

High-Speed, Four-Channel Differential Line Driver

PRODUCT DESCRIPTION

The MS2574/MS2574T/MS2574S is a high-speed, low power dissipation four-channel line driver, which is applied to equilibrium or non-equilibrium digital data transmission. Tri-state outputs can provide high current for driving equalized line such as twisted-pair or parallel dual-line and maintain high impedance state when in power-down state. The four drivers all have enable functions, which support two optional inputs: active high and active low (G, GN).

The MS2574 is available in SOP16 package, the MS2574T is available in TSSOP16 package and the MS2574S is available in SSOP16 package.

FEATURES

- Meet ANSI TIA/EIA-422-B, TIA/EIA-423-B and ITU Suggestion V.10 and V.11
- Transmission Rate: 50MHz
- Complementary Output
- Output Driver: $\pm 50\text{mA}$
- Power Supply: 3.0V-5.5V
- Tri-state Outputs
- Fail-safe for Open Output
- Bus Terminal ESD: $\pm 18\text{kV}$ (HBM)
- SOP16, TSSOP16, SSOP16 Package

APPLICATIONS

- Reliability Automotive Applications
- Factory Automation Equipment
- Motor Encoder
- AC and Servo Motor Driver

PRODUCT SPECIFICATION

| Part Number | Package | Marking |
|-------------|---------|---------|
| MS2574 | SOP16 | MS2574 |
| MS2574T | TSSOP16 | MS2574T |
| *MS2574S | SSOP16 | MS2574S |

*The package is not available temporarily. If necessary, please contact Hangzhou Ruimeng Sales Department Center.



SOP16

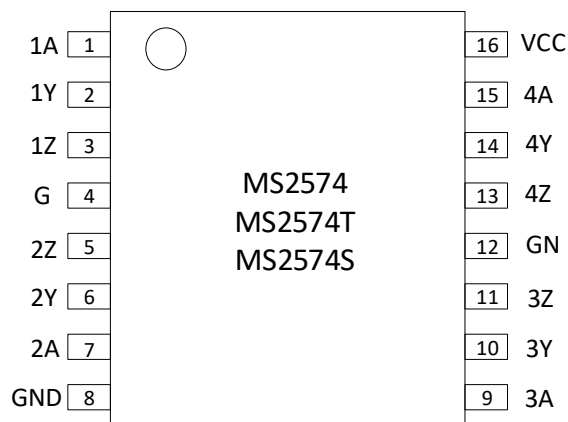


TSSOP16



SSOP16

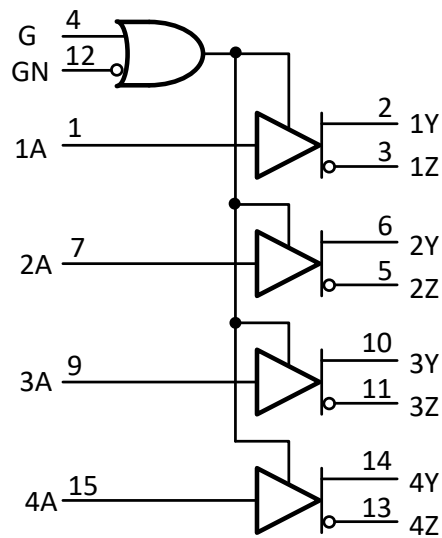
PIN CONFIGURATION



PIN DESCRIPTION

| Pin | Name | Type | Description |
|-----|------|------|---------------------------------------|
| 1 | 1A | I | Data Input of RS422 Driver 1 |
| 2 | 1Y | O | Non-Inverting Output of Driver 1 |
| 3 | 1Z | O | Inverting Output of Driver 1 |
| 4 | G | I | Enable Signal for Non-Inverting Input |
| 5 | 2Z | O | Inverting Output of Driver 2 |
| 6 | 2Y | O | No-Inverting Output of Driver 2 |
| 7 | 2A | I | Data Input of RS422 Driver 2 |
| 8 | GND | - | Ground |
| 9 | 3A | I | Data Input of RS422 Driver 3 |
| 10 | 3Y | O | Non-Inverting Output of Driver 3 |
| 11 | 3Z | O | Inverting Output of Driver 3 |
| 12 | GN | I | Enable Signal for Inverting Input |
| 13 | 4Z | O | Inverting Output of Driver 4 |
| 14 | 4Y | O | No-Inverting Output of Driver 4 |
| 15 | 4A | I | Data Input of RS422 Driver 4 |
| 16 | VCC | - | Power Supply |

