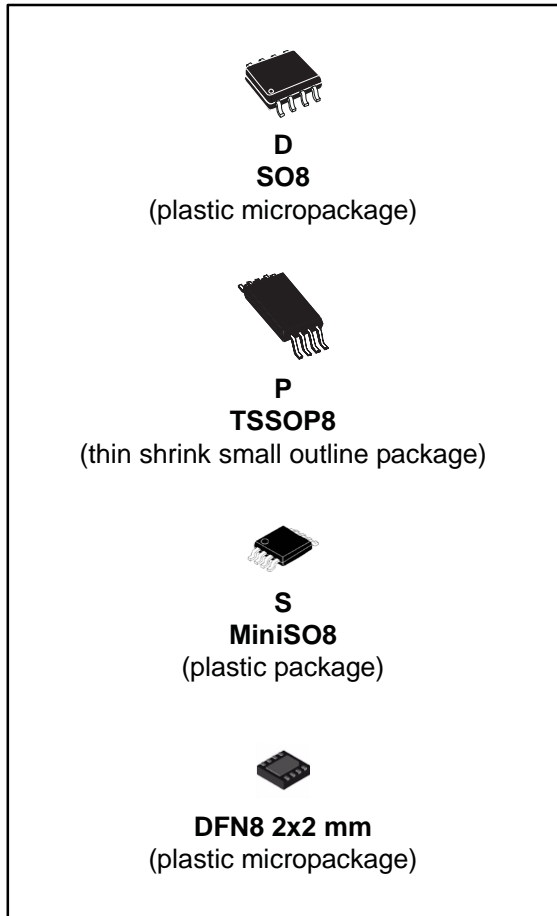


Micropower dual CMOS voltage comparators

Datasheet - production data



Features

- Low supply current: 5 μ A typ. per comparator
- Wide single supply range 2.7 V to 16 V or dual supplies (± 1.35 V to ± 8 V)
- Extremely low input bias current: 1 pA typ.

- Input common-mode voltage range includes ground
- Push-pull output
- High input impedance: 10^{12} Ω typ
- Fast response time: 2.7 μ s typ. for 5 mV overdrive
- ESD tolerance: 4 kV HBM, 200 V MM

Related products

- Pin-to-pin and functionally compatible with the dual CMOS TS3702 comparators
- See the TSX393 for open drain output

Applications

- Automotive
- Industrial

Description

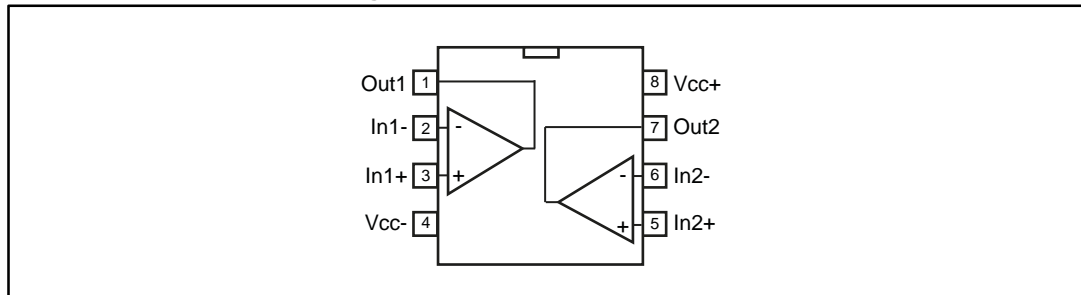
The TSX3702 is a micropower CMOS dual voltage comparator which exhibits a very low current consumption of 5 μ A typical per comparator. This device was designed as the improvement of the TS3702: it shows a lower current consumption, a better input offset voltage, and an enhanced ESD tolerance. The TSX3702 is fully specified over a wide temperature range and is proposed in automotive grade for the SO8 package. It is fully compatible with the TS3702 CMOS comparator and is available with similar packages. New tiny packages (MiniSO8 and DFN8 2x2 mm) are also proposed for the TSX3702 thus allowing even more integration on applications.

Contents

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1 Package pin connections

Figure 1: Pin connections top view



2 Absolute maximum ratings

Table 1: Absolute maximum ratings (AMR)

| Symbol | Parameter | Value | Unit | |
|------------|---|------------|------|------|
| V_{CC+} | Supply voltage ⁽¹⁾ | 18 | V | |
| V_{id} | Differential input voltage ⁽²⁾ | ±18 | | |
| V_{in} | Input voltage | -0.3 to 18 | | |
| V_o | Output voltage | 18 | | |
| I_o | Output current | 20 | mA | |
| I_F | Forward current in ESD protection diodes on inputs ⁽³⁾ | 50 | | |
| T_j | Maximum junction temperature | 150 | °C | |
| R_{thja} | Thermal resistance junction to ambient ⁽⁴⁾ | SO8 | 125 | °C/W |
| | | TSSOP8 | 120 | |
| | | MiniSO8 | 190 | |
| | | DFN8 2x2 | 57 | |
| T_{stg} | Storage temperature range | -65 to 150 | °C | |
| ESD | HBM: human body model ⁽⁵⁾ | 4000 | V | |
| | MM: machine model ⁽⁶⁾ | 200 | | |
| | CDM: charged device model ⁽⁷⁾ | 1500 | | |
| | Latch-up immunity | 200 | mA | |

Notes:

- ⁽¹⁾All voltage values, except differential voltage, are with respect to network ground terminal.
- ⁽²⁾Differential voltages are the non-inverting input terminal with respect to the inverting input terminal.
- ⁽³⁾Guaranteed by design
- ⁽⁴⁾Short-circuits can cause excessive heating and destructive dissipation. Values are typical.
- ⁽⁵⁾According to JEDEC standard JESD22-A114F
- ⁽⁶⁾According to JEDEC standard JESD22-A115A
- ⁽⁷⁾According to ANSI/ESD STM5.3.1

