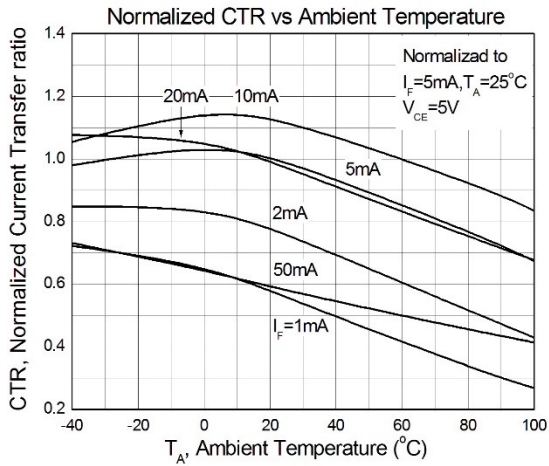


Figure 7

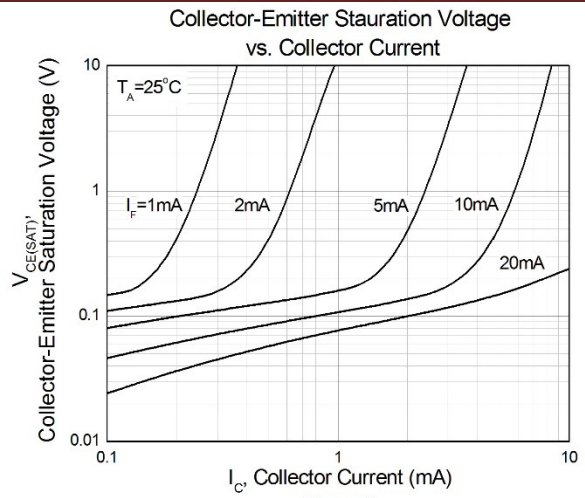


Figure 8

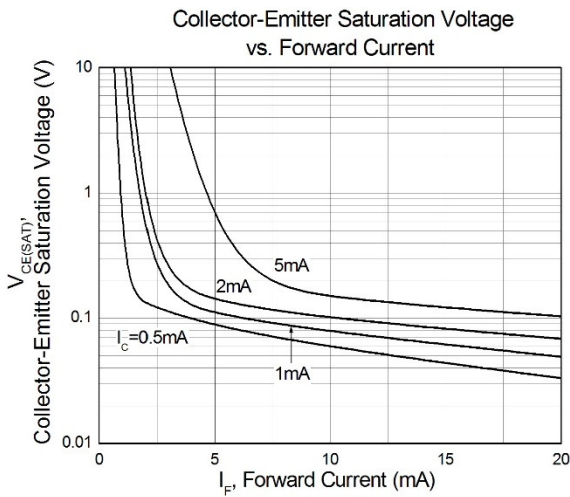


Figure 9

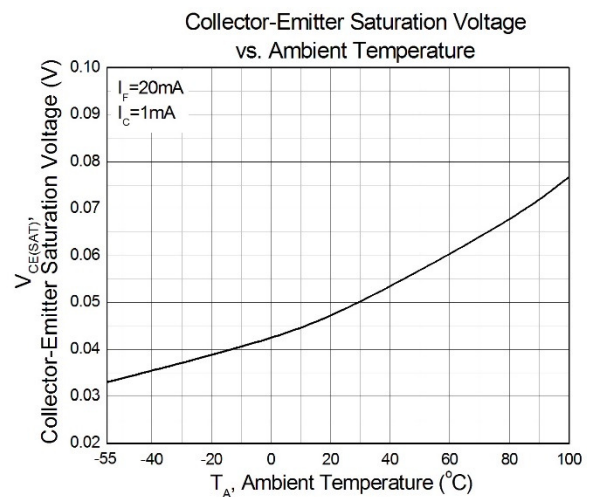