BLOCK DIAGRAM



Function Table

| Input A | Enable | | Output | |
|------------|--------|----|--------|---|
| | G | GN | Y | Z |
| H | H | X | H | L |
| L | H | X | L | H |
| H | X | L | H | L |
| L | X | L | L | H |
| X | L | H | Z | Z |

ABSOLUTE MAXIMUM RATINGS

Any exceeding absolute maximum rating application causes permanent damage to device. Because long-time absolute operation state affects device reliability. Absolute ratings just conclude from a series of extreme tests. It doesn't represent chip can operate normally in these extreme conditions.

| Parameter | | Symbol | Ratings | Unit |
|--|---------|-----------------|------------|------|
| Power Supply | | V_{CC} | 2.5 ~ 6.0 | V |
| Maximum Input Voltage | | V_{IN-MAX} | 6.0 | V |
| Maximum Shutdown (Hi-Z) Output Voltage | | V_{OZ-MAX} | 5.5 | V |
| Soldering Temperature (10s) | | $T_{SOLDERING}$ | 260 | °C |
| Storage Temperature | | T_{STG} | -65 ~ +150 | °C |
| ESD(HBM) (Output Y, Z Pin) | | V_{ESD} | ±18k | V |
| Thermal Resistance, Junction-to-Ambient Temperature | SOP16 | $R_{\theta JA}$ | 77.97 | °C/W |
| | TSSOP16 | | 101.324 | |

RECOMMENDED OPERATING CONDITIONS

| Parameter | Symbol | Range | | | Unit |
|--------------------------|----------|-------|-----|-----|------|
| | | Min | Typ | Max | |
| Power Supply | V_{CC} | 3 | | 5.5 | V |
| High-Level Input Voltage | V_{IH} | 2 | | | V |
| Low-Level Input Voltage | V_{IL} | | | 0.8 | V |
| Operating Temperature | T_A | -40 | | 125 | °C |

ELECTRICAL CHARACTERISTICS

Within power supply and operating temperature.

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|------------------------------------|----------|--|-----|------|------|---------|
| Input Clamp Voltage | V_{IK} | $V_{CC}=5V, I_I=-18mA$ | | -0.8 | -1.2 | V |
| | | $V_{CC}=3.3V, I_I=-18mA$ | | -0.8 | -1.2 | |
| High-Level Output Voltage | V_{OH} | $V_{CC}=5V, I_{OH}=-20mA$ | 4.5 | 4.7 | | V |
| | | $V_{CC}=3.3V, I_{OH}=-20mA$ | 2.7 | 2.9 | | |
| Low-Level Output Voltage | V_{OL} | $V_{CC}=5V, I_{OL}=20mA$ | | 0.2 | 0.4 | V |
| | | $V_{CC}=3.3V, I_{OL}=20mA$ | | 0.2 | 0.4 | |
| Off-state (Hi-Z) Output Current | I_{OZ} | $V_{CC}=3.3V\sim 5V$ $V_O=0.5V$ $V_O=2.5V$ | | | 20 | μA |
| High-Level Input Current | I_{IH} | $V_{CC}=3.3V\sim 5V, V_I=2.7V$ | | | 20 | μA |
| Low-Level Input Current | I_{IL} | $V_{CC}=3.3V\sim 5V, V_I=0.4V$ | | | -20 | μA |
| Short-Circuit Output Current | I_{OS} | $V_{CC}=3.3V\sim 5V$ | | 50 | 100 | mA |
| Power Supply Current | I_{CC} | $V_{CC}=5V$, Input low, all outputs floating | | 65 | 100 | μA |
| | | $V_{CC}=3.3V$, Input low, all outputs floating | | 40 | 70 | |

- Operating condition is $T_A=25^{\circ}C$ for all typical values.
- Only one output is shorted at most, and the duration time shouldn't exceed 1s.

