Functional Safety Information

SN74LV405xA-Q1
Functional Safety FIT Rate, FMD and Pin FMA

Table of Contents

Trademarks

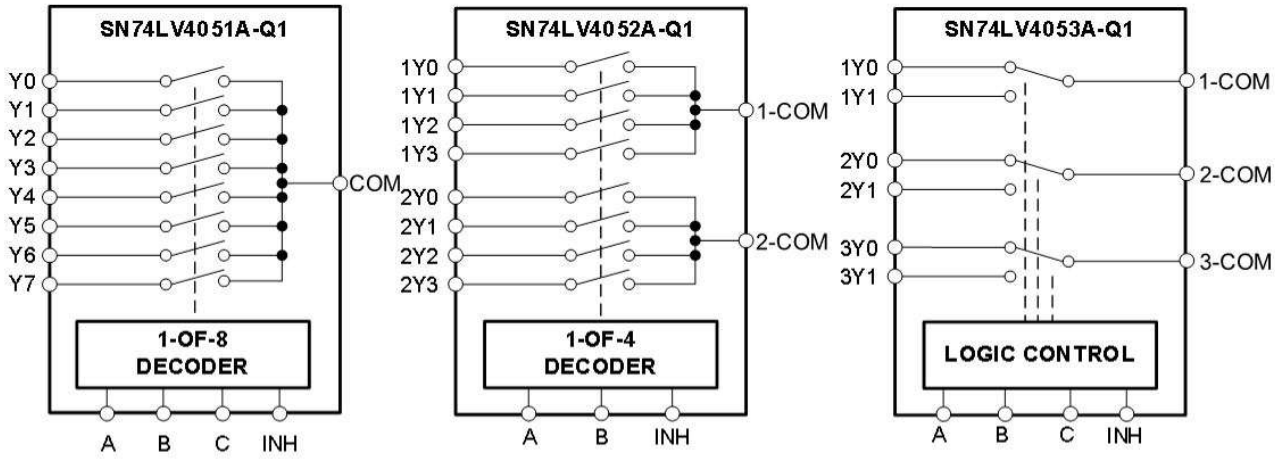
1 Overview

This document contains information for the SN74LV405xA-Q1 (TSSOP, SOIC, and the SOT-23-THIN packages) to aid in a functional safety system design. Information provided are:

- Functional safety failure in time (FIT) rates of the semiconductor component estimated by the application of industry reliability standards
- Component failure modes and their distribution (FMD) based on the primary function of the device
- Pin failure mode analysis (pin FMA)

Figure 1-1 shows the device functional block diagram for reference.

Figure 1-1. Functional Block Diagram



The SN74LV405xA-Q1 was developed using a quality-managed development process, but was not developed in accordance with the IEC 61508 or ISO 26262 standards.

2 Functional Safety Failure In Time (FIT) Rates

2.1 TSSOP Package

This section provides functional safety failure in time (FIT) rates for the TSSOP package of the SN74LV405xA-Q1 based on two different industry-wide used reliability standards:

- Table 2-1 provides FIT rates based on IEC TR 62380 / ISO 26262 part 11
- Table 2-2 provides FIT rates based on the Siemens Norm SN 29500-2

Table 2-1. Component Failure Rates per IEC TR 62380 / ISO 26262 Part 11

FIT IEC TR 62380 / ISO 26262	FIT (Failures Per 10^9 Hours)
Total component FIT rate	17
Die FIT rate	3
Package FIT rate	14

The failure rate and mission profile information in Table 2-1 comes from the reliability data handbook IEC TR 62380 / ISO 26262 part 11:

- Mission profile: Motor control from table 11 or figure 16
- Power dissipation: 140.6mW
- Climate type: World-wide table 8 or figure 13
- Package factor (lambda 3): Table 17b or figure 15
- Substrate material: FR4
- EOS FIT rate assumed: 0 FIT

Table 2-2. Component Failure Rates per Siemens Norm SN 29500-2

Table	Category	Reference FIT Rate	Reference Virtual T_J
5	BICMOS ASICs Analog and mixed = <50V supply	20 FIT	55°C

The reference FIT rate and reference virtual T_J (junction temperature) in Table 2-2 come from the Siemens Norm SN 29500-2 tables 1 through 5. Failure rates under operating conditions are calculated from the reference failure rate and virtual junction temperature using conversion information in SN 29500-2 section 4.