Figure 10

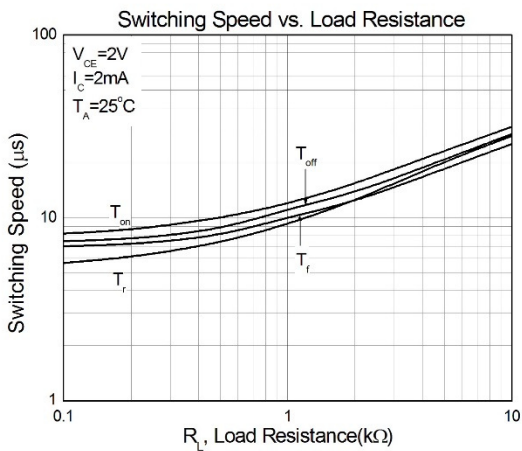


Figure 11



Test Circuit

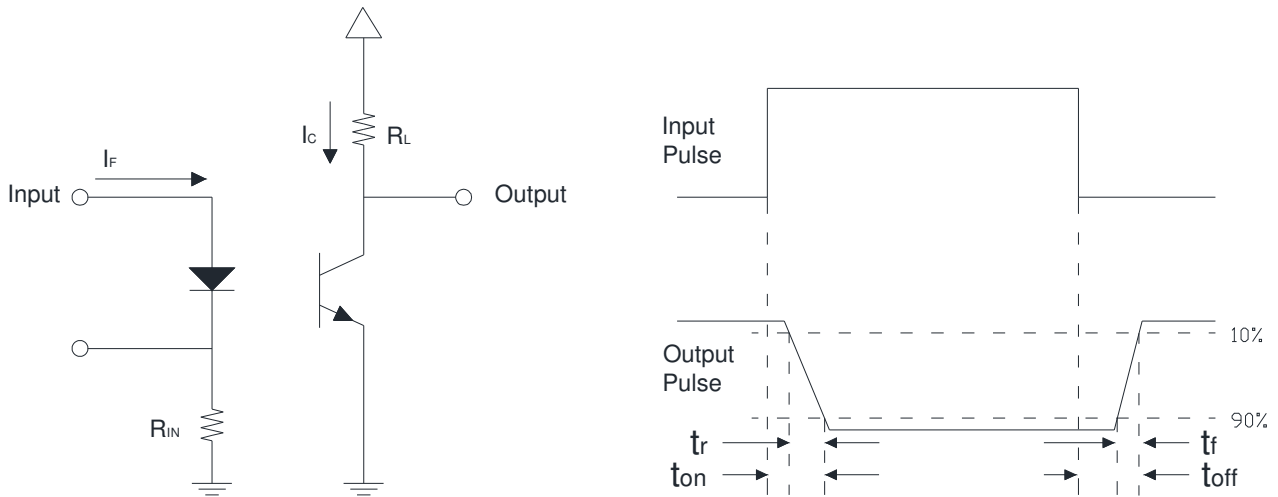
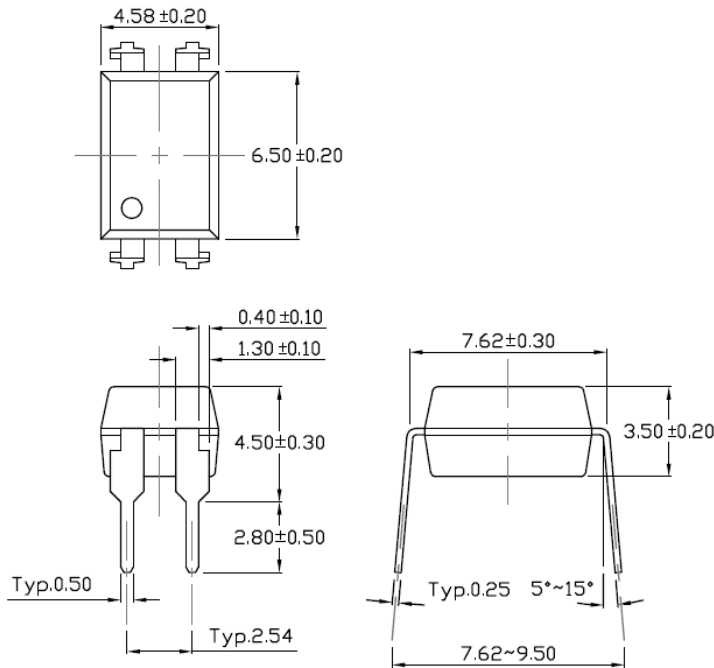