Switch Characteristics

| Parameter | Symbol | Condition | Typ | Max | Unit |
|---|------------|---------------------------|-----------------|-----|------|
| Propagation Delay Time, Low-to-High-Level | t_{PLH} | $C_L=30pF$, Open S1, S2 | 6 | 10 | ns |
| Propagation Delay Time, High-to-Low-Level | t_{PHL} | | 6 | 10 | |
| Output Enable Time to High Level | t_{PZH} | $C_L=30pF$ | $R_L=75\Omega$ | 9 | ns |
| Output Enable Time to Low Level | t_{PZL} | | $R_L=180\Omega$ | 9.5 | |
| Output Disable Time from High Level | t_{PHZ} | $C_L=10pF$, Close S1, S2 | 9 | 15 | ns |
| Output Disable Time from Low Level | t_{PLZ} | | 11 | 15 | |
| Output-to-Output Skew Time | t_{SKEW} | $C_L=30pF$, Open S1, S2 | 1 | 3 | ns |

| Parameter | Symbol | Condition | Typ | Max | Unit |
|------------------|--------|--|-----|-----|------|
| Output Rise Time | t_R | $V_{CC}=5.0V$, Y, Z connected with 100Ω , $C_L=10pF$ | 2.3 | | ns |
| | | $V_{CC}=3.3V$, Y, Z connected with 100Ω , $C_L=10pF$ | 3.5 | | |
| Output Fall Time | t_F | $V_{CC}=5.0V$, Y, Z connected with 100Ω , $C_L=10pF$ | 2.5 | | ns |
| | | $V_{CC}=3.3V$, Y, Z connected with 100Ω , $C_L=10pF$ | 4.0 | | |

1. Test conditions are $V_{CC}=3.3V\sim 5V$, $T_A=25^\circ C$.

2. Unless other noted, off-state is high-impedance state for each output terminal.

3. The test circuit is shown in figure 1. C_L includes parasitic capacitance of prod and socket. Input signal is from waveform generator, and it should meet the following demands: $PRR\leq 1MHz$, $Z_o\approx 50\Omega$, $t_R\leq 15ns$, $t_F\leq 6ns$. Each enable terminal is tested alone.

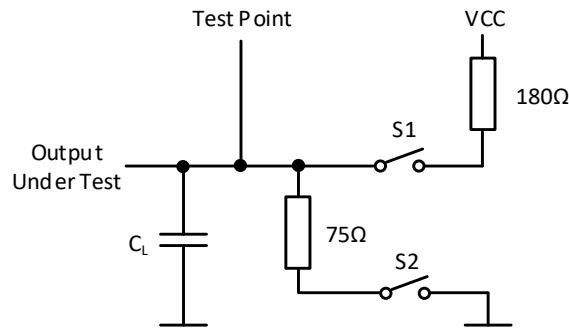


Figure 1. Switch Characteristic Test Circuit

4. Test propagation delay time and skew time. It needs to open S1 and S2. The corresponding test waveform is shown in figure 2.

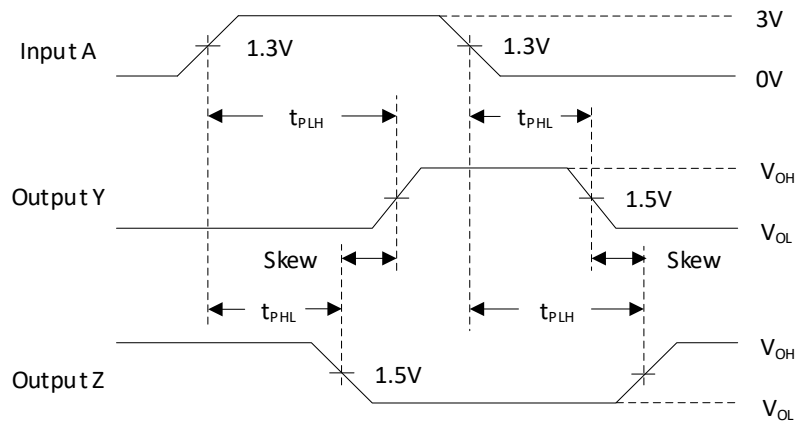


Figure 2. Propagation Delay Time and Skew Time

5. Test output enable time and disable time. Note S1 and S2 states are different. Please refer to above table and figure 3 to adjust switch state and test respectively. Waveform 1 represents that driver maintains low-level by input and enable signal (unless enable terminal controls driver into high-impedance state). Waveform 2 represents that driver maintains high-level by input and enable signal (unless enable terminal controls driver into high-impedance state).

