

QT-Brightek Optocoupler Series

10Mbit/s High Speed Logic Gate Optocoupler

Part No.: 6N137, QT2601

| | | |
|-----------------------|-------------------------|--------------|
| Product: 6N137_QT2601 | Date: February 12, 2018 | Page 1 of 19 |
| | Version# 1.0 | |

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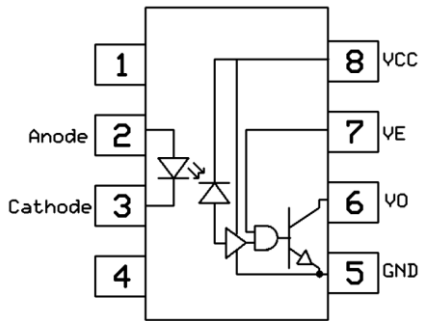
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Introduction

Feature:

- High Speed 10Mbit/s
- High Isolation voltage between input and output (Viso = 5000V rms)
- Creepage distance > 7.4mm
- Available in Tube or Tape and reel
- Available with standard DIP-8, Gullwing lead bend, SMD lead bend, and SMD low profile options.

Schematic:

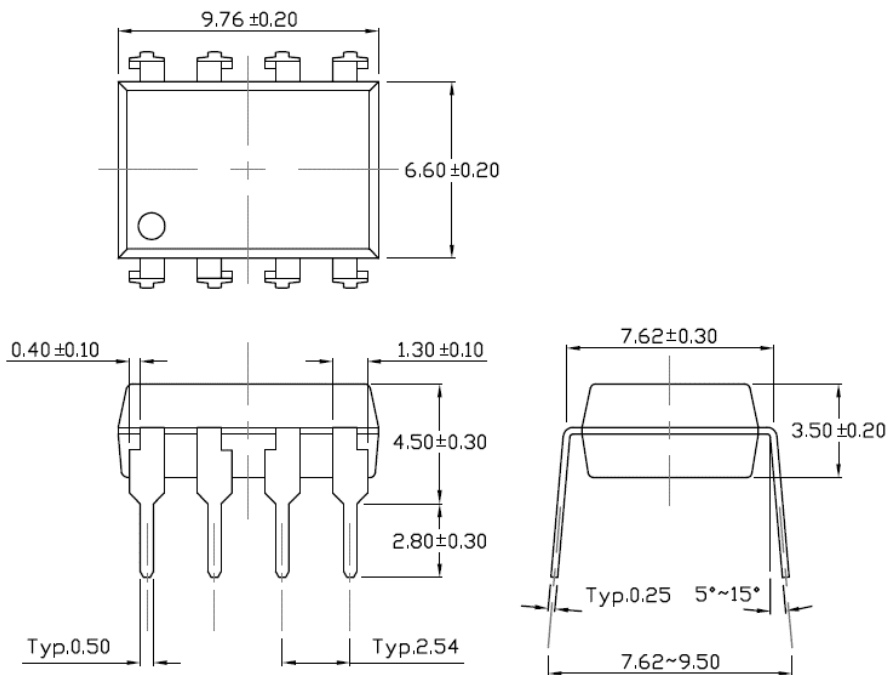


Certification & Compliance:

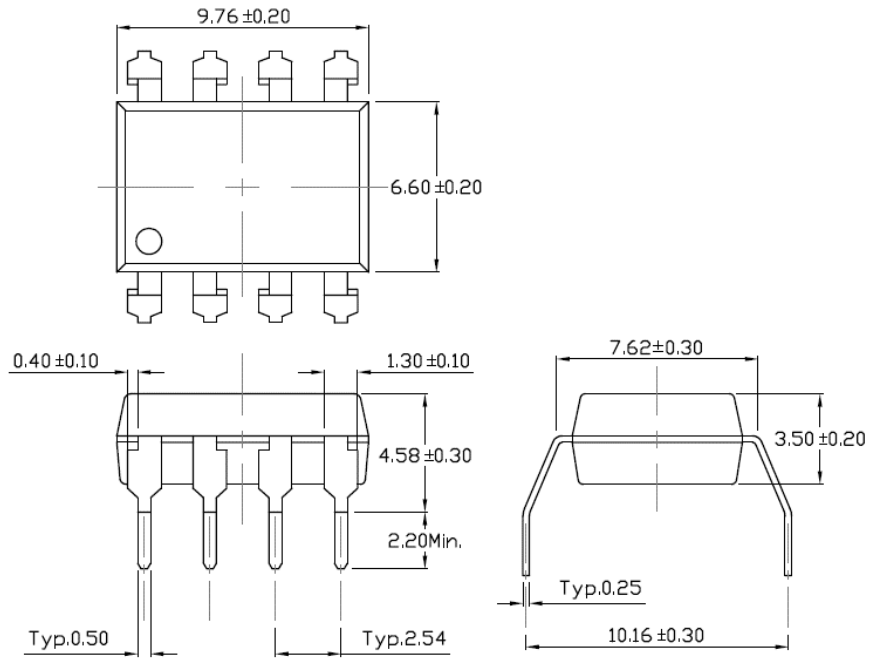
- Pb free and RoHS Compliant
- UL recognized (File #E338132)
- cUL recognized (File #E338132)
- VDE (Pending Approval)