Figure 12: Switching Time Test Circuits

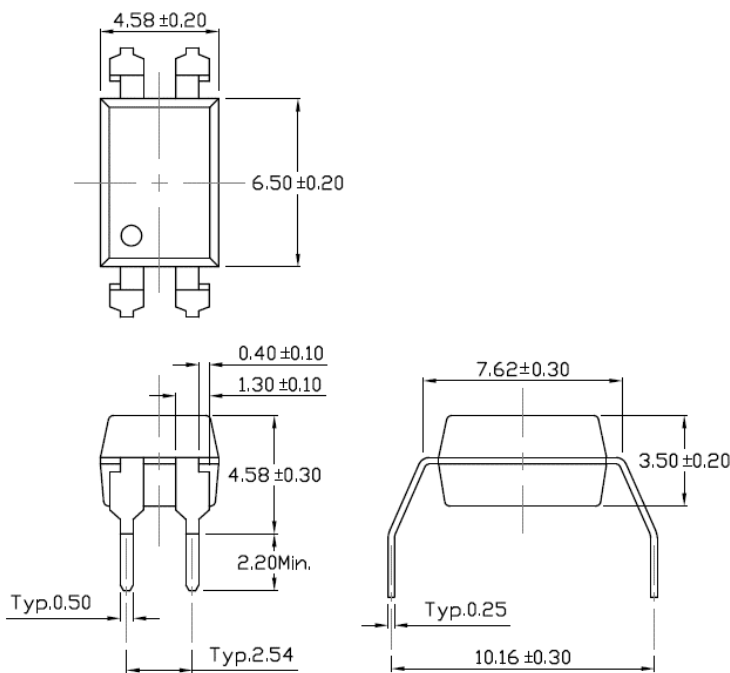


Package Dimension *Dimensions in mm unless otherwise stated*

Standard DIP – Through Hole

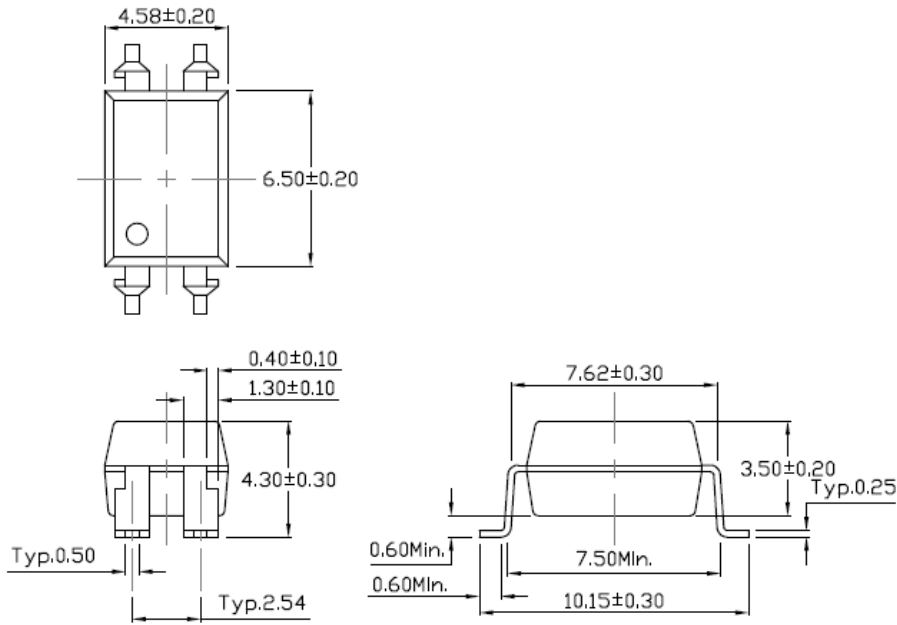


Gullwing (400mil) Lead Forming – Through Hole (M Type)

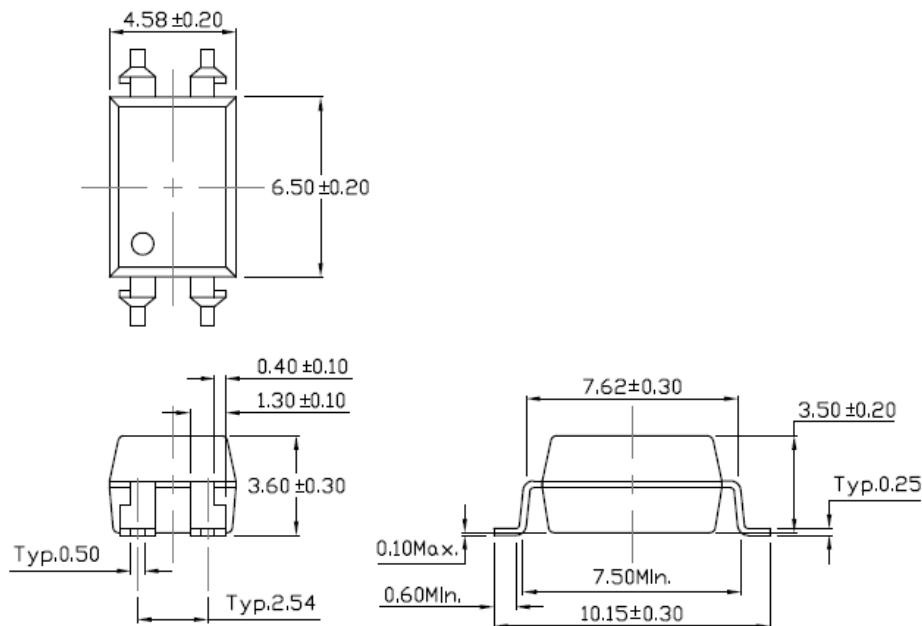




Surface Mount Lead Forming (S Type)