2.2 SOIC Package

This section provides functional safety failure in time (FIT) rates for the SOIC package of the SN74LV405xA-Q1 based on two different industry-wide used reliability standards:

- Table 2-3 provides FIT rates based on IEC TR 62380 / ISO 26262 part 11
- Table 2-4 provides FIT rates based on the Siemens Norm SN 29500-2

Table 2-3. Component Failure Rates per IEC TR 62380 / ISO 26262 Part 11

FIT IEC TR 62380 / ISO 26262	FIT (Failures Per 10^9 Hours)
Total component FIT rate	36
Die FIT rate	3
Package FIT rate	33

The failure rate and mission profile information in Table 2-3 comes from the reliability data handbook IEC TR 62380 / ISO 26262 part 11:

- Mission profile: Motor control from table 11 or figure 16
- Power dissipation: 140.6mW
- Climate type: World-wide table 8 or figure 13
- Package factor (lambda 3): Table 17b or figure 15
- Substrate material: FR4
- EOS FIT rate assumed: 0 FIT

Table 2-4. Component Failure Rates per Siemens Norm SN 29500-2

Table	Category	Reference FIT Rate	Reference Virtual T_J
5	BICMOS ASICs Analog and mixed = <50V supply	20 FIT	55°C

The reference FIT rate and reference virtual T_J (junction temperature) in Table 2-4 come from the Siemens Norm SN 29500-2 tables 1 through 5. Failure rates under operating conditions are calculated from the reference failure rate and virtual junction temperature using conversion information in SN 29500-2 section 4.

2.3 SOT-23-THIN Package

This section provides functional safety failure in time (FIT) rates for the SOT-23-THIN package of the SN74LV405xA-Q1 based on two different industry-wide used reliability standards:

- Table 2-5 provides FIT rates based on IEC TR 62380 / ISO 26262 part 11
- Table 2-6 provides FIT rates based on the Siemens Norm SN 29500-2

Table 2-5. Component Failure Rates per IEC TR 62380 / ISO 26262 Part 11

FIT IEC TR 62380 / ISO 26262	FIT (Failures Per 10^9 Hours)
Total component FIT rate	9
Die FIT rate	3
Package FIT rate	6

The failure rate and mission profile information in Table 2-5 comes from the reliability data handbook IEC TR 62380 / ISO 26262 part 11:

- Mission profile: Motor control from table 11 or figure 16
- Power dissipation: 140.6mW
- Climate type: World-wide table 8 or figure 13
- Package factor (lambda 3): Table 17b or figure 15
- Substrate material: FR4
- EOS FIT rate assumed: 0 FIT

Table 2-6. Component Failure Rates per Siemens Norm SN 29500-2

Table	Category	Reference FIT Rate	Reference Virtual T_J
5	BICMOS ASICs Analog and mixed = <50V supply	20 FIT	55°C

The reference FIT rate and reference virtual T_J (junction temperature) in Table 2-6 come from the Siemens Norm SN 29500-2 tables 1 through 5. Failure rates under operating conditions are calculated from the reference failure rate and virtual junction temperature using conversion information in SN 29500-2 section 4.

3 Failure Mode Distribution (FMD)

The failure mode distribution estimation for the SN74LV405xA-Q1 in Table 3-1 comes from the combination of common failure modes listed in standards such as IEC 61508 and ISO 26262, the ratio of sub-circuit function size and complexity, and from best engineering judgment.

The failure modes listed in this section reflect random failure events and do not include failures resulting from misuse or overstress.

Table 3-1. Die Failure Modes and Distribution

Die Failure Modes	Failure Mode Distribution (%)
MUX no output (Hi-Z)	45
MUX channel stuck on	5
MUX channel stuck off	5
MUX functional, out of specification voltage or timing	45

4 Pin Failure Mode Analysis (Pin FMA)

This section provides a failure mode analysis (FMA) for the pins of the SN74LV405xA-Q1. The failure modes covered in this document include the typical pin-by-pin failure scenarios:

- Pin short-circuited to ground (see Table 4-2, Table 4-6, and Table 4-10)
- Pin open-circuited (see Table 4-3, Table 4-7, and Table 4-11)
- Pin short-circuited to an adjacent pin (see Table 4-4, Table 4-8, and Table 4-12)
- Pin short-circuited to Vcc (see Table 4-5, Table 4-9, and Table 4-13)

Table 4-2 through Table 4-13 also indicate how these pin conditions can affect the device as per the failure effects classification in Table 4-1.