3 Operating conditions

Table 2: Operating conditions

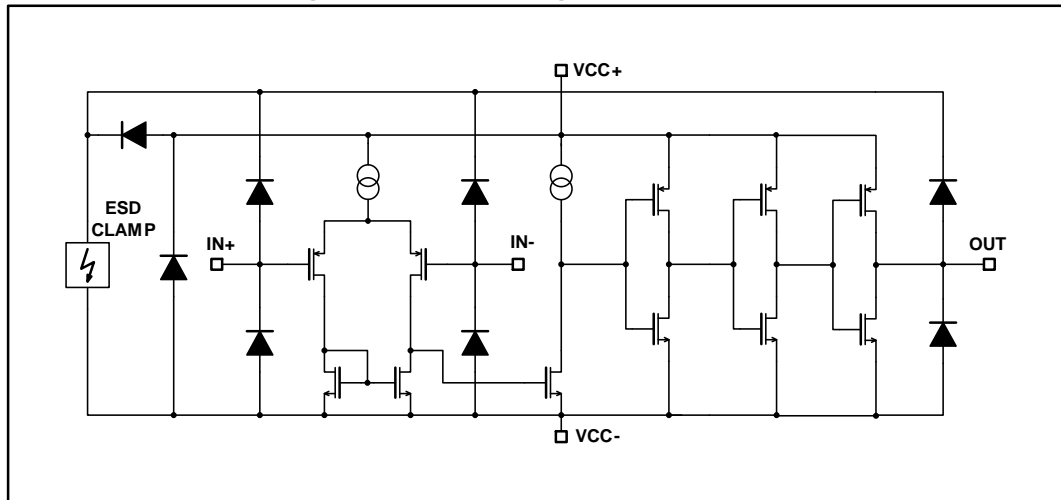
| Symbol | Parameter | Value | Unit |
|-----------------|--------------------------------------|----------------------|------|
| V_{CC+} | Supply voltage | 2.7 to 16 | V |
| $V_{icm}^{(1)}$ | Common mode input voltage range | 0 to $V_{CC+} - 1.5$ | |
| | $T_{min} \leq T_{amb} \leq T_{max}$ | 0 to $V_{CC+} - 2$ | |
| T_{oper} | Operating free-air temperature range | -40 to 125 | °C |

Notes:

⁽¹⁾The output state is guaranteed as long as one input remains with this common mode input voltage range, and the other input remains between -0.3 V and 16 V (meaning that one input can be driven above V_{CC+}).

4 Schematic diagram

Figure 2: Schematic diagram (one operator)



5 Electrical characteristics

Table 3: $V_{CC+} = 3\text{ V}$, $V_{CC-} = 0\text{ V}$, $T_{amb} = 25\text{ °C}$ (unless otherwise specified)

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|-----------|-------------------------------------|---|------|------|------|------|
| V_{io} | Input offset voltage ⁽¹⁾ | $V_{icm} = 0\text{ V}$ | -5 | 0.1 | 5 | mV |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | -6 | | 6 | |
| I_{io} | Input offset current ⁽²⁾ | $V_{icm} = V_{CC}/2$ | | 1 | 10 | pA |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | | | 600 | |
| I_{ib} | Input bias current ⁽²⁾ | $V_{icm} = V_{CC}/2$ | | 1 | 10 | pA |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | | | 1200 | |
| CMR | Common-mode rejection ratio | $V_{icm} = 0\text{ to max }V_{icm}$ | 58 | 73 | | dB |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | 55 | | | |
| SVR | Supply voltage rejection ratio | $V_{CC+} = 3\text{ V to }5\text{ V}$, $V_{icm} = V_{CC}/2$ | 69 | 88 | | dB |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | 69 | | | |
| V_{OH} | High-level output voltage drop | $V_{id} = 1\text{ V}$, $I_{OH} = 4\text{ mA}$ | | 300 | 400 | mV |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | | | 600 | |
| V_{OL} | Low-level output voltage | $V_{id} = -1\text{ V}$, $I_{OL} = 4\text{ mA}$ | | 300 | 400 | mV |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | | | 600 | |
| I_{CC} | Supply current per comparator | No load, outputs low | | 5 | 6 | μA |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | | | 7 | |
| | | No load, outputs high | | 8 | 9 | |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | | | 11 | |
| t_{PLH} | Response time low to high | $V_{icm} = 0\text{ V}$, $f = 10\text{ kHz}$, $R_L = 5.1\text{ k}\Omega$, $C_L = 50\text{ pF}$, overdrive = 5 mV | | 2.4 | | μs |
| | | Overdrive = 100 mV | | 0.5 | 0.6 | |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | | | 0.77 | |
| t_{PHL} | Response time high to low | $V_{icm} = 0\text{ V}$, $f = 10\text{ kHz}$, $R_L = 5.1\text{ k}\Omega$, $C_L = 50\text{ pF}$, overdrive = 5 mV | | 2.0 | | μs |
| | | Overdrive = 100 mV | | 0.45 | 0.6 | |
| | | $T_{min} \leq T_{amb} \leq T_{max}$ | | | 0.65 | |
| t_r | Rise time | $f = 10\text{ kHz}$, $C_L = 50\text{ pF}$, $R_L = 5.1\text{ k}\Omega$, overdrive 50 mV | | 39 | | ns |
| t_f | Fall time | $f = 10\text{ kHz}$, $C_L = 50\text{ pF}$, $R_L = 5.1\text{ k}\Omega$, overdrive 50 mV | | 39 | | |

Notes:

⁽¹⁾The specified offset voltage is the maximum value required to drive the output up to 2.5 V or down to 0.3 V.