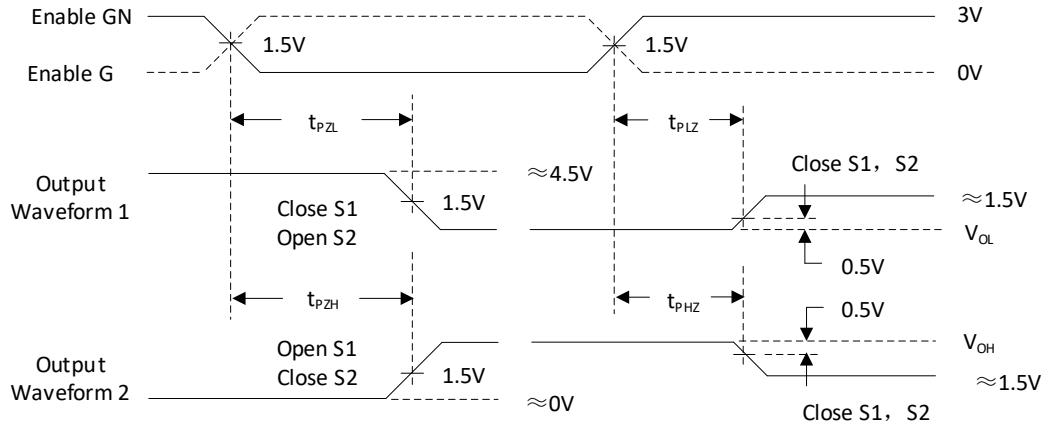
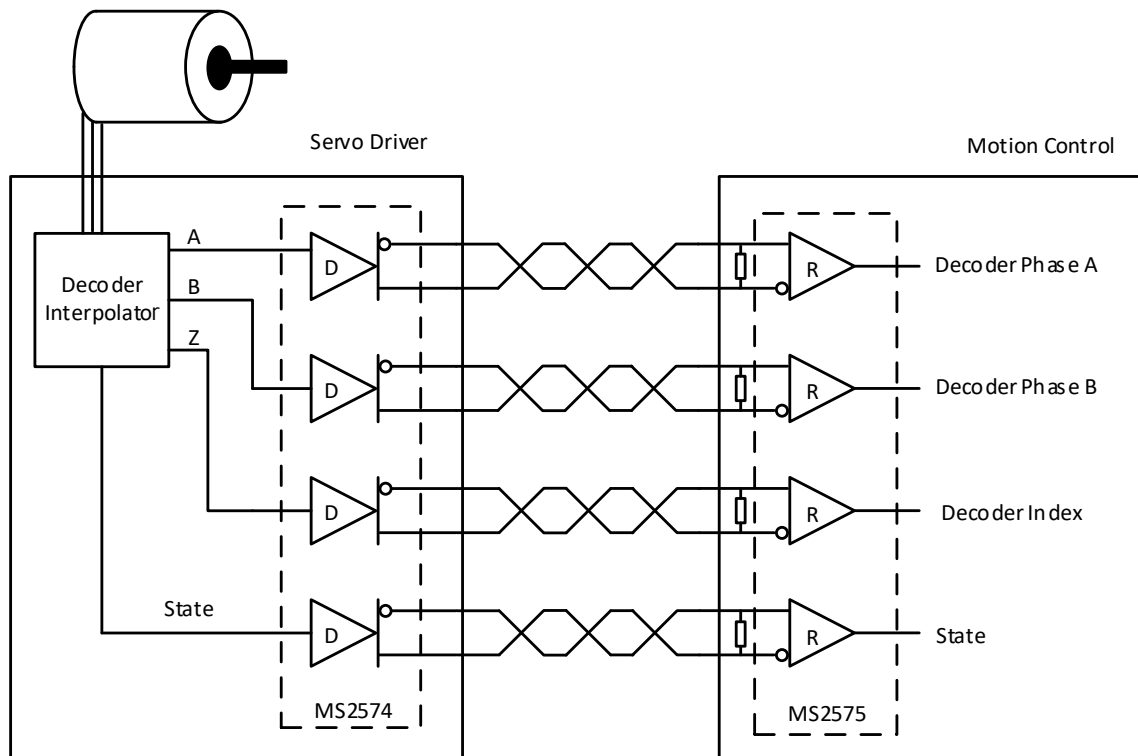


Figure 3. Enable and Disable Time Waveform

TYPICAL APPLICATION DIAGRAM

The following diagram shows a decoder circuit for servo system.