Table 4-1. TI Classification of Failure Effects

Class	Failure Effects
A	Potential device damage that affects functionality.
B	No device damage, but loss of functionality.
C	No device damage, but performance degradation.
D	No device damage, no impact to functionality or performance.

4.1 SN74LV4051A-Q1: TSSOP, SOIC, and SOT-23-THIN Packages

Figure 4-1 and Figure 4-2 show the SN74LV405xA-Q1 pin diagrams for the TSSOP, SOIC, and SOT-23-THIN packages. For a detailed description of the device pins, see the *Pin Configuration and Functions* section in the SN74LV405xA-Q1 data sheet.

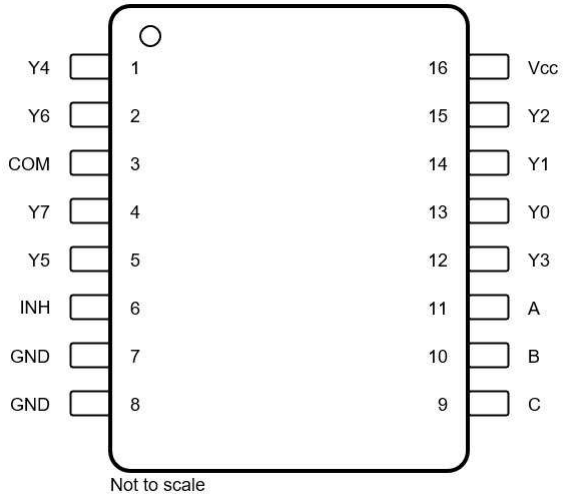


Figure 4-1. Pin Diagram TSSOP and SOIC Packages

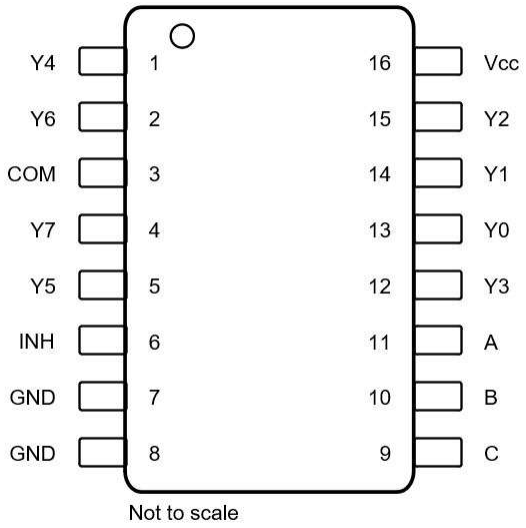


Figure 4-2. Pin Diagram SOT-23-THIN Package

Table 4-2. Pin FMA for Device Pins Short-Circuited to Ground

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
Y4	1	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y6	2	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
COM	3	Corruption of the signal passed on to the Y pins. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y7	4	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y5	5	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
INH	6	INH stuck low. Can no longer disable the device without power down.	B
GND	7	No effect, normal operation.	D
GND	8	No effect, normal operation.	D
C	9	Address stuck low. Cannot control switch states.	B
B	10	Address stuck low. Cannot control switch states.	B
A	11	Address stuck low. Cannot control switch states.	B
Y3	12	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y0	13	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y1	14	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y2	15	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Vcc	16	Device is not powered. Device is not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A

Table 4-3. Pin FMA for Device Pins Open-Circuited

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
Y4	1	Corruption of the signal passed on to the COM pin.	B
Y6	2	Corruption of the signal passed on to the COM pin.	B
COM	3	Corruption of the signal passed on to the Y pins.	B
Y7	4	Corruption of the signal passed on to the COM pin.	B
Y5	5	Corruption of the signal passed on to the COM pin.	B
INH	6	Loss of control of the INH pin. Cannot turn off the device.	B
GND	7	Device not powered. Device not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	8	Device not powered. Device not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
C	9	Control of the address pin is lost. Cannot control switch.	B
B	10	Control of the address pin is lost. Cannot control switch.	B
A	11	Control of the address pin is lost. Cannot control switch.	B
Y3	12	Corruption of the signal passed on to the COM pin.	B
Y0	13	Corruption of the signal passed on to the COM pin.	B
Y1	14	Corruption of the signal passed on to the COM pin.	B
Y2	15	Corruption of the signal passed on to the COM pin.	B
Vcc	16	Device is not powered. Device is not functional.	B