⁽²⁾Guaranteed by design

Table 4: VCC+ = 5 V, VCC- = 0 V, Tamb = 25 °C (unless otherwise specified)

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|------------------|-------------------------------------|---|------|------|------|------|
| V _{io} | Input offset voltage ⁽¹⁾ | V _{icm} = V _{CC} /2 | -5 | 0.1 | 5 | mV |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | -6 | | 6 | |
| I _{io} | Input offset current ⁽²⁾ | V _{icm} = V _{CC} /2 | | 1 | 10 | pA |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 600 | |
| I _{ib} | Input bias current ⁽²⁾ | V _{icm} = V _{CC} /2 | | 1 | 10 | pA |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 1200 | |
| CMR | Common-mode rejection ratio | V _{icm} = 0 to max V _{icm} | 66 | 85 | | dB |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | 65 | | | |
| SVR | Supply voltage rejection ratio | V _{CC} ⁺ = 5 V to 10 V, V _{icm} = V _{CC} /2 | 71 | 89 | | dB |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | 70 | | | |
| V _{OH} | High-level output voltage drop | V _{id} = 1 V, I _{OH} = 4 mA | | 180 | 250 | mV |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 400 | |
| V _{OL} | Low-level output voltage | V _{id} = -1 V, I _{OL} = 4 mA | | 180 | 250 | mV |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 400 | |
| I _{CC} | Supply current per comparator | No load, outputs low | | 5 | 8 | μA |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 9 | |
| | | No load, outputs high | | 9 | 10 | |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 11 | |
| t _{PLH} | Response time low to high | V _{icm} = 0 V, f = 10 kHz, R _L = 5.1 kΩ, C _L = 50 pF, overdrive = 5 mV | | 2.4 | | μs |
| | | Overdrive = 10 mV | | 1.5 | | |
| | | Overdrive = 20 mV | | 0.9 | | |
| | | Overdrive = 40 mV | | 0.6 | | |
| | | Overdrive = 100 mV | | 0.35 | 0.55 | |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 0.6 | |
| | | TTL input ⁽³⁾ | | 0.45 | 0.6 | |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 0.65 | |
| t _{PHL} | Response time high to low | V _{icm} = 0 V, f = 10 kHz, R _L = 5.1 kΩ, C _L = 50 pF, overdrive = 5 mV | | 2.8 | | μs |
| | | Overdrive = 10 mV | | 1.8 | | |
| | | Overdrive = 20 mV | | 1.0 | | |
| | | Overdrive = 40 mV | | 0.7 | | |
| | | Overdrive = 100 mV | | 0.46 | 0.6 | |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 0.7 | |
| | | TTL input ⁽³⁾ | | 0.30 | 0.40 | |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 0.50 | |

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|--------|-----------|---|------|------|------|------|
| t_r | Rise time | $f = 10 \text{ kHz}$, $C_L = 50 \text{ pF}$, $R_L = 5.1 \text{ k}\Omega$, overdrive 50 mV | | 30 | | ns |
| t_f | Fall time | $f = 10 \text{ kHz}$, $C_L = 50 \text{ pF}$, $R_L = 5.1 \text{ k}\Omega$, overdrive 50 mV | | 30 | | |

Notes:

(1)The specified offset voltage is the maximum value required to drive the output up to 4.5 V or down to 0.3 V.

(2)Guaranteed by design

(3)A step from 0 V to 3 V is applied on one input while the other is fixed at 1.4 V. Response time is the time interval between the application of the input voltage step and the moment the output voltage reaches 50 % of its final value.

Table 5: VCC+ = 16 V, VCC- = 0 V, Tamb = 25 °C (unless otherwise specified)

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|------------------|-------------------------------------|---|------|------|------|------|
| V _{io} | Input offset voltage ⁽¹⁾ | V _{icm} = V _{CC} /2 | -5 | 0.1 | 5 | mV |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | -6 | | 6 | |
| I _{io} | Input offset current ⁽²⁾ | V _{icm} = V _{CC} /2 | | 1 | 10 | pA |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 600 | |
| I _{ib} | Input bias current ⁽²⁾ | V _{icm} = V _{CC} /2 | | 1 | 10 | pA |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 1200 | |
| CMR | Common-mode rejection ratio | V _{icm} = 0 to max V _{icm} | 72 | 90 | | dB |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | 70 | | | |
| SVR | Supply voltage rejection ratio | V _{CC} ⁺ = 5 V to 16 V, V _{icm} = V _{CC} /2 | 73 | 90 | | dB |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | 72 | | | |
| V _{OH} | High-level output voltage drop | V _{id} = 1 V, I _{OH} = 4 mA | | 90 | 150 | mV |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 250 | |
| V _{OL} | Low-level output voltage | V _{id} = -1 V, I _{OL} = 4 mA | | 90 | 150 | mV |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 250 | |
| I _{CC} | Supply current per comparator | No load, outputs low | | 7 | 9 | μA |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 10 | |
| | | No load, outputs high | | 11 | 13 | |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 14 | |
| t _{PLH} | Response time low to high | V _{icm} = 0 V, f = 10 kHz, R _L = 5.1 kΩ, C _L = 50 pF, overdrive = 5 mV | | 2.2 | | μs |
| | | Overdrive = 10 mV | | 1.4 | | |
| | | Overdrive = 20 mV | | 0.9 | | |
| | | Overdrive = 40 mV | | 0.6 | | |
| | | Overdrive = 100 mV | | 0.34 | 0.55 | |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 0.60 | |
| t _{PHL} | Response time high to low | V _{icm} = 0 V, f = 10 kHz, R _L = 5.1 kΩ, C _L = 50 pF, overdrive = 5 mV | | 2.4 | | μs |
| | | Overdrive = 10 mV | | 1.6 | | |
| | | Overdrive = 20 mV | | 1.0 | | |
| | | Overdrive = 40 mV | | 0.7 | | |
| | | Overdrive = 100 mV | | 0.55 | 0.70 | |
| | | T _{min} ≤ T _{amb} ≤ T _{max} | | | 0.75 | |
| t _r | Rise time | f = 10 kHz, C _L = 50 pF, R _L = 5.1 kΩ, overdrive 50 mV | | 11 | | ns |
| t _f | Fall time | f = 10 kHz, C _L = 50 pF, R _L = 5.1 kΩ, overdrive 50 mV | | 11 | | |

Notes:

⁽¹⁾The specified offset voltage is the maximum value required to drive the output up to 4.5 V or down to 0.3 V.

