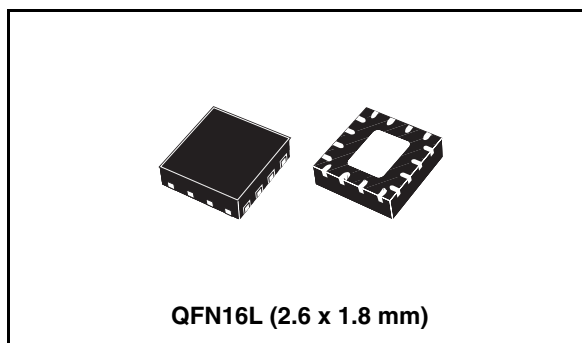


Low voltage dual SP4T switch

Features

- Ultra low power dissipation:
 - $I_{CC} = 0.1 \mu\text{A}$ (max.) at $T_A = 25 \text{ }^\circ\text{C}$
- Low “ON” resistance:
 - $R_{ON} = 4.6 \Omega$ ($T_A = 25 \text{ }^\circ\text{C}$) at $V_{CC} = 4.3 \text{ V}$
 - $R_{ON} = 5.8 \Omega$ ($T_A = 25 \text{ }^\circ\text{C}$) at $V_{CC} = 3.0 \text{ V}$
- Wide operating voltage range:
 - $V_{CC} \text{ (Opr)} = 1.65 \text{ to } 4.3 \text{ V}$ single supply
- 4.3 V tolerant and 1.8 V compatible threshold on digital control input at $V_{CC} = 2.3 \text{ to } 3.0 \text{ V}$
- Typical bandwidth (-3dB) at 300 MHz on all channels
- Latch-up performance exceeds 300 mA per JESD 78, Class II
- ESD performance exceeds JESD22
 - 2000-V Human body model (A114-A)



Description

The STG3482 is a high-speed CMOS low voltage dual analog SP4T (single pole four throw) switch or 4:1 multiplexer/demultiplexer switch fabricated in silicon gate C²MOS technology. It is designed to operate from 1.65 to 4.3 V, making this device ideal for portable applications.

By controlling the SEL1 and SEL2, one of the independent channels will be connected to the common channel. An /OE pin is also available in this device to disconnect all the switches.

Additional key features are fast switching speed, break-before-make delay time and ultra low power consumption. All inputs and outputs are equipped with protection circuits against static discharge, giving them ESD immunity and transient excess voltage.

Table 1. Device summary

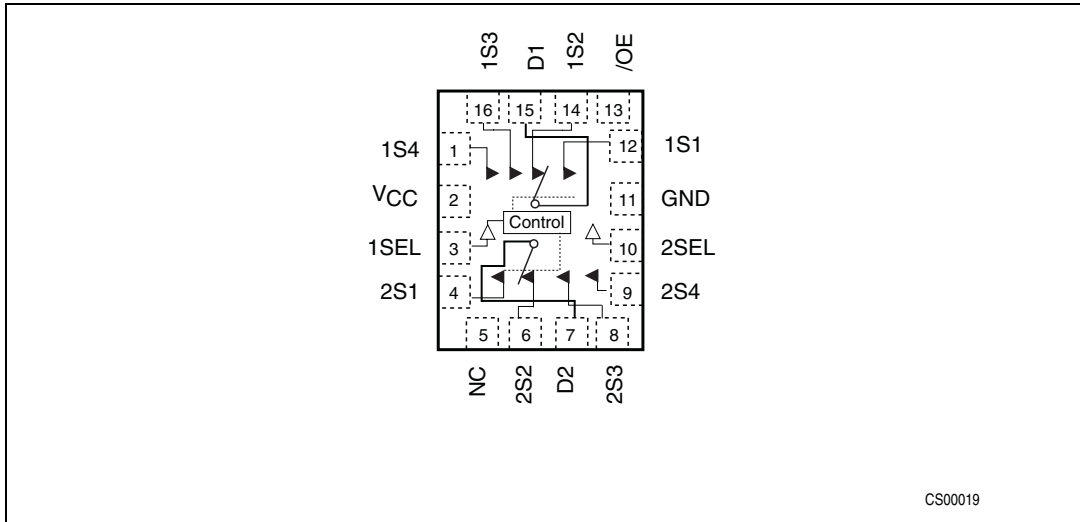
| Order code | Package | Packaging |
|------------|-----------------------|---------------|
| STG3482QTR | QFN16L (2.6 x 1.8 mm) | Tape and reel |