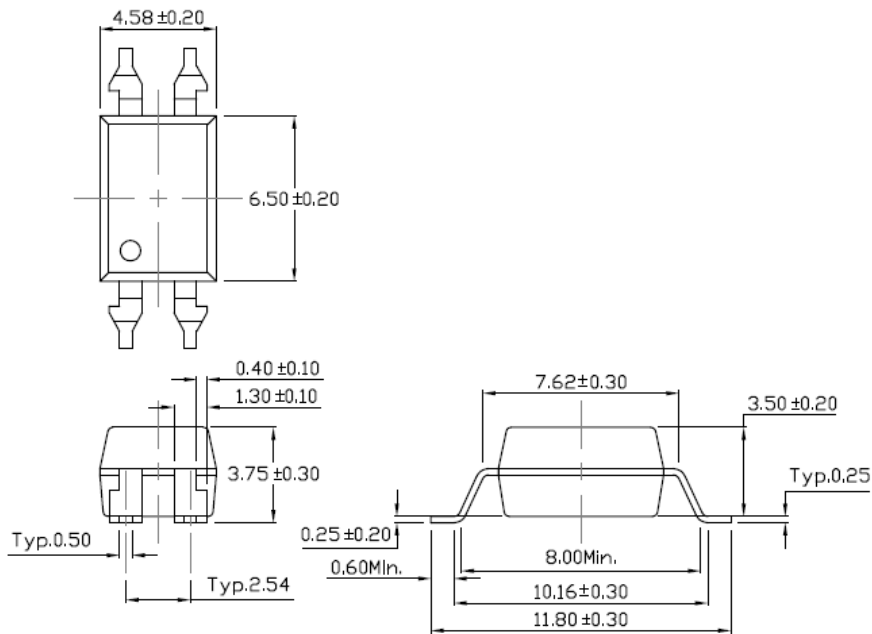


Surface Mount (Low Profile) Lead Forming (SL Type)





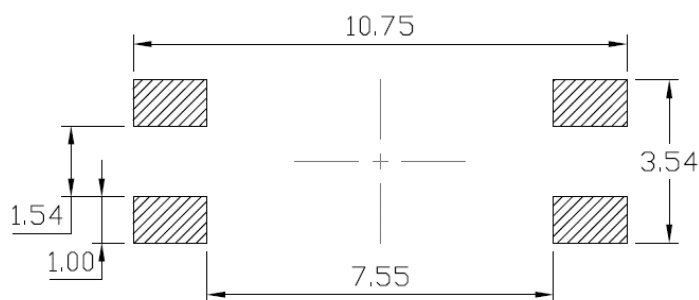
Surface Mount (Gullwing) Lead Forming (SLM Type)



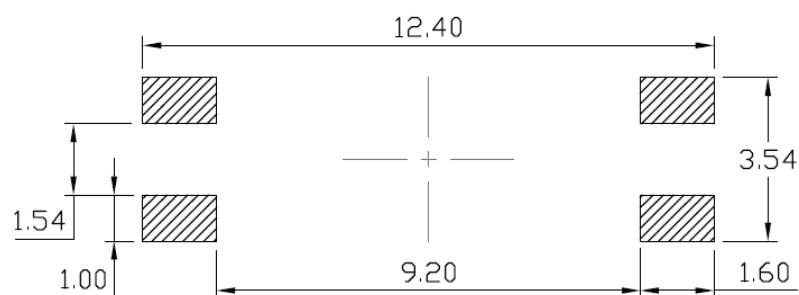


Recommended Solder Mask *Dimensions in mm unless otherwise stated*

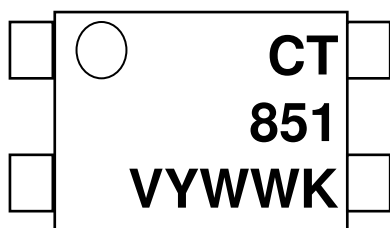
Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming



Surface Mount (Gullwing) Lead Forming



Marking Information



Note:

- CT : Denotes "CT Micro"
- 851 : Part Number
- V : VDE Option
- R : CTR Rank
- Y : Fiscal Year
- WW : Work Week
- K : Manufacturing Code



Ordering Information**CT851(V)(Y)(Z)**

V = VDE Option (V or None)

Y = Lead form option (S, SL, M, SLM or none)