⁽²⁾Guaranteed by design

Figure 3: Current consumption vs. supply voltage, output high

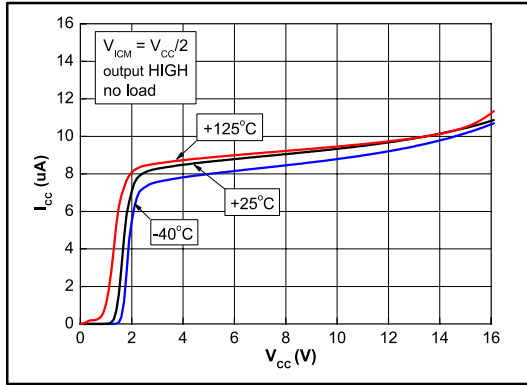


Figure 4: Current consumption vs. supply voltage, output low

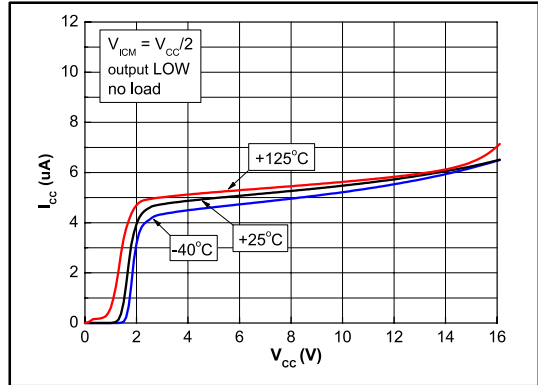


Figure 5: Current consumption vs. input common-mode voltage, output high

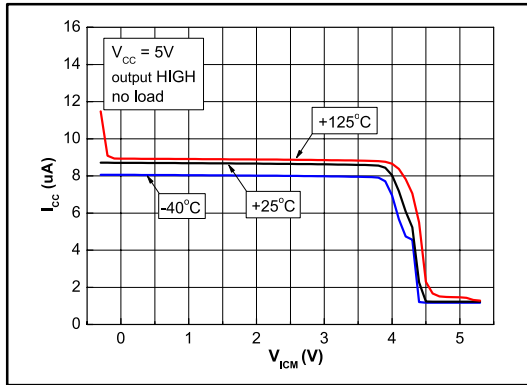


Figure 6: Current consumption vs. common-mode voltage, output low

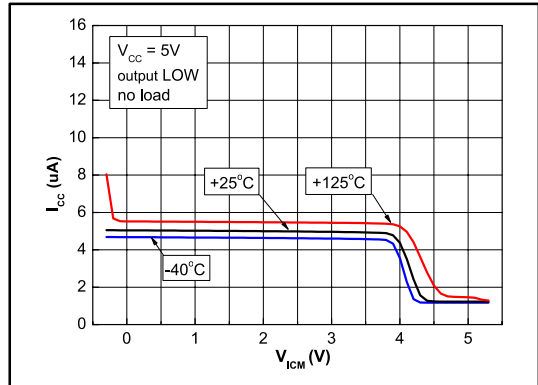


Figure 7: Output voltage drop vs. output source current, VCC = 5 V

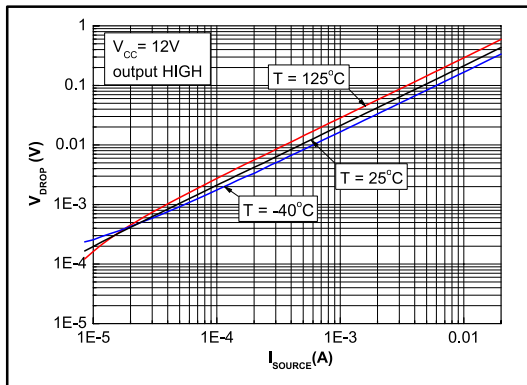


Figure 8: Output voltage drop vs. output source current, VCC = 12 V

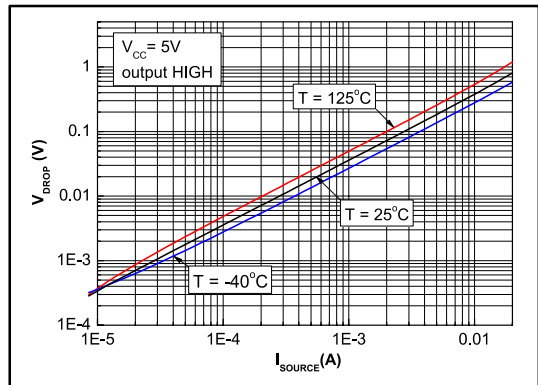


Figure 9: Output voltage drop vs. output sink current, VCC = 5 V

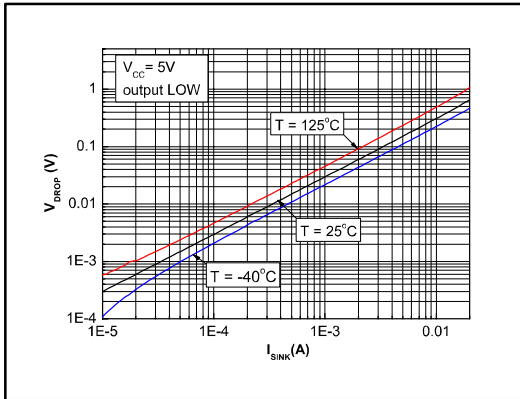


Figure 10: Output voltage drop vs. output sink current, VCC = 12 V

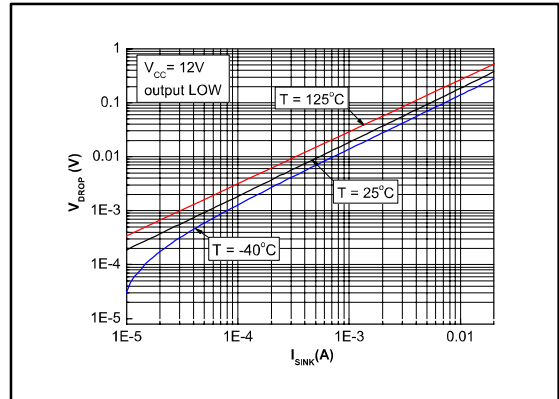


Figure 11: Input offset voltage distribution, VCC = 5 V

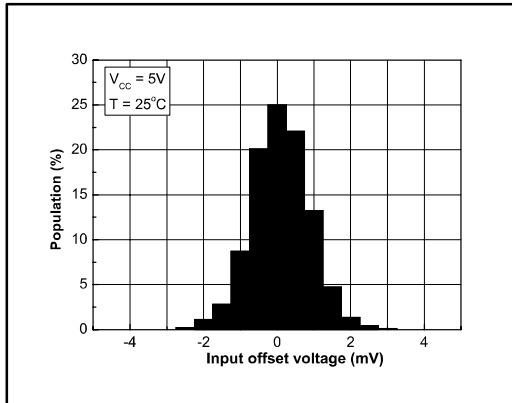