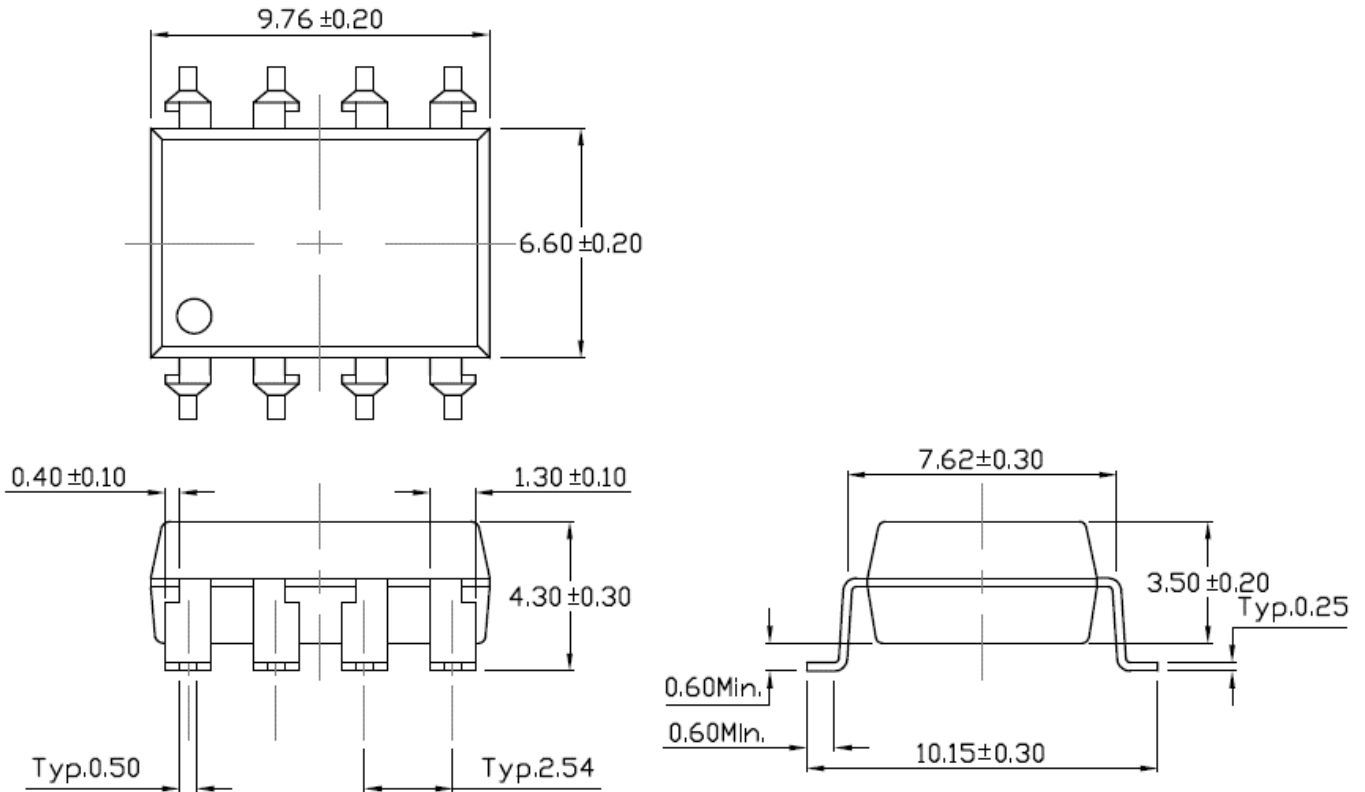
Dimension: (Dot location indicates pin 1) 8-Pin Dip (standard):



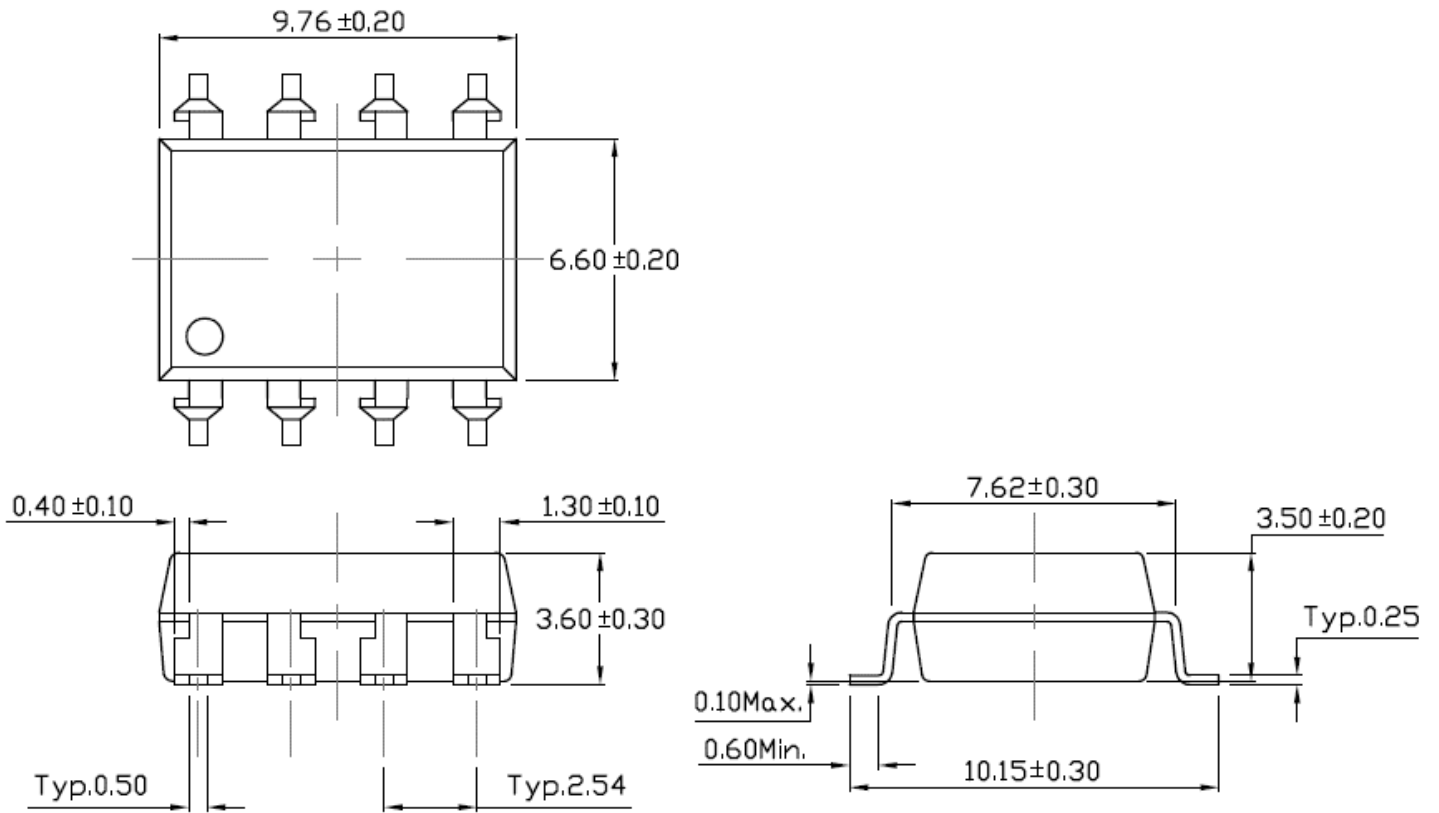
Gullwing (400mil) lead bend (Option M):



SMD lead bend (Option S):



SMD (Low Profile) bend (Option SL):



All Dimensions are in mm

Absolute Maximum Rating

| Symbol | Parameter | Rating | Units |
|------------------|---|----------------|------------------|
| V _{ISO} | Isolation Voltage* | 5000 | V _{RMS} |
| T _{STG} | Storage Temperature | -55 ~ +125 | °C |
| T _{OPR} | Operating Temperature | -55 ~ +85 | °C |
| T _{SOL} | Lead Solder Temperature | 260 for 10 sec | °C |
| EMITTER | | | |
| I _F | Forward Current | 50 | mA |
| V _R | Reverse Voltage | 5 | V |
| P _I | Power Dissipation | 100 | mW |
| | Power Dissipation Derated above 100°C | - | mW/°C |
| DETECTOR | | | |
| P _O | Power Dissipation | 85 | mW |
| I _O | Average Output current | 50 | mA |
| V _O | Output voltage** | 7.0 | V |
| V _{CC} | Supply voltage | 7.0 | V |
| V _E | Enable Input Voltage Not to Exceed V _{CC} by more than 500mW | 5.5 | V |

*AC for 1 minute, RH =40~60%

**1min (Max.)

Electrical Characteristic (T_A=25 °C)