Contents

| | | |
|----------|--------------------------------------------|-----------|
| 1 | Pin settings | 3 |
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| 2 | Device summary | 4 |
| 3 | Maximum rating | 5 |
| | 3.1 Recommended operating conditions | 5 |
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| 5 | Package mechanical data | 10 |
| 6 | Revision history | 13 |

1 Pin settings

Figure 1. Pin connection (top through view)



CS00019

1.1 Pin description

Table 2. Pin description

| Pin number | Symbol | Name and function |
|------------|-----------------|----------------------------|
| 1 | 1S4 | Independent channel |
| 2 | V _{CC} | Positive supply voltage |
| 3 | 1SEL | Control |
| 4 | 2S1 | Independent channel |
| 5 | NC | No connect |
| 6 | 2S2 | Independent channel |
| 7 | D2 | Common channels |
| 8 | 2S3 | Independent channel |
| 9 | 2S4 | Independent channel |
| 10 | 2SEL | Control |
| 11 | GND | Ground (0V) |
| 12 | 1S1 | Independent channel |
| 13 | /OE | Output enable (active low) |
| 14 | 1S2 | Independent channel |
| 15 | D1 | Common channel |
| 16 | 1S3 | Independent channel |

Note: Exposed pad must be soldered to a floating plane. Do NOT connect to power or ground.

2 Device summary

Figure 2. Input equivalent circuit

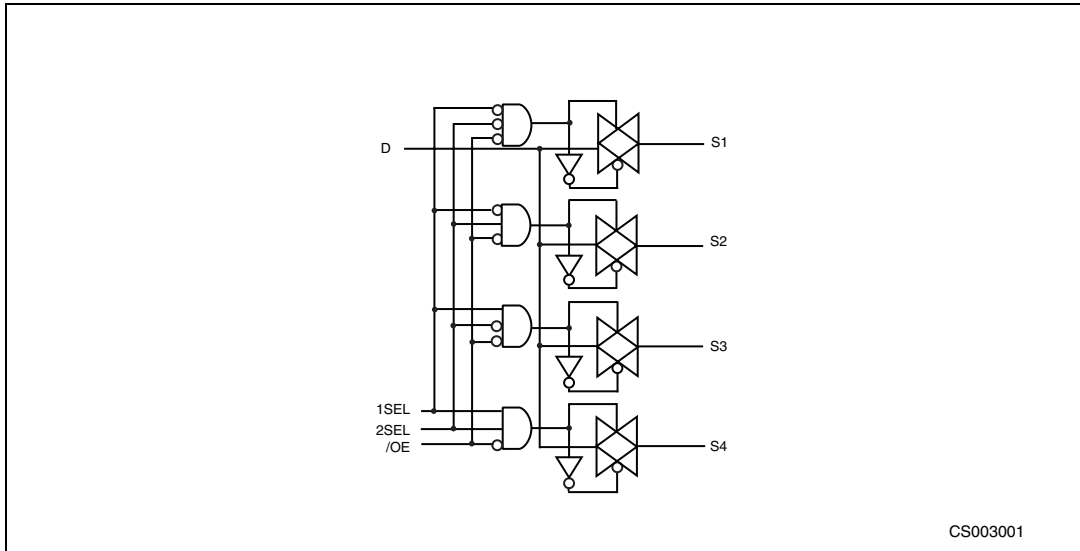


Table 3. Truth table

| /OE | 1SEL | 2SEL | Switch connection |
|-----|------|------|-------------------|
| H | X | X | High-Z |
| L | L | L | D1-1S1, D2-2S1 |
| L | L | H | D1-1S2, D2-2S2 |
| L | H | L | D1-1S3, D2-2S3 |
| L | H | H | D1-1S4, D2-2S4 |

3 Maximum rating

Stressing the device above the rating listed in the “Absolute maximum ratings” table may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in the Operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Refer also to the STMicroelectronics SURE Program and other relevant quality documents.