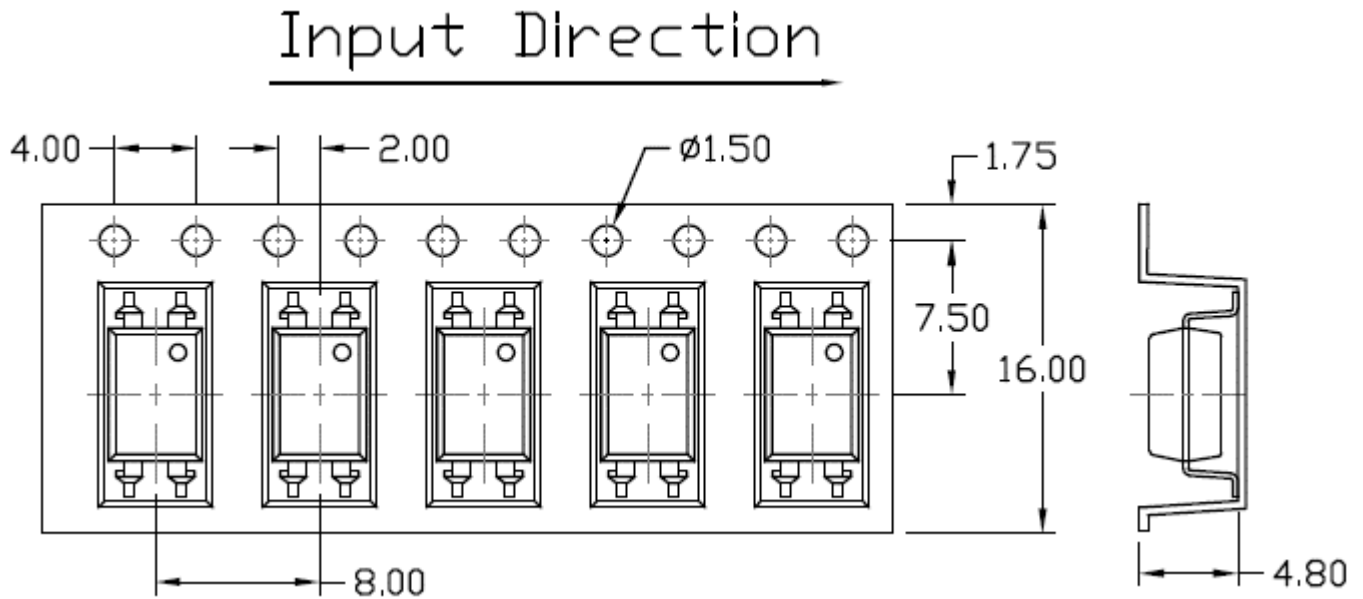
Z = Tape and reel option (T1, T2, T3, T4 or none)

| Option | Description | Quantity |
|---------------|---|-----------------|
| None | Standard 4 Pin Dip | 100 Units/Tube |
| M | Gullwing (400mil) Lead Forming | 100 Units/Tube |
| S(T1) | Surface Mount Lead Forming – With Option 1 Taping | 1500 Units/Reel |
| S(T2) | Surface Mount Lead Forming – With Option 2 Taping | 1500 Units/Reel |
| S(T3) | Surface Mount Lead Forming – With Option 3 Taping | 1000 Units/Reel |
| S(T4) | Surface Mount Lead Forming – With Option 4 Taping | 1000 Units/Reel |
| SL(T1) | Surface Mount (Low Profile) Lead Forming– With Option 1 Taping | 1500 Units/Reel |
| SL(T2) | Surface Mount (Low Profile) Lead Forming – With Option 2 Taping | 1500 Units/Reel |
| SL(T3) | Surface Mount (Low Profile) Lead Forming– With Option 3 Taping | 1000 Units/Reel |
| SL(T4) | Surface Mount (Low Profile) Lead Forming – With Option 4 Taping | 1000 Units/Reel |
| SLM(T1) | Surface Mount (Gullwing) Lead Forming– With Option 1 Taping | 1500 Units/Reel |
| SLM(T2) | Surface Mount (Gullwing) Lead Forming – With Option 2 Taping | 1500 Units/Reel |

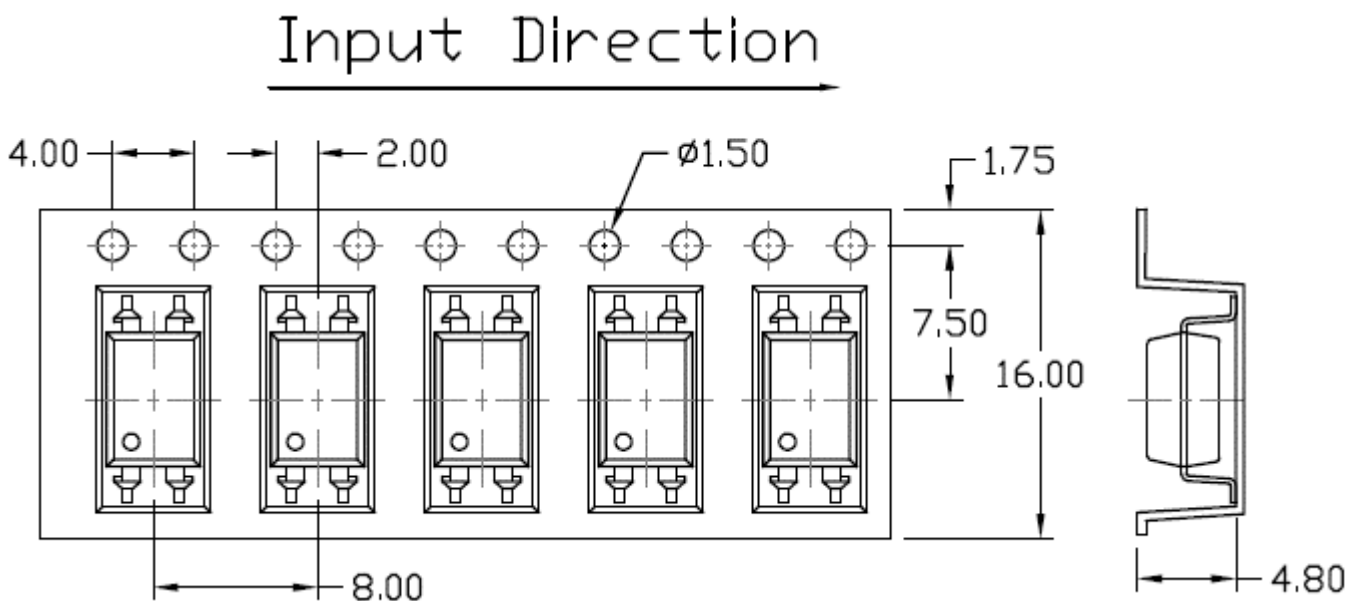


Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

Option S(T1) & SL(T1)