Figure 12: Input current vs input voltage, VCC = 5 V

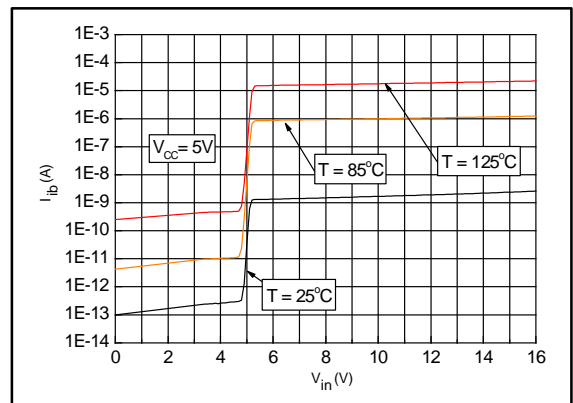


Figure 13: Propagation delay tPLH vs. input signal overdrive, VCC = 5 V

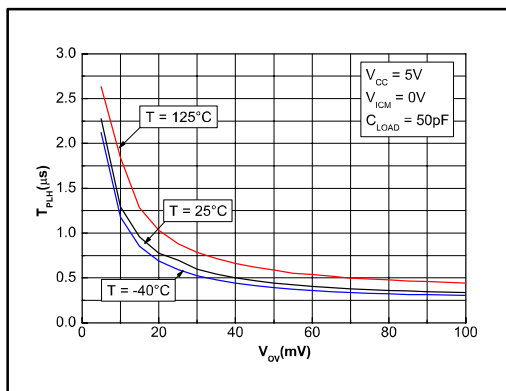


Figure 14: Propagation delay tPHL vs. input signal overdrive, VCC = 5 V

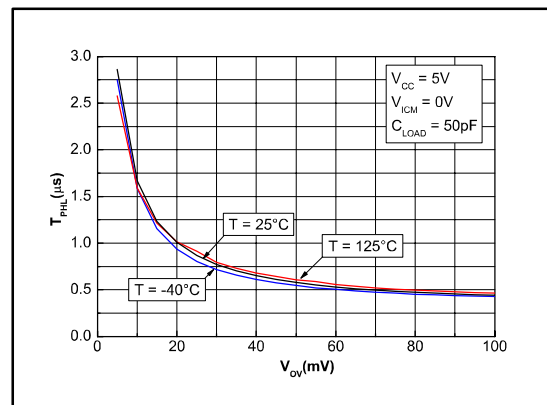


Figure 15: Propagation delay tPLH vs. supply voltage, VCC = 5 V

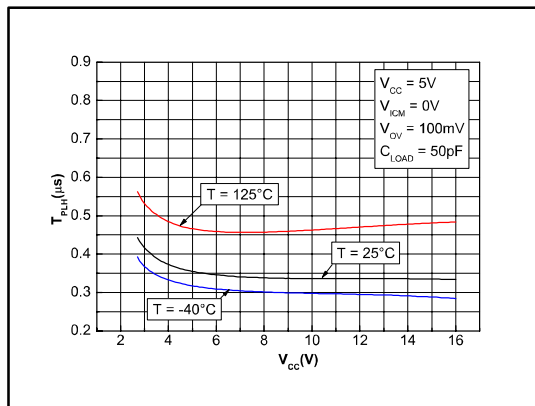
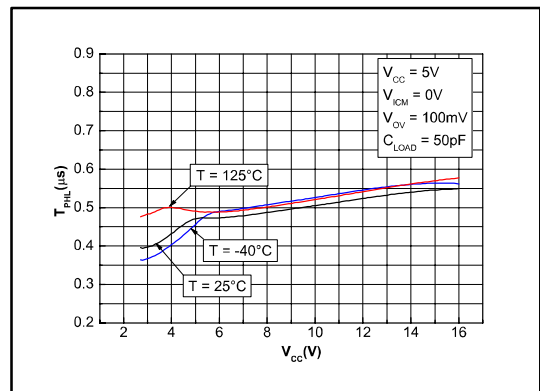


Figure 16: Propagation delay tPHL vs. supply voltage, VCC = 5 V



6 Application information (input voltages)

The ESD strategy used in the TSX3702 (and shown in [Figure 2](#)) allows input voltages from -0.3 V up to 16 V to be applied regardless of the V_{CC+} voltage. When $V_{IN} > V_{CC+}$ a leakage current goes from the input through the protection diode to the ESD clamp. This current is about 0.2 nA at 25 °C and about 250 nA at 125 °C. For a detailed input characteristic see [Figure 12](#). The device is designed to prevent phase reversal.