Table 4-4. Pin FMA for Device Pins Short-Circuited to Adjacent Pin

Pin Name	Pin No.	Shorted to	Description of Potential Failure Effects	Failure Effect Class
Y4	1	Y6	Possible corruption of the signal passed on to the COM pin.	B
Y6	2	COM	Possible corruption of the signal passed on to the YX and COM pin.	B
COM	3	Y7	Possible corruption of the signal passed on to the YX and COM pin.	B
Y7	4	Y5	Possible corruption of the signal passed on to the COM pin.	B
Y5	5	INH	Possible corruption of the signal passed on to the COM pin. Switch state is undefined.	B
INH	6	GND	Possible damage to device if the signal voltage is negative. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	7	GND	Possible damage to device if the signal voltage is negative. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	8	C	Not considered, corner pin.	D
C	9	B	Control of the address pin is lost. Cannot control switch.	B
B	10	A	Control of the address pin is lost. Cannot control switch.	B
A	11	Y3	Control of the address pin is lost. Cannot control switch.	B
Y3	12	Y0	Corruption of the signal passed on to the COM pin.	B
Y0	13	Y1	Corruption of the signal passed on to the COM pin.	B
Y1	14	Y2	Corruption of the signal passed on to the COM pin.	B
Y2	1	VCC	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Vcc	16	Y4	Not considered, corner pin.	D

Table 4-5. Pin FMA for Device Pins Short-Circuited to Vcc

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
Y4	1	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y6	2	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
COM	3	Corruption of the signal passed on to the Y pins. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y7	4	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y5	5	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
INH	6	INH stuck high. Can no longer enable the device.	B
GND	7	Device is not powered and not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	8	Device is not powered and not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
C	9	Address stuck high. Cannot control switch.	B
B	10	Address stuck high. Cannot control switch.	B
A	11	Address stuck high. Cannot control switch.	B
Y3	12	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y0	13	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y1	14	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Y2	15	Corruption of the signal passed on to the COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Vcc	16	No effect, normal operation.	D

4.2 SN74LV4052A-Q1: TSSOP and SOT-23-THIN Packages

Figure 4-3 and Figure 4-4 show the SN74LV405xA-Q1 pin diagrams for the TSSOP and SOT-23-THIN packages. For a detailed description of the device pins, see the *Pin Configuration and Functions* section in the SN74LV405xA-Q1 data sheet.