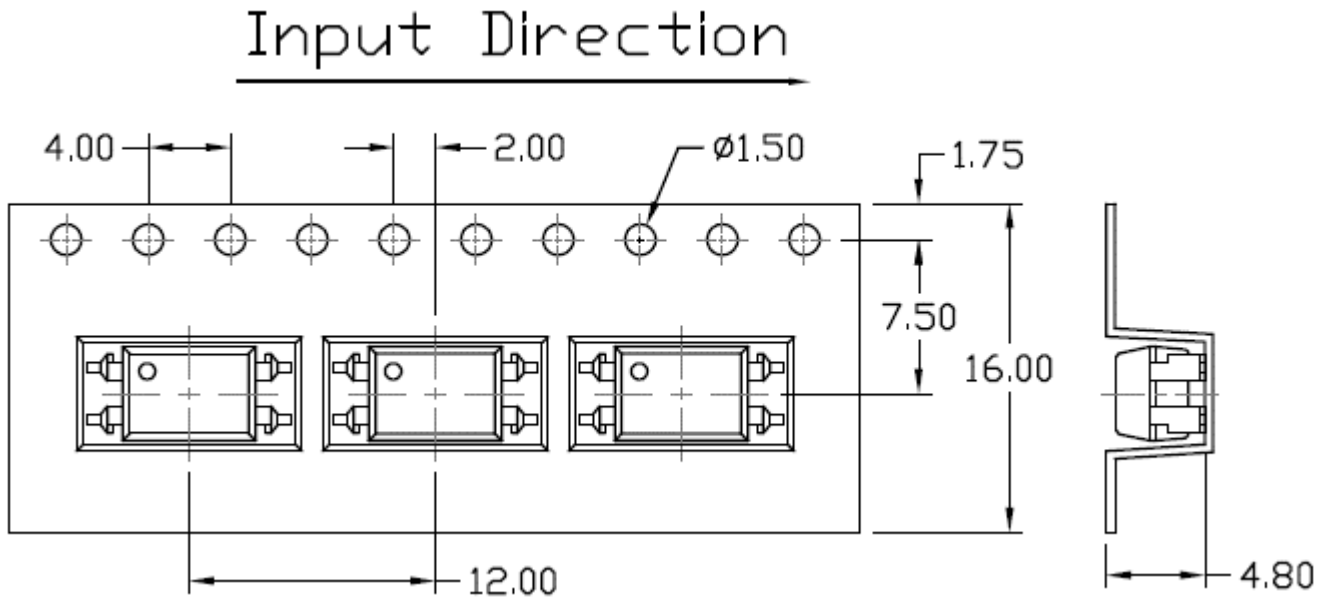


Option S(T2) & SL(T2)