Table 4. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|-----------------------|----------------------------------------------------------|------------------------|------------|
| V_{CC} | Supply voltage | -0.5 to 5.5 | V |
| V_I | DC input voltage | -0.5 to $V_{CC} + 0.5$ | V |
| V_{IC} | DC control input voltage | -0.5 to 5.5 | V |
| V_O | DC output voltage | -0.5 to $V_{CC} + 0.5$ | V |
| I_{IKC} | DC input diode current on control pin ($V_{SEL} < 0V$) | -50 | mA |
| I_{IK} | DC input diode current ($V_{SEL} < 0V$) | ± 50 | mA |
| I_{OK} | DC output diode current | ± 20 | mA |
| I_O | DC output current | ± 128 | mA |
| I_{OP} | DC output current peak (pulse at 1ms, 10% duty cycle) | ± 300 | mA |
| I_{CC} or I_{GND} | DC V_{CC} or ground current | ± 100 | mA |
| P_D | Power dissipation at $T_A = 70^\circ C^{(1)}$ | 1120 | mW |
| T_{stg} | Storage temperature | -65 to 150 | $^\circ C$ |
| T_L | Lead temperature (10 sec) | 300 | $^\circ C$ |

1. Derate above 70 $^\circ C$ by 18.5 mW/ $^\circ C$

3.1 Recommended operating conditions

Table 5. Recommended operating conditions

| Symbol | Parameter | Value | Unit |
|----------|----------------------------------------|----------------------------|------------|
| V_{CC} | Supply voltage | 1.65 to 4.3 | V |
| V_I | Input voltage | 0 to V_{CC} | V |
| V_{IC} | Control input voltage | 0 to 4.3 | V |
| V_O | Output voltage | 0 to V_{CC} | V |
| T_{op} | Operating temperature | -40 to 85 | $^\circ C$ |
| dt/dv | Input rise and fall time control input | $V_{CC} = 1.65$ to 2.7 V | 0 to 20 |
| | | $V_{CC} = 3.0$ to 4.3 V | 0 to 10 |
| | | | ns/V |

4 Electrical characteristics

Table 6. DC specifications

| Symbol | Parameter | Test conditions | | Value | | | | Unit |
|-------------------|-----------------------------------------------------|------------------------|------------------------------------------------------------------|------------|------|----------------------|------|------|
| | | V _{CC} (V) | | TA = 25 °C | | -40 to 85 °C | | |
| | | | | Typ | Max | Min | Max | |
| V _{IH} | High level input voltage | 1.65 –1.95 | | | | 0.65 V _{CC} | | V |
| | | 2.3 –2.5 | | | | 1.2 | | |
| | | 2.7 –3.0 | | | | 1.3 | | |
| | | 3.3 –3.6 | | | | 1.4 | | |
| | | 4.3 | | | | 1.6 | | |
| V _{IL} | Low level input voltage | 1.65 –1.95 | | | 0.25 | | 0.25 | V |
| | | 2.3 –2.5 | | | 0.25 | | 0.25 | |
| | | 2.7 –3.0 | | | 0.25 | | 0.25 | |
| | | 3.3 –3.6 | | | 0.30 | | 0.30 | |
| | | 4.3 | | | 0.40 | | 0.40 | |
| R _{PEAK} | Switch on peak resistance | 1.8 | V _S = 0 V to V _{CC} I _S = 8 mA | 12.0 | 16.0 | | | Ω |
| | | 2.7 | | 6.3 | 8.0 | | | |
| | | 3.0 | | 5.8 | 7.5 | | | |
| | | 3.7 | | 5.0 | 6.5 | | | |
| | | 4.3 | | 4.6 | 6.0 | | | |
| R _{ON} | Switch ON resistance | 3.0 | V _S = 3 V I _S = 8 mA | 4.0 | 5.2 | | | Ω |
| | | 3.0 | V _S = 0.8 V I _S = 8 mA | 5.0 | 6.5 | | | |
| ΔR _{ON} | ON resistance match between channels ⁽¹⁾ | 1.8 | V _S @ R _{ON} Max I _S = 8mA | 0.3 | | | | Ω |
| | | 2.7 | | 0.3 | | | | |
| | | 3.0 | | 0.3 | | | | |
| | | 3.7 | | 0.3 | | | | |
| | | 4.3 | | 0.3 | | | | |
| R _{FLAT} | ON resistance flatness ⁽²⁾ | 1.8 | V _S = 0V to V _{CC} I _S = 8mA | 5.9 | | | | Ω |
| | | 2.7 | | 1.9 | | | | |
| | | 3.0 | | 1.6 | | | | |
| | | 3.7 | | 1.4 | | | | |
| | | 4.3 | | 1.6 | | | | |