(T_A=0 to 70C unless specified otherwise)

Emitter

| Symbol | Characteristics | Device | Test Condition | Range | | | Unit |
|----------------------------------|--|--------|-----------------------|-------|------|-----|-------|
| | | | | Min | Typ | Max | |
| V _F | Forward Voltage | - | I _F = 10mA | - | 1.4 | 1.6 | V |
| V _R | Reverse Voltage | | I _R = 10μA | 5 | - | - | V |
| ΔV _F /ΔT _A | Temperature coefficient of forward voltage | | I _F = 10mA | - | -1.8 | - | mV/°C |

Detector

| Symbol | Characteristic | Device | Test Condition | Range | | | Unit |
|------------------|---------------------------|--------|---|-------|-------|------|------|
| | | | | Min | Typ | Max | |
| I _{CCH} | Logic High Supply Current | - | I _F =0mA, V _E =0.5V, V _{CC} =5.5V | - | 6.5 | 10 | mA |
| I _{CCL} | Logic Low Supply Current | - | I _F =10mA, V _E =0.5V, V _{CC} =5.5V | - | 8.8 | 13 | mA |
| V _{EH} | High Level Enable Voltage | - | I _F =10mA, V _{CC} =5.5V | 2.0 | - | - | V |
| V _{EL} | Low Level Enable Voltage | - | I _F =10mA, V _{CC} =5.5V | - | - | 0.8 | V |
| I _{EH} | High Level Enable Current | - | V _E =2.0V, V _{CC} =5.5V | - | -0.53 | -1.6 | mA |
| I _{EL} | Low Level Enable Current | - | V _E =0.5V, V _{CC} =5.5V | - | -0.75 | -1.6 | mA |

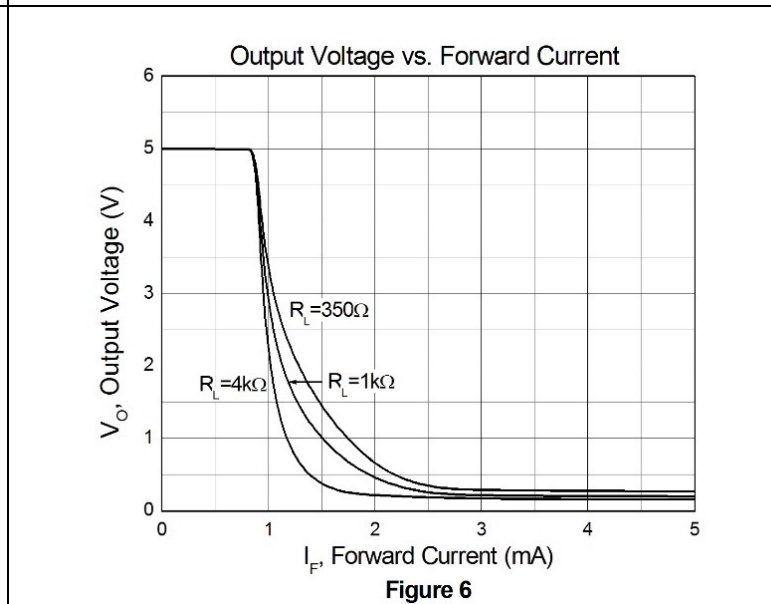
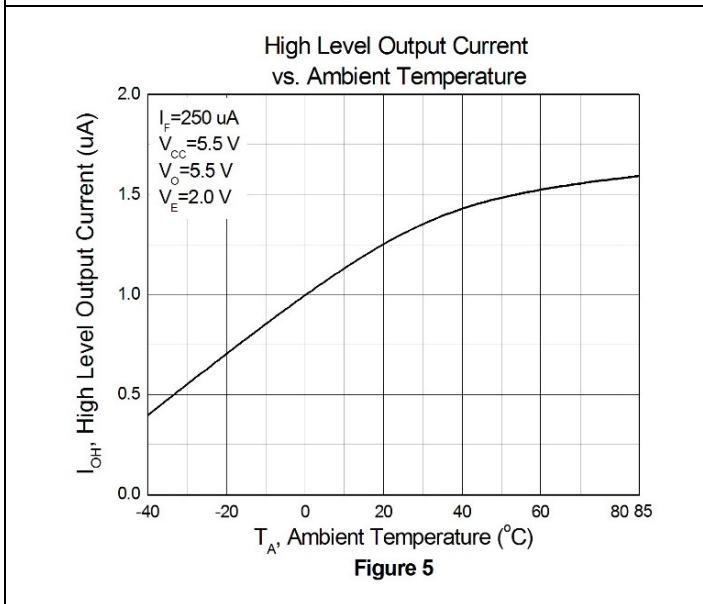
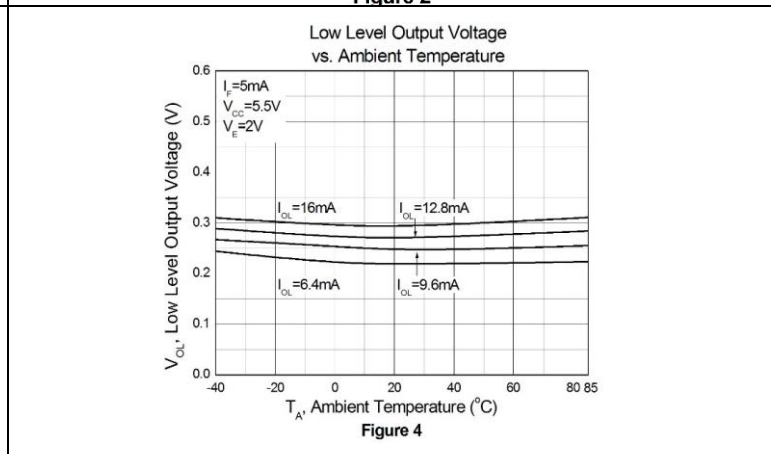
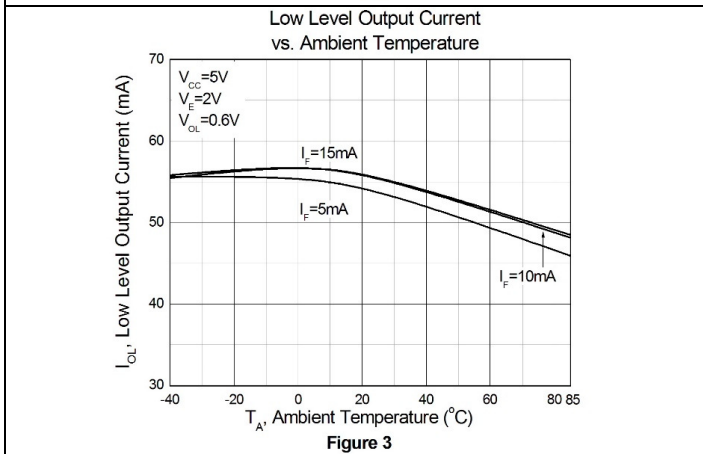
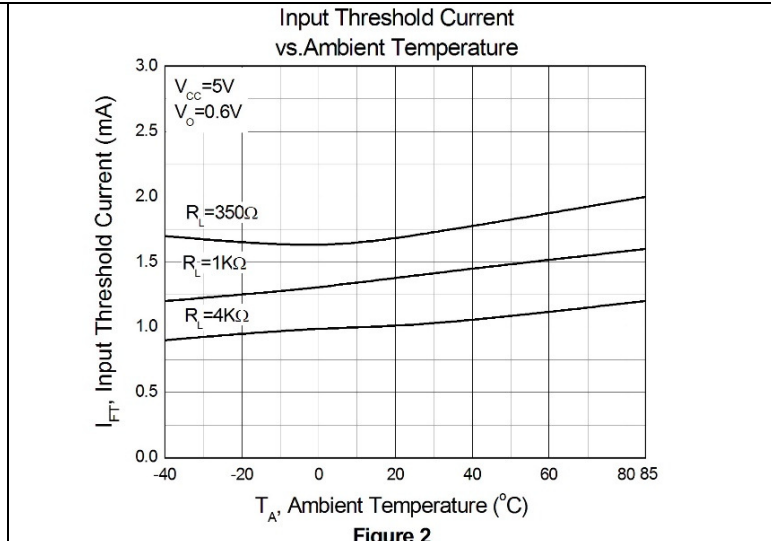
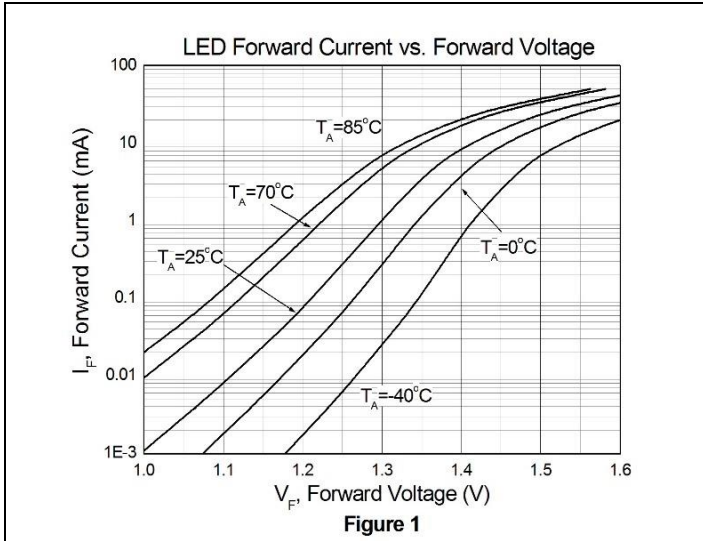
Transfer Characteristics