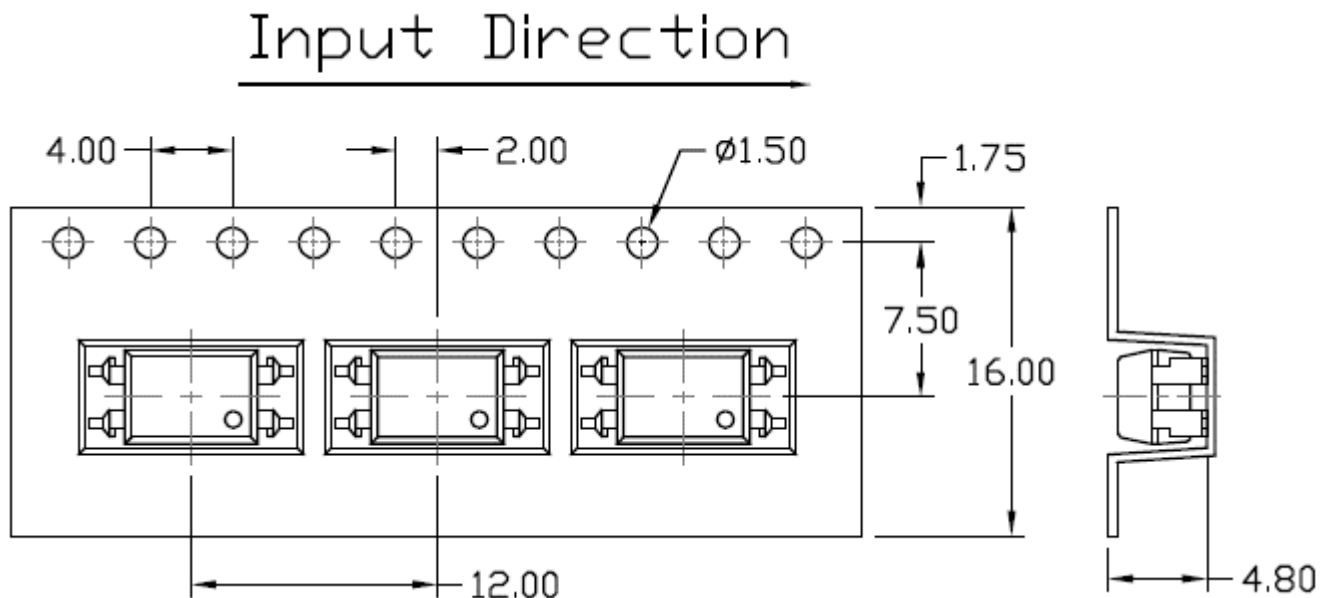




Option S(T3) & SL(T3)



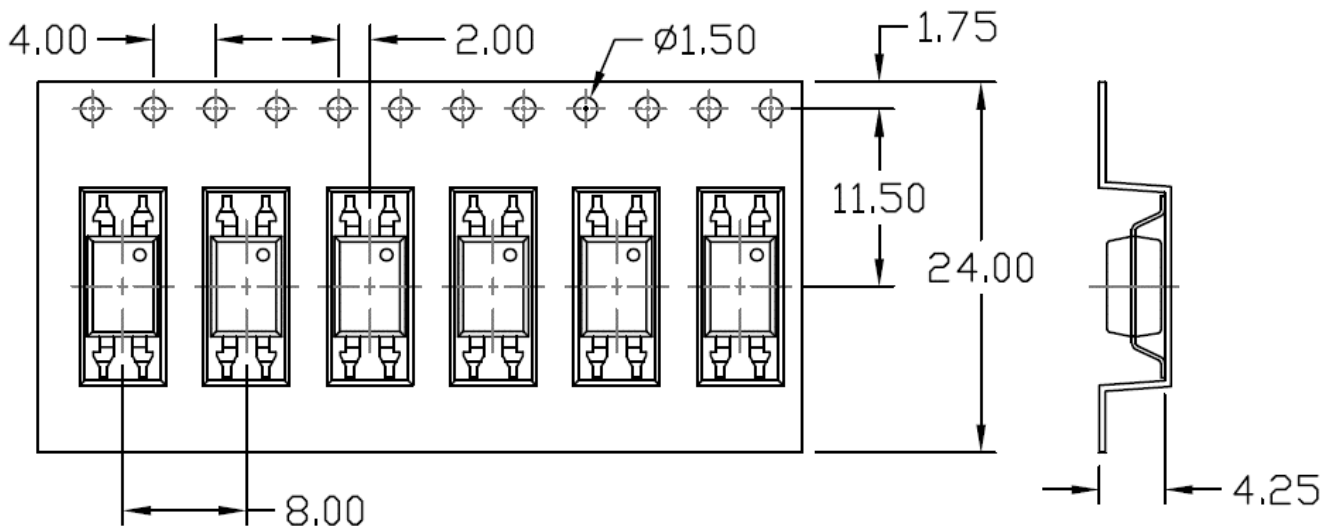
Option S(T4) & SL(T4)





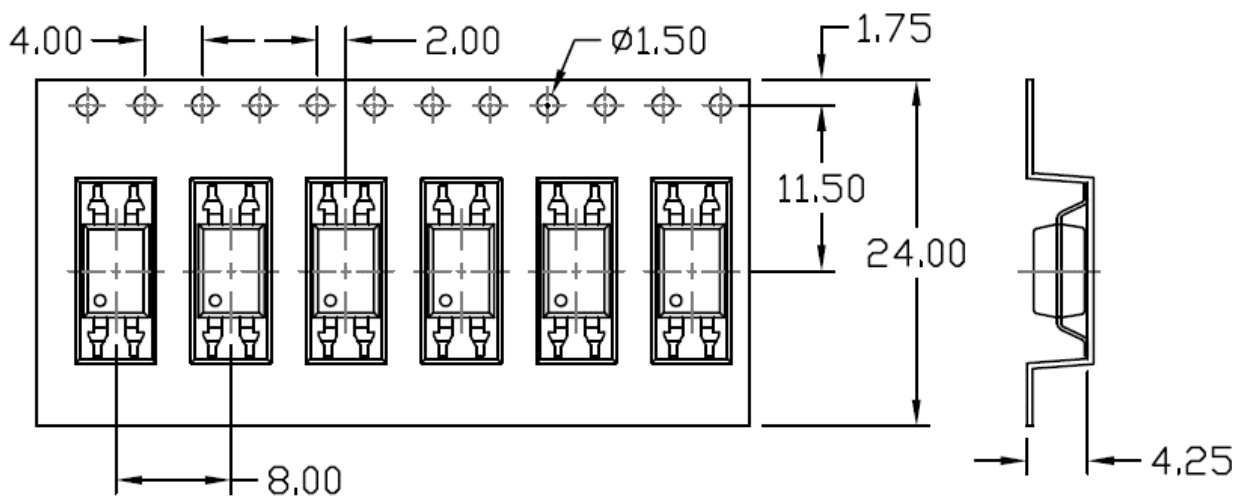
Option SLM(T1)