Table 6. DC specifications

| Symbol | Parameter | Test conditions | | Value | | | | Unit |
|-------------------|----------------------------------------------|------------------------|-----------------------------------------------------------------------|------------|------|--------------|------|------|
| | | V _{CC} (V) | | TA = 25 °C | | -40 to 85 °C | | |
| | | | | Typ | Max | Min | Max | |
| I _{OFF} | OFF state leakage current (SN), (D) | 4.3 | V _S = 0.3 or 4 V | | ±20 | | ±100 | nA |
| I _{IN} | Input leakage current | 0 to 4.3 | V _{SEL} = 0 to 4.3 V | | ±0.1 | | ±1 | μA |
| I _{CC} | Quiescent supply current | 1.65 to 4.3 | V _{SEL} = V _{CC} or GND | | ±0.1 | | ±1.0 | μA |
| I _{CCLV} | Quiescent supply current low voltage driving | 4.3 | V _{1SEL} , V _{2SEL} = 1.65 V | ±37 | ±50 | | ±100 | μA |
| | | | V _{1SEL} , V _{2SEL} = 1.80 V | ±33 | ±40 | | ±50 | |
| | | | V _{1SEL} , V _{2SEL} = 2.60 V | ±12 | ±20 | | ±30 | |
| | | | V _{1SEL} , V _{2SEL} = 0 V _{OE} = 1.65 V | ±19 | ±25 | | ±50 | |
| | | | V _{1SEL} , V _{2SEL} = 0 V _{OE} = 1.80 V | ±17 | ±20 | | ±25 | |
| | | | V _{1SEL} , V _{2SEL} = 0 V _{OE} = 2.60 V | ±6 | ±10 | | ±15 | |

1. $\Delta R_{on} = R_{on(max)} - R_{on(Min)}$
2. Flatness is defined as the difference between the maximum and minimum value of on-resistance as measured over the specified analog signal ranges.

Table 7. AC electrical characteristics ($C_L = 35 \text{ pF}$, $R_L = 50 \text{ } \Omega$, $t_r = t_f \leq 5 \text{ ns}$)

| Symbol | Parameter | Test conditions | | Value | | | | | Unit |
|-------------------------------------|------------------------------|-----------------|-----------------------------------------------------------------------------|------------------------|------|-----|--------------|-----|------|
| | | Vcc (V) | | T _A = 25 °C | | | -40 to 85 °C | | |
| | | | | Min | Typ | Max | Min | Max | |
| t _{PLH} , t _{PHL} | Propagation delay | 1.65 – 1.95 | | | 0.30 | | | | ns |
| | | 2.3 – 2.7 | | | 0.30 | | | | |
| | | 3.0 – 3.3 | | | 0.27 | | | | |
| | | 3.6 – 4.3 | | | 0.28 | | | | |
| t _{ON} | Turn-ON time | 1.65 – 1.95 | V _S = 0.8 V | | 37 | | | ns | |
| | | 2.3 – 2.7 | | | 20 | 30 | | | 34 |
| | | 3.0 – 3.3 | V _S = 1.5 V | | 15 | 25 | | | 26 |
| | | 3.6 – 4.3 | | | 12 | 18 | | | 20 |
| t _{OFF} | Turn-OFF time | 1.65 – 1.95 | V _S = 0.8 | | 23 | | | ns | |
| | | 2.3 – 2.7 | | | 17 | 23 | | | 17 |
| | | 3.0 – 3.3 | V _S = 1.5 V | | 12 | 18 | | | 12 |
| | | 3.6 – 4.3 | | | 10 | 15 | | | 10 |
| t _D | Break before make time delay | 1.65 – 1.95 | | 1 | 24 | | | ns | |
| | | 2.3 – 2.7 | C _L = 35 pF R _L = 50 Ω V _S = 1.5 V | 1 | 15 | | | | |
| | | 3.0 – 3.3 | | 1 | 11 | | | | |
| | | 3.6 – 4.3 | | 1 | 9 | | | | |
| Q | Charge injection | 1.65 | | | 10 | | | pC | |
| | | 2.3 | C _L = 100 pF V _{GEN} = 0 V R _{GEN} = 0 Ω | | 11 | | | | |
| | | 3.0 | | | 11 | | | | |
| | | 4.3 | | | 11 | | | | |