| Symbol | Characteristic | Device | Test Condition | Range | | | Unit |
|----------|---------------------------|--------|---|-------|------|-----|---------|
| | | | | Min | Typ | Max | |
| I_{FT} | Input Threshold Current | - | $V_{CC}=5.5V, V_O=0.6V, V_E=2.0V, I_O=13mA$ | - | 2.5 | 5 | mA |
| I_{OH} | Logic High Output Current | - | $I_F=250\mu A, V_O=V_{CC}=5.5V, V_E=2.0V$ | - | 2.0 | 100 | μA |
| V_{OL} | Logic Low Output Voltage | - | $I_F=5mA, I_O=13mA, V_{CC}=5.5V, V_E=2.0V$ | - | 0.35 | 0.6 | V |

Switching Characteristics (TA=25°C, VCC=5V)

| Symbol | Characteristic | Device | Test Condition | Range | | | Unit |
|-----------|--|--------|--|-------|-------|-----|------------|
| | | | | Min | Typ | Max | |
| T_{PHL} | Propagation Delay Time Logic High to Logic Low | - | $C_L=15pF, R_L=350\Omega$ | - | 34 | 75 | ns |
| T_{PLH} | Propagation Delay Time Logic Low to Logic High | - | | - | 39 | 75 | |
| P_{WD} | Pulse Width Distortion | - | | - | 5 | 34 | |
| T_r | Output Rise Time | - | | - | 37 | - | |
| T_f | Output Fall Time | - | | - | 10 | - | |
| T_{ELH} | Enable Propagation Delay Low To High | - | $V_{EH}=3.5V, C_L=15pF, R_L=350\Omega$ | - | 15 | - | ns |
| T_{EHL} | Enable Propagation Delay High To Low | - | | - | 15 | - | ns |
| CM_H | Common Mode Transient Immunity at Logic High | 6N137 | $I_F = 0mA, V_{CM}=50Vp-p, V_{OH}=2.0V, R_L=350\Omega$ | - | 10000 | - | V/ μs |
| | | QT2601 | | 5000 | 10000 | - | |
| CM_L | Common Mode Transient Immunity at Logic Low | 6N137 | $I_F = 7.5mA, V_{CM}=50Vp-p, V_{OH}=0.8V, R_L=350\Omega$ | - | 10000 | - | |
| | | QT2601 | | 5000 | 10000 | - | |