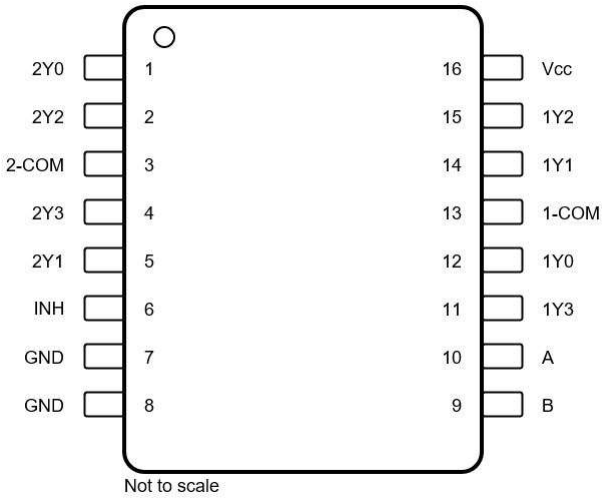


Figure 4-3. Pin Diagram TSSOP Package

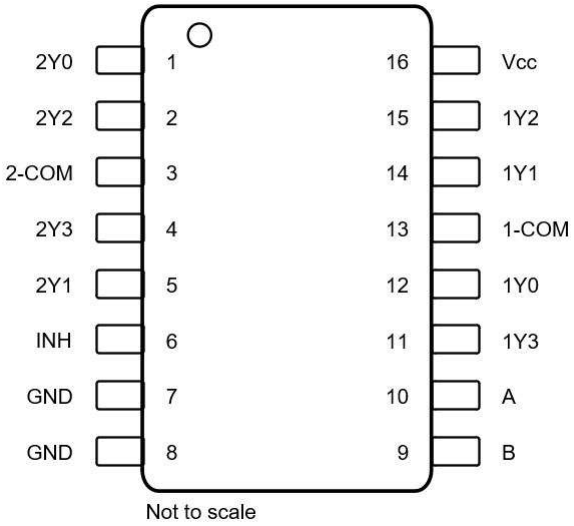


Figure 4-4. Pin Diagram SOT-23-THIN Package

Table 4-6. Pin FMA for Device Pins Short-Circuited to Ground

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
2Y0	1	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
2Y2	2	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
2-COM	3	Corruption of signal passed on to the 2Yx pins. If there is no limiting resistor in the switch path, then device damage is possible.	A
2Y3	4	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
2Y1	5	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
INH	6	INH stuck low. Can no longer disable the device without power down.	B
GND	7	No effect, normal operation.	D
GND	8	No effect, normal operation.	D
B	9	Address stuck low. Cannot control switch.	B
A	10	Address stuck low. Cannot control switch.	B
1Y3	11	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
1Y0	12	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
1-COM	13	Corruption of signal passed on to the 1Yx pins. If there is no limiting resistor in the switch path, then device damage is possible.	A
1Y1	14	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
1Y2	15	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Vcc	16	Device is not powered. Device is not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A

Table 4-7. Pin FMA for Device Pins Open-Circuited

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
2Y0	1	Corruption of the signal passed on to the 2-COM pin.	B
2Y2	2	Corruption of the signal passed on to the 2-COM pin.	B
2-COM	3	Corruption of the signal passed on to the 2Yx pins.	B
2Y3	4	Corruption of the signal passed on to the 2-COM pin.	B
2Y1	5	Corruption of the signal passed on to the 2-COM pin.	B
INH	6	Loss of control of the INH pin. Cannot turn off the device.	B
GND	7	Device not powered. Device not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	8	Device not powered. Device not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
B	9	Control of the address pin is lost. Cannot control switch.	B
A	10	Control of the address pin is lost. Cannot control switch.	B
1Y3	11	Corruption of the signal passed on to the 1-COM pin.	B
1Y0	12	Corruption of the signal passed on to the 1-COM pin.	B
1-COM	13	Corruption of the signal passed on to the 1Yx pins.	B
1Y1	14	Corruption of the signal passed on to the 1-COM pin.	B
1Y2	15	Corruption of the signal passed on to the 1-COM pin.	B
Vcc	16	Device is not powered. Device is not functional.	B

Table 4-8. Pin FMA for Device Pins Short-Circuited to Adjacent Pin

Pin Name	Pin No.	Shorted to	Description of Potential Failure Effects	Failure Effect Class
2Y0	1	2Y2	Possible corruption of the signal passed on to the 2-COM pin.	B
2Y2	2	2-COM	Possible corruption of the signal passed on to the 2Yx and 2-COM pin.	B
2-COM	3	2Y3	Possible corruption of the signal passed on to the 2Yx and 2-COM pin.	B
2Y3	4	2Y1	Possible corruption of the signal passed on to the 2-COM pin.	B
2Y1	5	INH	Possible corruption of the signal passed on to the 2-COM pin. Switch state is undefined.	B
INH	6	GND	Possible damage to device if the signal voltage is negative. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	7	GND	Possible damage to device if the signal voltage is negative. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	8	B	Not considered, corner pin.	D
B	9	A	Control of the address pin is lost. Cannot control switch.	B
A	10	1Y3	Possible corruption of the signal passed on to the 1-COM pin. Control of the address pin is lost. Cannot control switch	B
1Y3	11	1Y0	Possible corruption of the signal passed on to the 1-COM pin.	B
1Y0	12	1-COM	Possible corruption of the signal passed on to the 1Yx and 1-COM pin.	B
1-COM	13	1Y1	Possible corruption of the signal passed on to the 1Yx and 1-COM pin.	B
1Y1	14	1Y2	Possible corruption of the signal passed on to the 1-COM pin.	B
1Y2	15	Vcc	Corruption of the signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Vcc	16	2Y0	Not considered, corner pin.	D