Input Direction



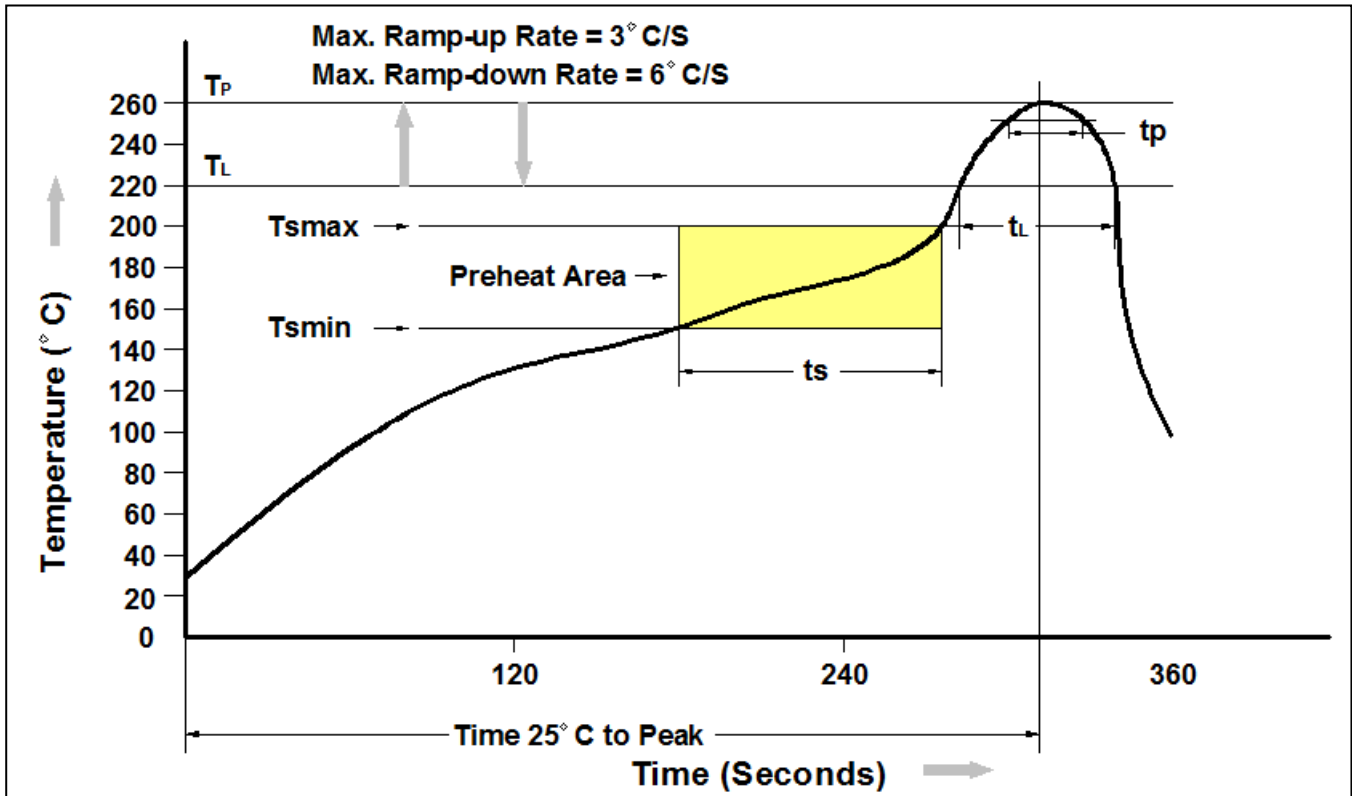
Option SLM(T2)

Input Direction





Reflow Profile



| Profile Feature | Pb-Free Assembly Profile |
|---------------------------------|--------------------------|
| Temperature Min. (Tsmin) | 150 °C |
| Temperature Max. (Tsmax) | 200 °C |
| Time (ts) from (Tsmin to Tsmax) | 60-120 seconds |
| Ramp-up Rate (tL to tP) | 3 °C/second max. |
| Liquidous Temperature (TL) | 217 °C |
| Time (tL) Maintained Above (TL) | 60 – 150 seconds |
| Peak Body Package Temperature | 260 °C +0 °C / -5 °C |
| Time (tP) within 5 °C of 260 °C | 30 seconds |
| Ramp-down Rate (TP to TL) | 6 °C/second max |
| Time 25 °C to Peak Temperature | 8 minutes max. |



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