Characteristic Curves



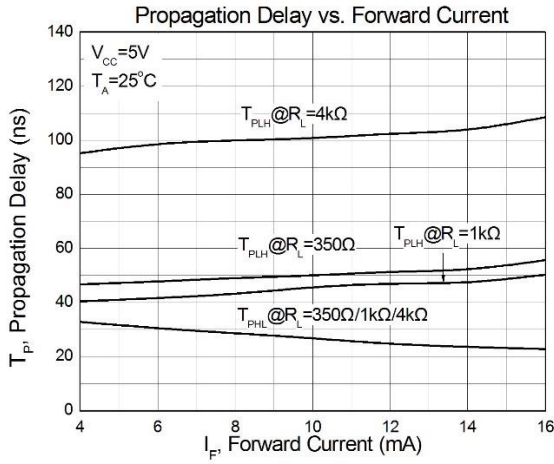


Figure 7

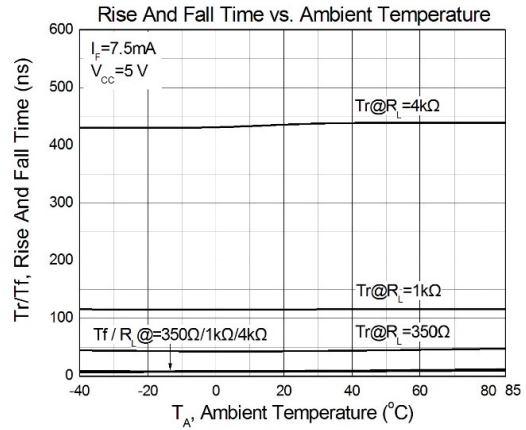


Figure 8

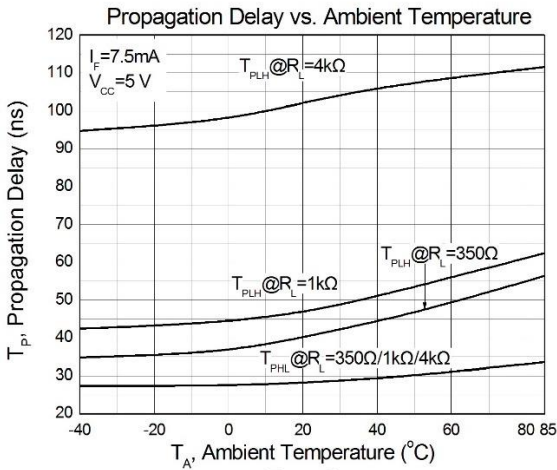


Figure 9

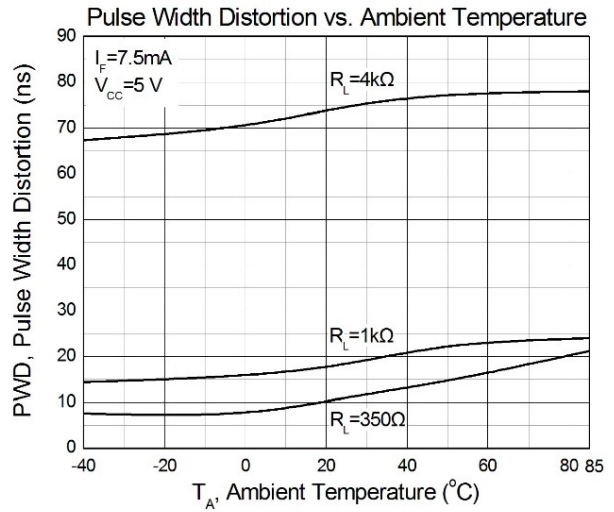


Figure 10

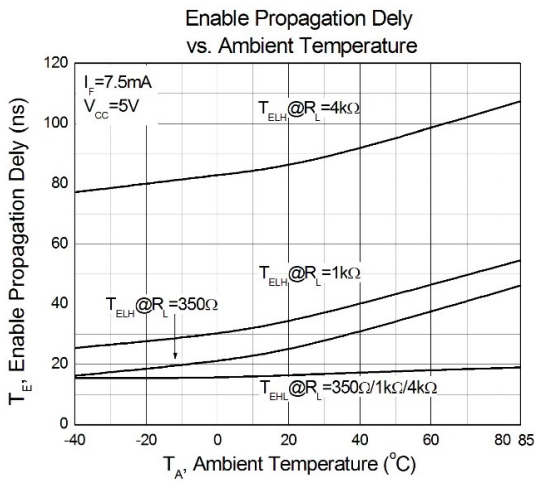
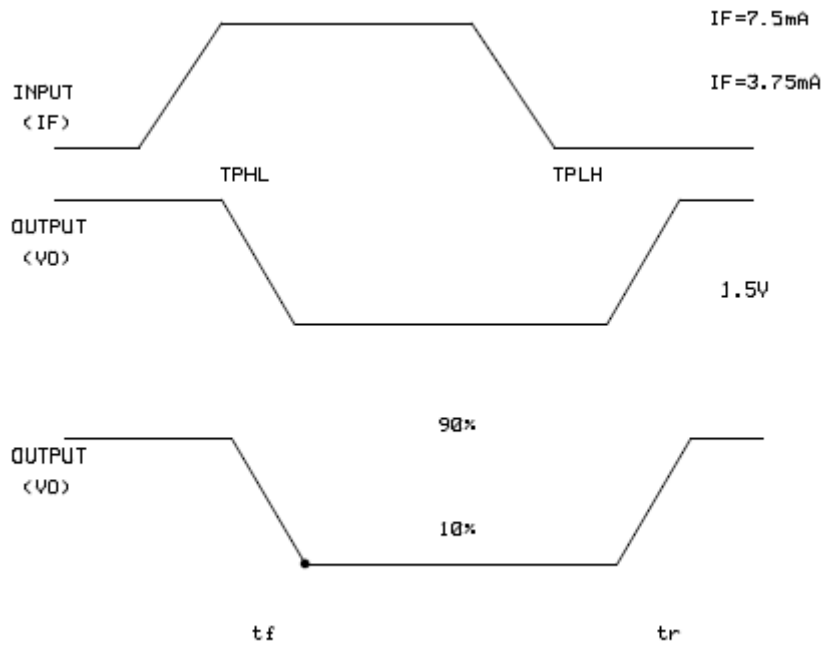
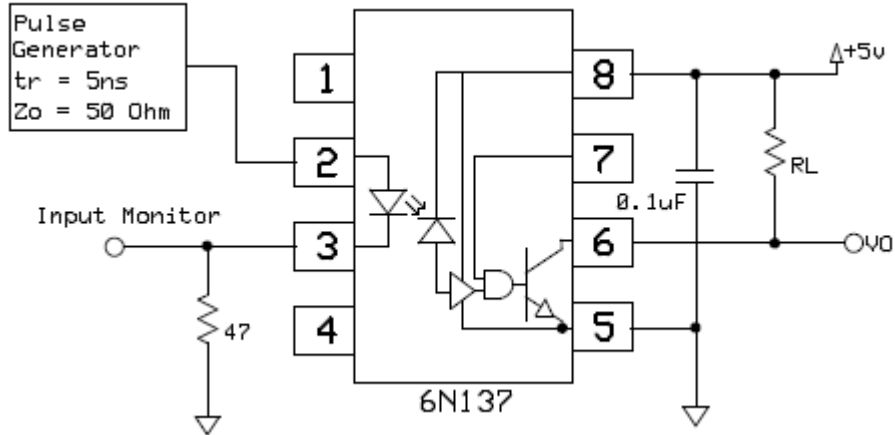
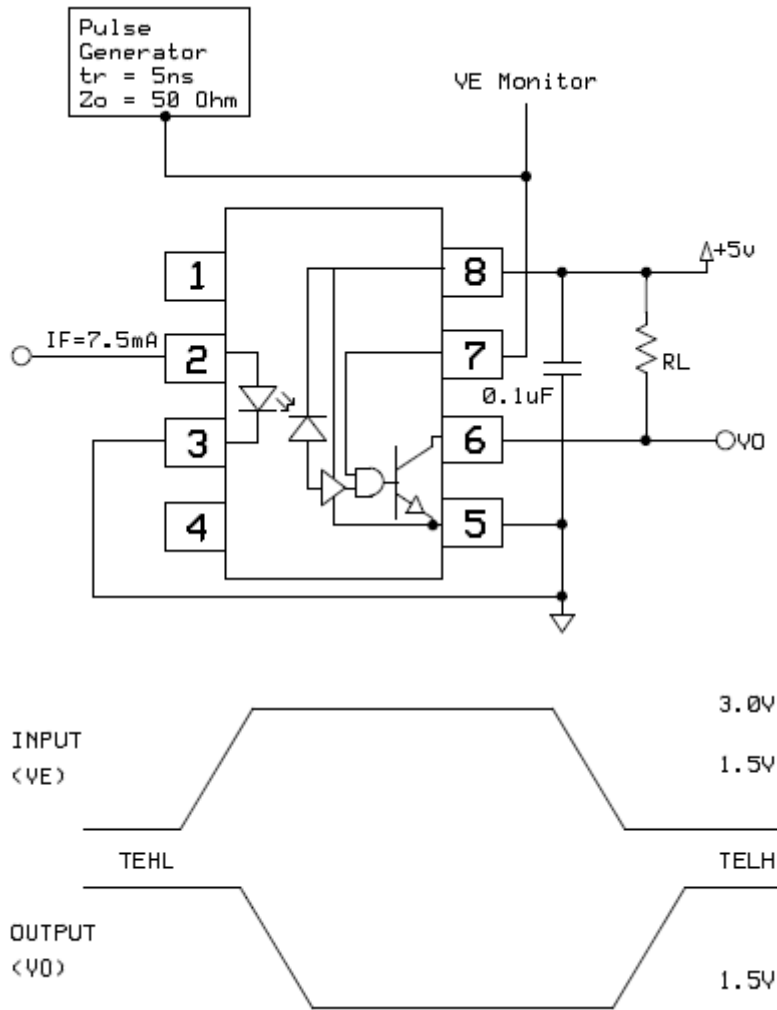