Table 4-9. Pin FMA for Device Pins Short-Circuited to Vcc

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
2Y0	1	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
2Y2	2	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
2-COM	3	Corruption of signal passed on to the 2Yx pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
2Y3	4	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
2Y1	5	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
INH	6	INH stuck high. Can no longer enable the device.	B
GND	7	Device is not powered. Device is not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	8	Device is not powered. Device is not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
B	9	Address stuck high. Cannot control switch.	B
A	10	Address stuck high. Cannot control switch.	B
1Y3	11	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
1Y0	12	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
1-COM	13	Corruption of signal passed on to the 1Yx pin. If there is no limiting resistor in the switch path, then device damage is possible.	A

Table 4-9. Pin FMA for Device Pins Short-Circuited to Vcc (continued)

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
1Y1	14	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
1Y2	15	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Vcc	16	No effect, normal operation.	D

4.3 SN74LV4053A-Q1: TSSOP and SOT-23-THIN Packages

Figure 4-5 and Figure 4-6 show the SN74LV405xA-Q1 pin diagrams for the TSSOP and SOT-23-THIN packages. For a detailed description of the device pins, see the *Pin Configuration and Functions* section in the SN74LV405xA-Q1 data sheet.

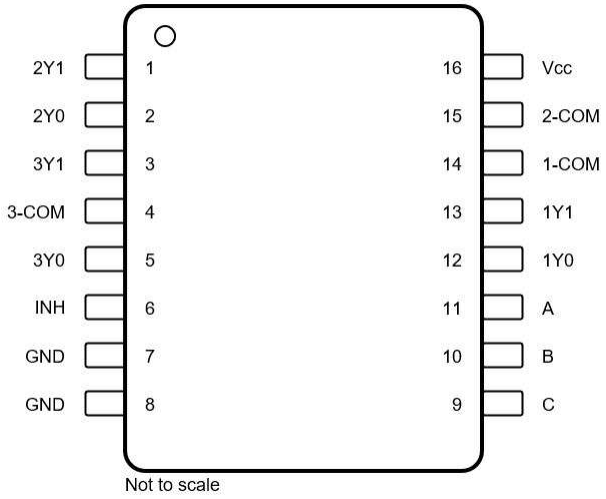


Figure 4-5. Pin Diagram TSSOP Package

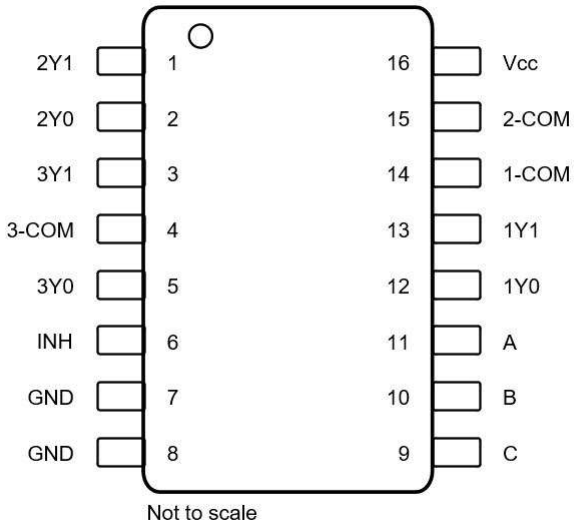


Figure 4-6. Pin Diagram SOT-23-THIN Package

Table 4-10. Pin FMA for Device Pins Short-Circuited to Ground

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
2Y1	1	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
2Y0	2	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
3Y1	3	Corruption of signal passed on to the 3-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
3-COM	4	Corruption of signal passed on to the 3Yx pins. If there is no limiting resistor in the switch path, then device damage is possible.	A
3Y0	5	Corruption of signal passed on to the 3-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
INH	6	INH stuck low. Can no longer disable the device without power down.	B
GND	7	No effect, normal operation.	D
GND	8	No effect, normal operation.	D
C	9	Address stuck low. Cannot control switch.	B
B	10	Address stuck low. Cannot control switch.	B
A	11	Address stuck low. Cannot control switch.	B
1Y0	12	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
1Y1	13	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
1-COM	14	Corruption of signal passed on to the 1Yx pins. If there is no limiting resistor in the switch path, then device damage is possible.	A
2-COM	15	Corruption of signal passed on to the 2Yx pins. If there is no limiting resistor in the switch path, then device damage is possible.	A
Vcc	16	Device is not powered. Device is not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A