7 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

7.1 SO8 package information

Figure 17: SO8 package outline

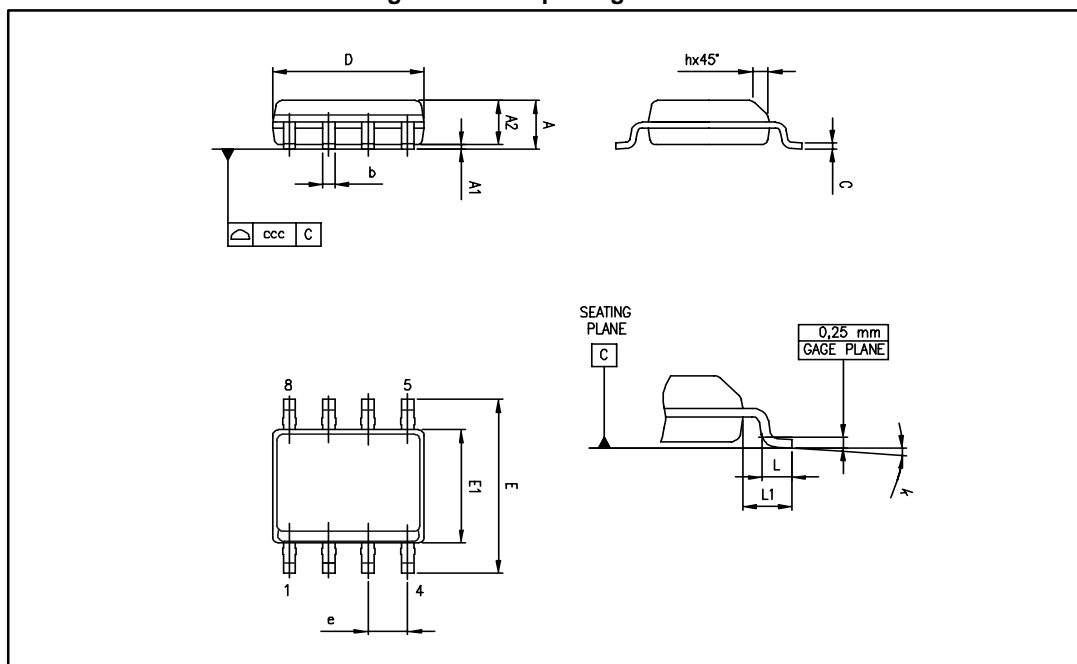


Table 6: SO8 mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max |
| A | | | 1.75 | | | 0.069 |
| A1 | 0.10 | | 0.25 | 0.004 | | 0.010 |
| A2 | 1.25 | | | 0.049 | | |
| b | 0.28 | | 0.48 | 0.011 | | 0.019 |
| c | 0.17 | | 0.23 | 0.007 | | 0.010 |
| D | 4.80 | 4.90 | 5.00 | 0.189 | 0.193 | 0.197 |
| E | 5.80 | 6.00 | 6.20 | 0.228 | 0.236 | 0.244 |
| E1 | 3.80 | 3.90 | 4.00 | 0.150 | 0.154 | 0.157 |
| e | | 1.27 | | | 0.050 | |
| h | 0.25 | | 0.50 | 0.010 | | 0.020 |
| L | 0.40 | | 1.27 | 0.016 | | 0.050 |
| L1 | | 1.04 | | | 0.040 | |
| k | 1° | | 8° | 1° | | 8° |
| ccc | | | 0.10 | | | 0.004 |

7.2 TSSOP8 package information

Figure 18: TSSOP8 package outline

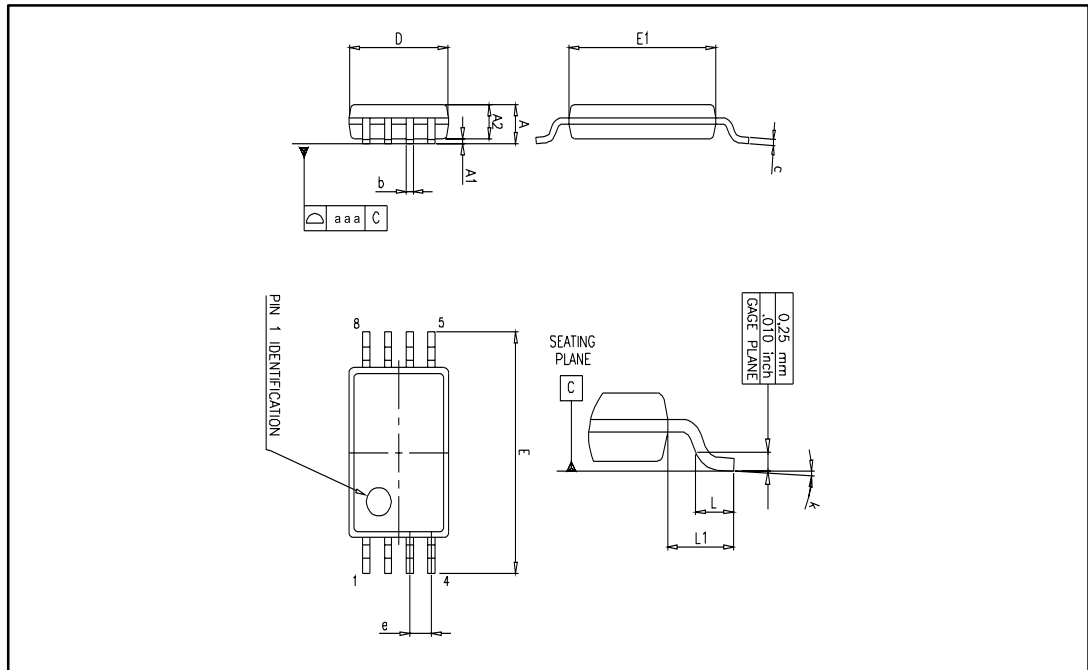


Table 7: TSSOP8 mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|--------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 1.2 | | | 0.047 |
| A1 | 0.05 | | 0.15 | 0.002 | | 0.006 |
| A2 | 0.80 | 1.00 | 1.05 | 0.031 | 0.039 | 0.041 |
| b | 0.19 | | 0.30 | 0.007 | | 0.012 |
| c | 0.09 | | 0.20 | 0.004 | | 0.008 |
| D | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| E | 6.20 | 6.40 | 6.60 | 0.244 | 0.252 | 0.260 |
| E1 | 4.30 | 4.40 | 4.50 | 0.169 | 0.173 | 0.177 |
| e | | 0.65 | | | 0.0256 | |
| k | 0° | | 8° | 0° | | 8° |
| L | 0.45 | 0.60 | 0.75 | 0.018 | 0.024 | 0.030 |
| L1 | | 1 | | | 0.039 | |
| aaa | | 0.1 | | | 0.004 | |