Figure 11

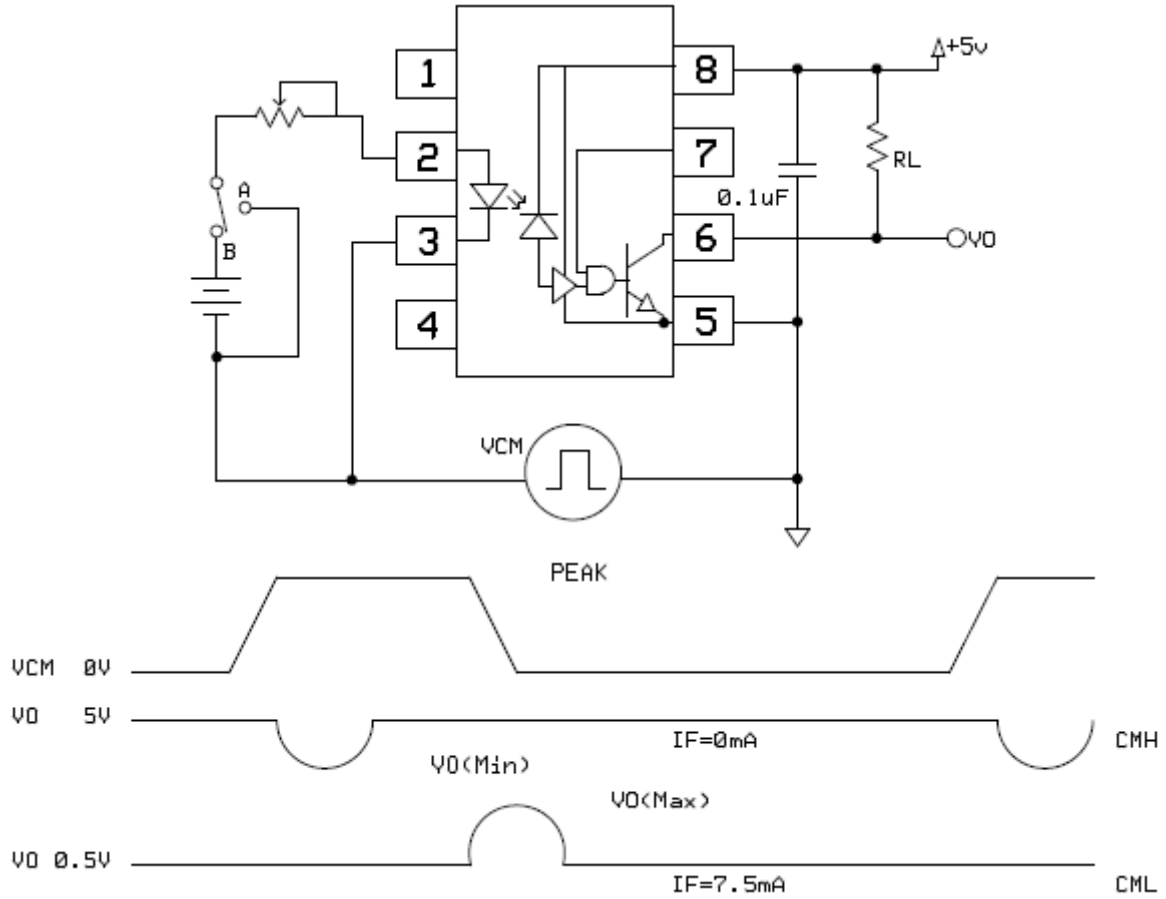
Test Circuits



Switching Time Test Circuit

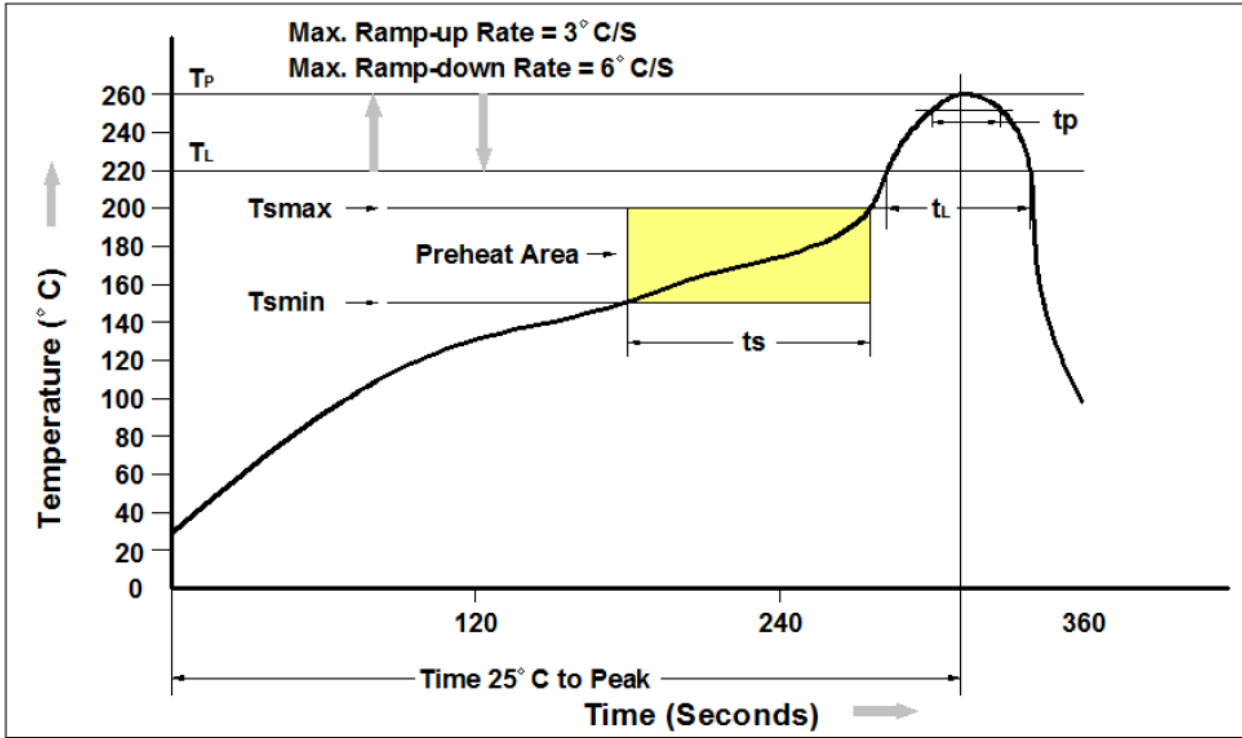


Enable Switching Time Test Circuit