Table 8. Analog switch characteristics ($C_L = 5\text{pF}$, $R_L = 50\Omega$, $T_A = 25^\circ\text{C}$)

| Symbol | Parameter | Test conditions | | Value | | | | | Unit |
|------------------|---------------------------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------|------|--------------|-----|------|
| | | V _{CC} (V) | | T _A = 25 °C | | | -40 to 85 °C | | |
| | | | | Min | Typ | Max | Min | Max | |
| OIRR | OFF Isolation ⁽¹⁾ | 1.65 — 4.3 | V _S = 1V _{RMS} , f = 1 MHz Signal = 0 dBm | | -75 | | | | dB |
| | | | V _S = 1V _{RMS} , f = 10 MHz Signal = 0 dBm | | -58 | | | | |
| Xtalk | Crosstalk | 1.65 — 4.3 | V _S = 1V _{RMS} , f = 1 MHz Signal = 0 dBm | | -77 | | | | dB |
| | | | V _S = 1V _{RMS} , f = 10 MHz Signal = 0 dBm | | -60 | | | | |
| THD | Total harmonic distortion | 3.7 | f = 20 Hz to 20 kHz R _L = 32 Ω, C _L = 50 Ω V _{IN} = 2.8 V _{P-P} V _{DC} = V _{CC} /2 | | 0.01 | 0.02 | | | % |
| PSRR | Power supply rejection ratio | 3.7 | f = 217 Hz, R _L = 32 Ω, C _L = 50 Ω V _{ripple} = 150 mV V _{DC} = V _{CC} /2 | | -60 | | | | dB |
| BW | -3dB bandwidth | 3.0 — 4.3 | R _L = 50 Ω Bias = 1 V | | 300 | | | | MHz |
| D _G | Differential gain | 3.0 — 4.3 | R _L = 150 Ω | | 0.64 | | | | % |
| D _P | Differential phase | 3.0 — 4.3 | R _L = 150 Ω | | 0.1 | | | | deg |
| C _{IN} | Control pin input capacitance | | V _{CC} = 0 V | | 1.5 | | | | pF |
| C _{ON} | Sn port capacitance when switch is enabled | 3.3 | f = 1 MHz | | 6.7 | | | | |
| C _{OFF} | Sn port capacitance when switch is disabled | 3.3 | f = 1 MHz | | 2.8 | | | | |