7.3 DFN8 2x2 package information

Figure 19: DFN8 2x2 package outline

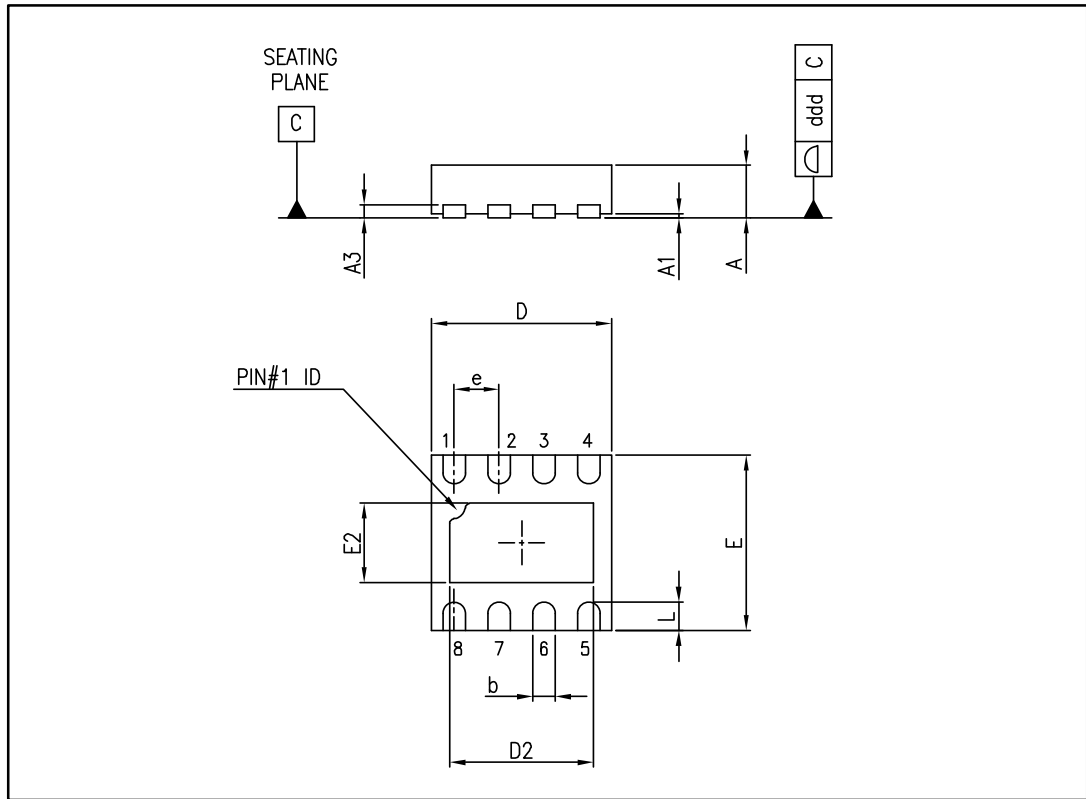
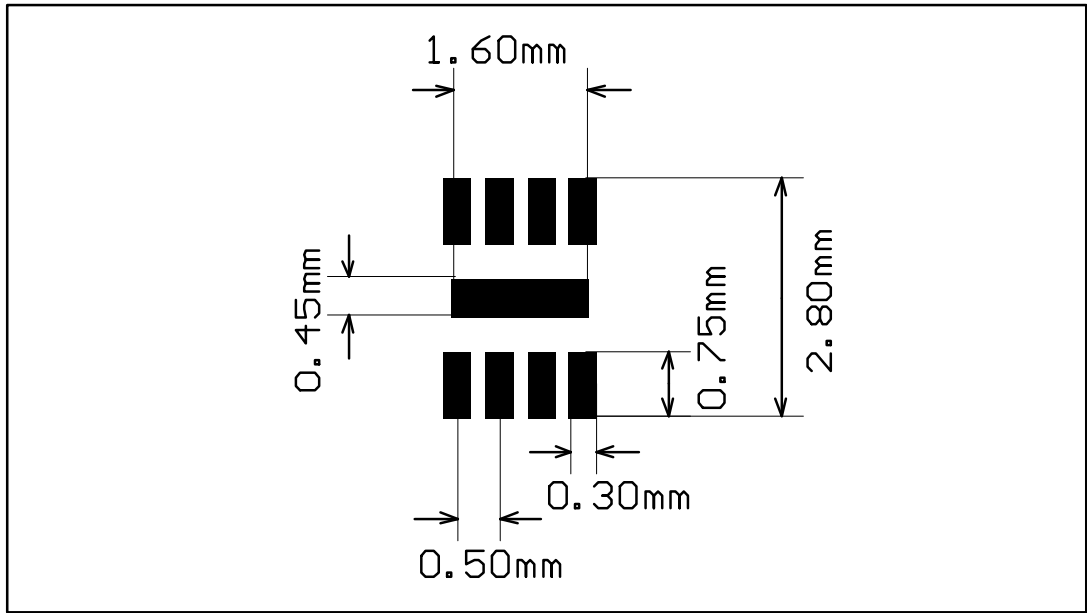