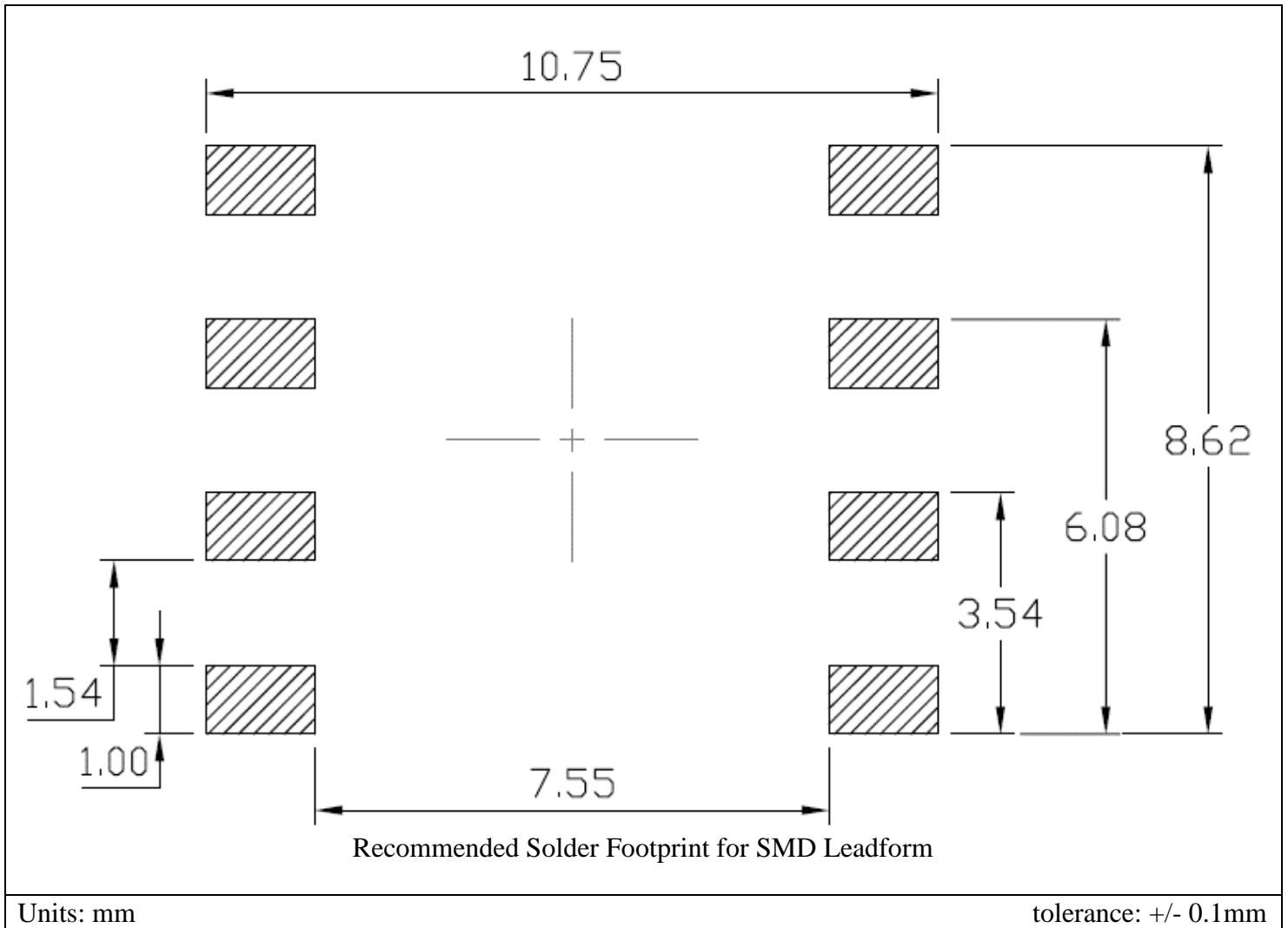


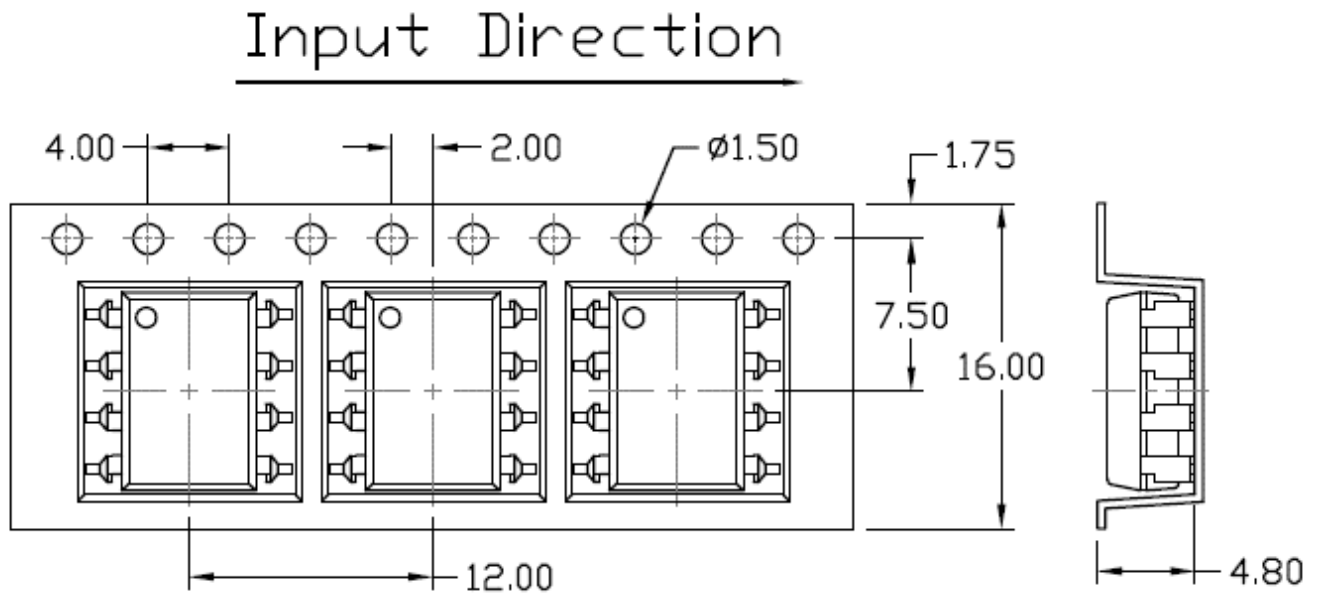
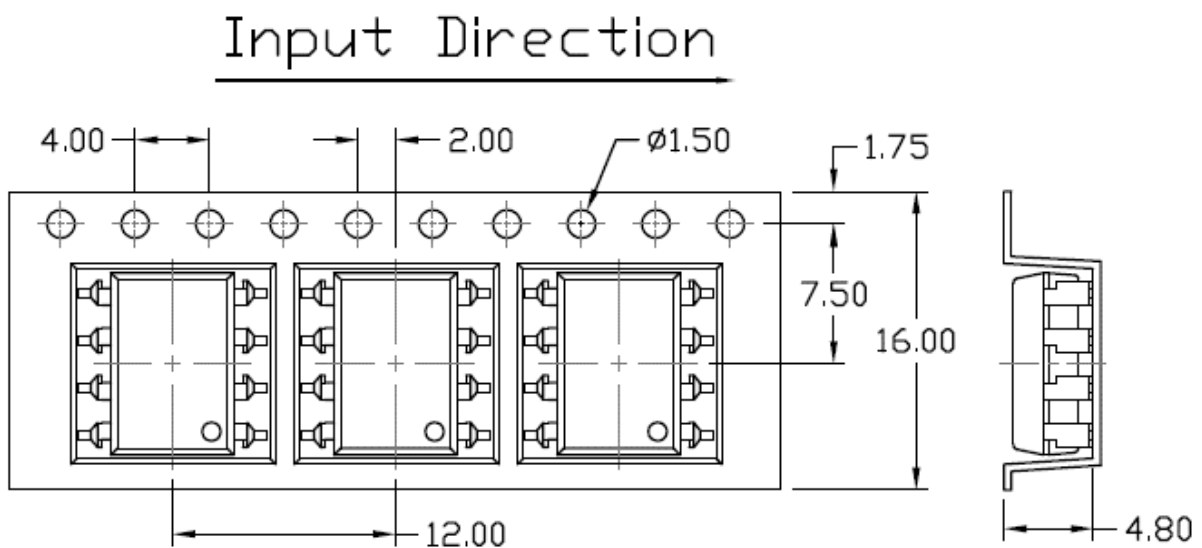
CMR Test Circuit