Table 4-11. Pin FMA for Device Pins Open-Circuited

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
2Y1	1	Corruption of the signal passed on to the 2-COM pin.	B
2Y0	2	Corruption of the signal passed on to the 2-COM pin.	B
3Y1	3	Corruption of the signal passed on to the 3-COM pin.	B
3-COM	4	Corruption of the signal passed on to the 3Yx pins.	B
3Y0	5	Corruption of the signal passed on to the 3-COM pin.	B
INH	6	Loss of control of the INH pin. Cannot turn off the device.	B
GND	7	Device not powered. Device not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	8	Device not powered. Device not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
C	9	Control of the address pin is lost. Cannot control switch.	B
B	10	Control of the address pin is lost. Cannot control switch.	B
A	11	Control of the address pin is lost. Cannot control switch.	B
1Y0	12	Corruption of the signal passed on to the 1-COM pin.	B
1Y1	13	Corruption of the signal passed on to the 1-COM pin.	B
1-COM	14	Corruption of the signal passed on to the 1Yx pins.	B
2-COM	15	Corruption of the signal passed on to the 2Yx pins.	B
Vcc	16	Device is not powered. Device is not functional.	B

Table 4-12. Pin FMA for Device Pins Short-Circuited to Adjacent Pin

Pin Name	Pin No.	Shorted to	Description of Potential Failure Effects	Failure Effect Class
2Y1	1	2Y0	Possible corruption of the signal passed on to the 2-COM pin.	B
2Y0	2	3Y1	Possible corruption of the signal passed on to the 2-COM and 3-COM pins.	B
3Y1	3	3-COM	Possible corruption of the signal passed on to the 3Yx and 3-COM pin.	B
3-COM	4	3Y0	Possible corruption of the signal passed on to the 3Yx and 3-COM pin.	B
3Y0	5	INH	Possible corruption of the signal passed on to the 3-COM pin. Switch state is undefined.	B
INH	6	GND	Possible damage to device if the signal voltage is negative. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	7	GND	Possible damage to device if the signal voltage is negative. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	8	C	Not considered, corner pin.	D
C	9	B	Control of the address pin is lost. Cannot control switch.	B
B	10	A	Control of the address pin is lost. Cannot control switch.	B
A	11	1Y0	Possible corruption of the signal passed on to the 1-COM pin. Control of the address pin is lost. Cannot control switch.	B
1Y0	12	1Y1	Possible corruption of the signal passed on to the 1-COM pin.	B
1Y1	13	1-COM	Possible corruption of the signal passed on to the 1Yx and 1-COM pin.	B
1-COM	14	2-COM	Possible corruption of the signal passed on to the 1Yx, 2Yx, 1-COM, and 2-COM pins.	B
2-COM	15	Vcc	Corruption of the signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Vcc	16	2Y1	Not considered, corner pin.	D

Table 4-13. Pin FMA for Device Pins Short-Circuited to Vcc

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
2Y1	1	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
2Y0	2	Corruption of signal passed on to the 2-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
3Y1	3	Corruption of signal passed on to the 3-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
3-COM	4	Corruption of signal passed on to the 3Yx pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
3Y0	5	Corruption of signal passed on to the 3-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
INH	6	INH stuck high. Can no longer enable the device.	B
GND	7	Device is not powered. Device is not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
GND	8	Device is not powered. Device is not functional. Observe that the absolute maximum ratings for all pins of the device are met, otherwise device damage is possible.	A
C	9	Address stuck high. Cannot control switch.	B
B	10	Address stuck high. Cannot control switch.	B
A	11	Address stuck high. Cannot control switch.	B
1Y0	12	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
1Y1	13	Corruption of signal passed on to the 1-COM pin. If there is no limiting resistor in the switch path, then device damage is possible.	A

Table 4-13. Pin FMA for Device Pins Short-Circuited to Vcc (continued)

Pin Name	Pin No.	Description of Potential Failure Effects	Failure Effect Class
1-COM	14	Corruption of signal passed on to the 1Yx pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
2-COM	15	Corruption of signal passed on to the 2Yx pin. If there is no limiting resistor in the switch path, then device damage is possible.	A
Vcc	16	No effect, normal operation.	D

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (August 2024) to Revision A (February 2025) **Page**

- MUX no output (Hi-Z) was changed to 45 instead of 5 in the *Die Failure Modes and Distribution* table.....5
- MUX channel stuck off was changed to 5 instead of 45 in the *Die Failure Modes and Distribution* table.....5

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