Table 8: DFN8 2x2 mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.51 | 0.55 | 0.60 | 0.020 | 0.022 | 0.024 |
| A1 | | | 0.05 | | | 0.002 |
| A3 | | 0.15 | | | 0.006 | |
| b | 0.18 | 0.25 | 0.30 | 0.007 | 0.010 | 0.012 |
| D | 1.85 | 2.00 | 2.15 | 0.073 | 0.079 | 0.085 |
| D2 | 1.45 | 1.60 | 1.70 | 0.057 | 0.063 | 0.067 |
| E | 1.85 | 2.00 | 2.15 | 0.073 | 0.079 | 0.085 |
| E2 | 0.75 | 0.90 | 1.00 | 0.030 | 0.035 | 0.039 |
| e | | 0.50 | | | 0.020 | |
| L | | | 0.425 | | | 0.017 |
| ddd | | | 0.08 | | | 0.003 |

Figure 20: DFN8 2x2 recommended footprint



7.4 MiniSO8 package information

Figure 21: MiniSO8 package outline

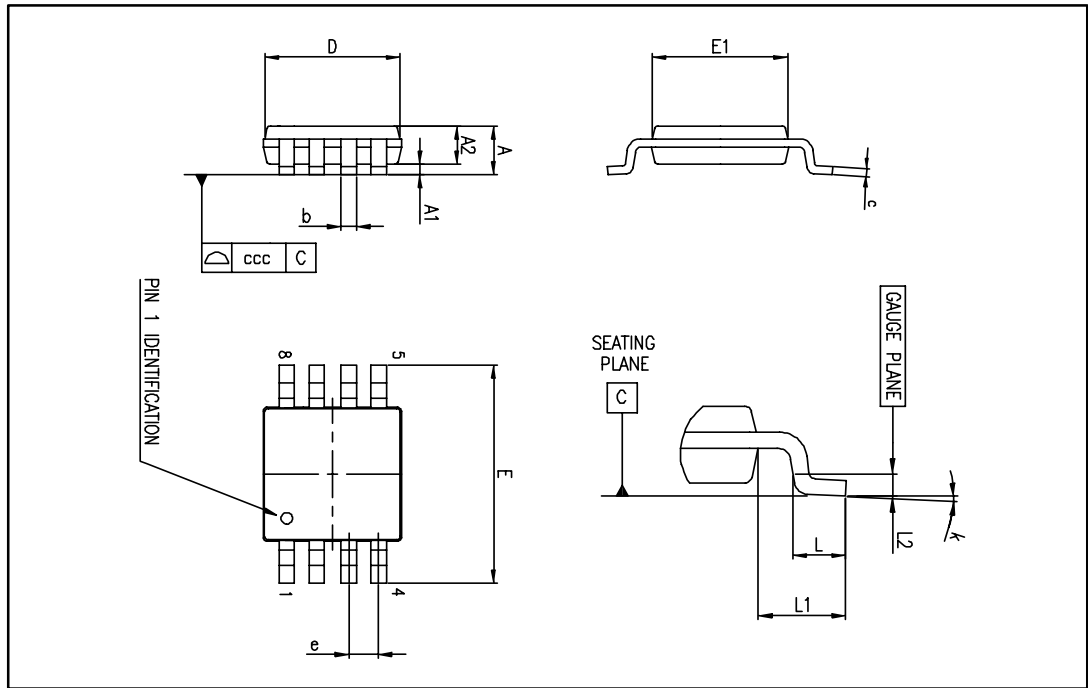


Table 9: MiniSO8 mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 1.1 | | | 0.043 |
| A1 | 0 | | 0.15 | 0 | | 0.006 |
| A2 | 0.75 | 0.85 | 0.95 | 0.030 | 0.033 | 0.037 |
| b | 0.22 | | 0.40 | 0.009 | | 0.016 |
| c | 0.08 | | 0.23 | 0.003 | | 0.009 |
| D | 2.80 | 3.00 | 3.20 | 0.11 | 0.118 | 0.126 |
| E | 4.65 | 4.90 | 5.15 | 0.183 | 0.193 | 0.203 |
| E1 | 2.80 | 3.00 | 3.10 | 0.11 | 0.118 | 0.122 |
| e | | 0.65 | | | 0.026 | |
| L | 0.40 | 0.60 | 0.80 | 0.016 | 0.024 | 0.031 |
| L1 | | 0.95 | | | 0.037 | |
| L2 | | 0.25 | | | 0.010 | |
| k | 0° | | 8° | 0° | | 8° |
| ccc | | | 0.10 | | | 0.004 |

8 Ordering information

Table 10: Order codes

| Order code | Temperature range | Package | Packing | Marking |
|----------------------------|-------------------|------------------------|---------------|---------|
| TSX3702IDT | -40 °C, 125 °C | SO8 | Tape and reel | SX3702 |
| TSX3702IPT | | TSSOP8 | | S3702 |
| TSX3702IST | | MiniSO8 | | K532 |
| TSX3702IQ2T | | DFN8 2x2 | | K5J |
| TSX3702IYDT ⁽¹⁾ | | SO8 (automotive grade) | | SX3702Y |

Notes:

⁽¹⁾Automotive qualification ongoing

9 Revision history

Table 11: Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 18-Apr-2014 | 1 | Initial release. |
| 13-Feb-2015 | 2 | <p>Table 1: Absolute maximum ratings (AMR): removed footnote associated with V_{in}.</p> <p>Table 2: Operating conditions: added footnote concerning V_{icm}.</p> <p>Figure 2: Schematic diagram (one operator): updated</p> <p>Table 6: added "L1"</p> |
| 06-Jun-2016 | 3 | <p>Table 3, Table 4, and Table 5: updated several values (I_{io}, I_{ib}, t_{PLH}, and t_{PHL}) and conditions (V_{OH}, V_{OL}, and CMR)</p> <p>Table 10: updated marking of order code TSX3702IPT (now SX3702 instead of 5X3702), updated automotive order code footnote.</p> |

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