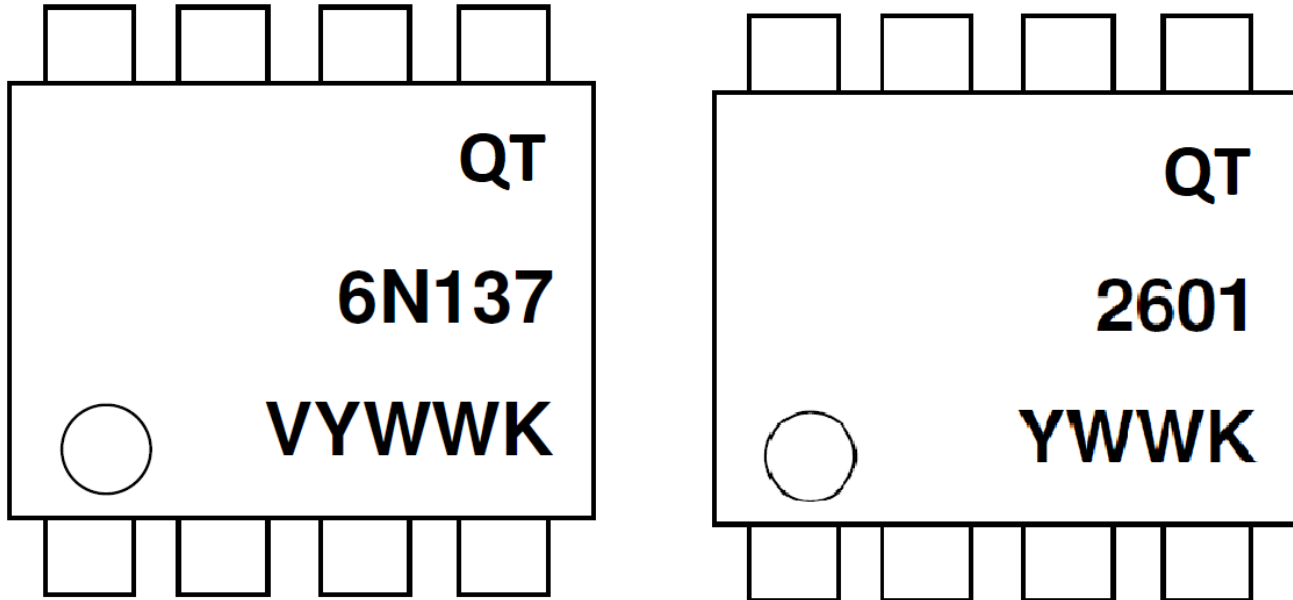
Solder Profile & Footprint



| Profile Feature | Pb-Free Assembly Profile |
|---|--------------------------|
| Temperature Min. (T _{smin}) | 150°C |
| Temperature Max. (T _{smax}) | 200°C |
| Time (t _s) from (T _{smin} to T _{smax}) | 60-120 seconds |
| Ramp-up Rate (t _L to t _p) | 3°C/second max. |
| Liquidous Temperature (T _L) | 217°C |
| Time (t _L) Maintained Above (T _L) | 60 – 150 seconds |
| Peak Body Package Temperature | 260°C +0°C / -5°C |
| Time (t _p) within 5°C of 260°C | 30 seconds |
| Ramp-down Rate (T _P to T _L) | 6°C/second max |
| Time 25°C to Peak Temperature | 8 minutes max. |



Packing & Labeling**Tape Dimension:****Option S(T1) & SL(T1)****Option S(T2) & SL(T2)**

Device Marking

QT = QT-Brightek Corporation
6N135 or 2601 = part number
Y = Year
WW = Week
V = VDE Option
K = Manufacturing code

Ordering Information

6N137(V)(Y)(Z) or QT2601(V)(Y)(Z)

V = VDE option (V or None)

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

Z=Tape and reel option (T1 or T2)

| Option | Description | Quantity |
|--------|---|----------------|
| None | Standard 8-Pin DIP | 40 Units/Tube |
| M | Gullwing | 40 Units/Tube |
| S(T1) | Surface Mount Lead Forming – with Option 1 Taping | 1000 pcs/ reel |
| S(T2) | Surface Mount Lead Forming – with Option 2 Taping | 1000 pcs/ reel |
| SL(T1) | SMD (Low Profile) Lead Forming – with Option 1 Taping | 1000 pcs/ reel |
| SL(T2) | SMD (Low Profile) Lead Forming – with Option 2 Taping | 1000 pcs/ reel |



Revision History

| Description: | Revision # | Revision Date |
|---------------------------------|------------|---------------|
| Initial release of 6N137_QT2601 | 1.0 | 02/12/2018 |
| | | |
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