1. Off Isolation = $20\text{Log}_{10}(V_D/V_S)$, V_D = output. V_S = input to off switch.

5 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

Figure 3. QFN16L (2.6 x 1.8 mm) package outline

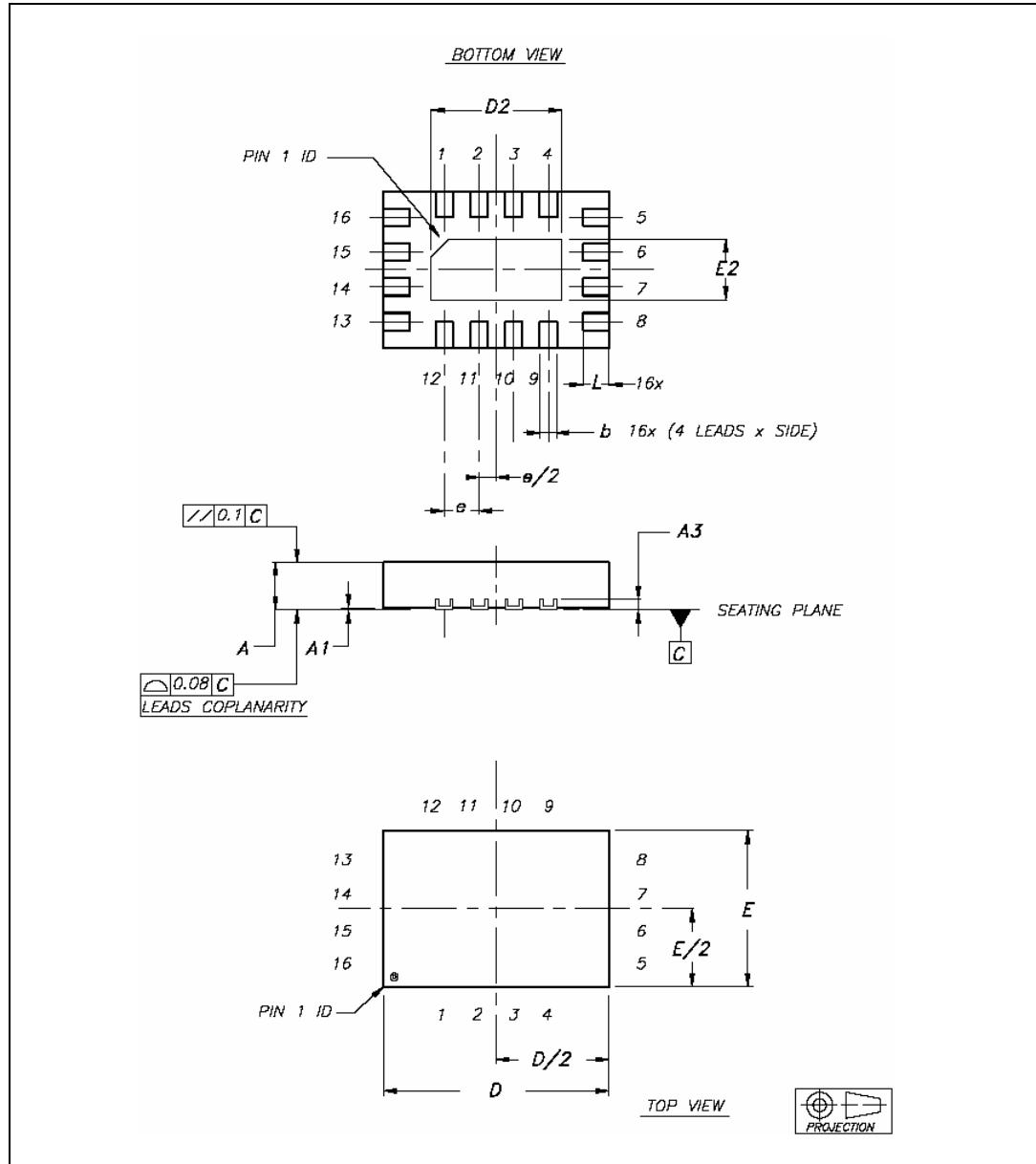
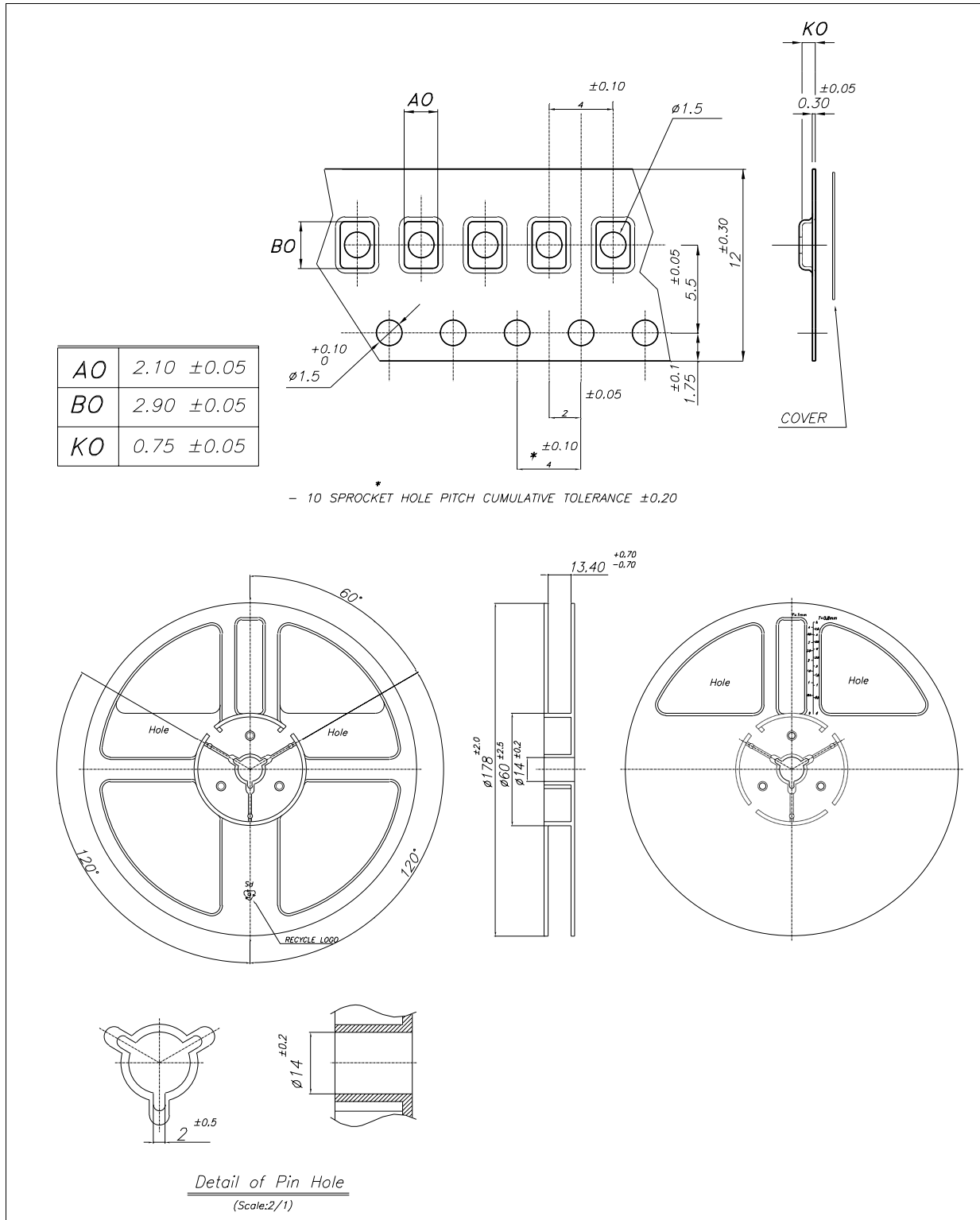


Table 9. QFN16L (2.6 x 1.8 mm) mechanical data

| Symbol | Millimeters | | |
|--------|-------------|------|------|
| | Typ | Min | Max |
| A | 0.50 | 0.45 | 0.55 |
| A1 | 0.02 | 0 | 0.05 |
| A3 | 0.127 | | |
| b | 0.20 | 0.15 | 0.25 |
| D | 2.60 | 2.50 | 2.70 |
| D2 | 1.50 | 1.40 | 1.60 |
| E | 1.80 | 1.70 | 1.90 |
| E2 | 0.70 | 0.60 | 0.80 |
| e | 0.40 | | |
| L | 0.30 | 0.25 | 0.35 |

1. VFQFPN - standard for thermally enhanced very fine pitch quad flat package no leads.
2. The leads size is comprehensive of the thickness of the leads finishing material.
3. Dimensions do not include mold protrusion.
4. Package outline exclusive of metal burrs dimensions.
5. Shipping media tape and reel units: 3000

Figure 4. QFN16L (2.6 x 1.8 mm) tape and reel



6 Revision history

Table 10. Document revision history

| Date | Revision | Changes |
|-------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21-Nov-2006 | 1 | Initial release. |
| 20-Nov-2007 | 2 | Updated latch-up performance value in <i>Features section n on page 1</i> , minor text changes, updated <i>Figure 1 on page 3</i> , <i>Table 2 on page 3</i> , <i>Table 5 on page 5</i> , <i>Table 6 on page 6</i> , <i>Table 7 on page 8</i> |

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