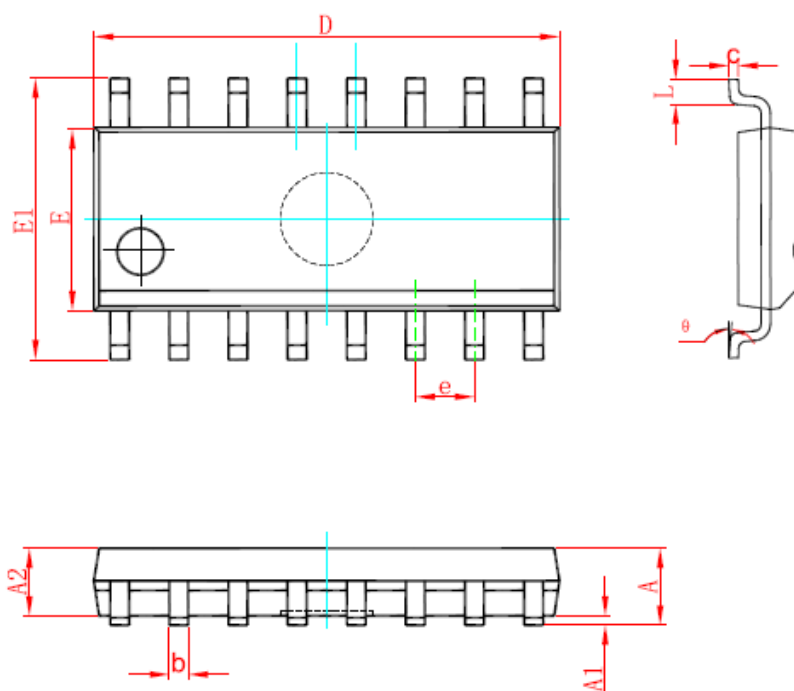


Note:

Place chip as close to interface as possible, which could reduce line resistance to decrease bus signal reflection. If the driver is at high-impedance state, 200mV bias voltage will be increased on Y-Z terminal for fail-safe.

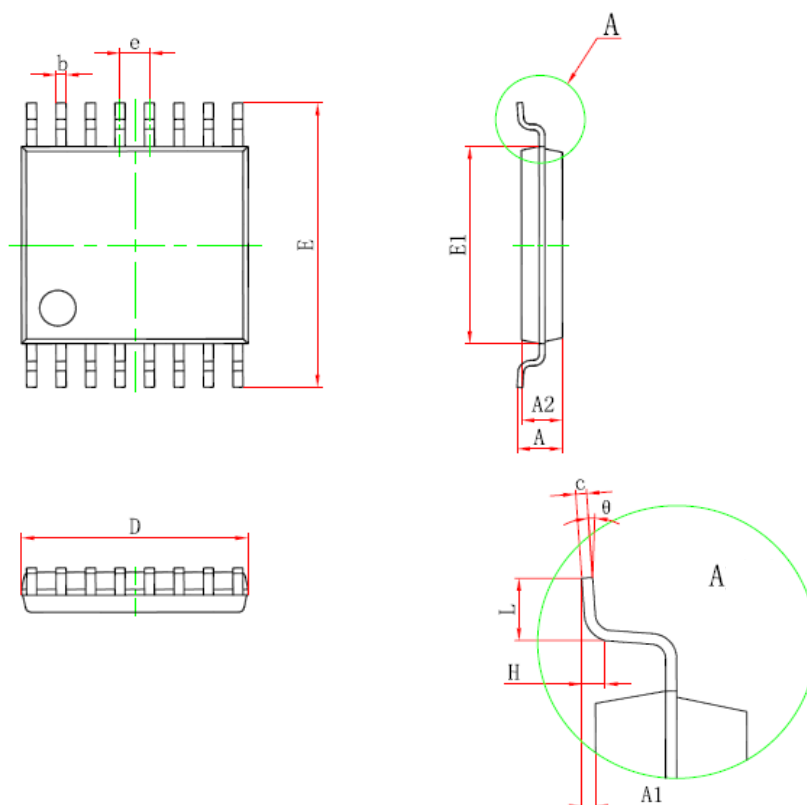
PACKAGE OUTLINE DIMENSIONS

SOP16



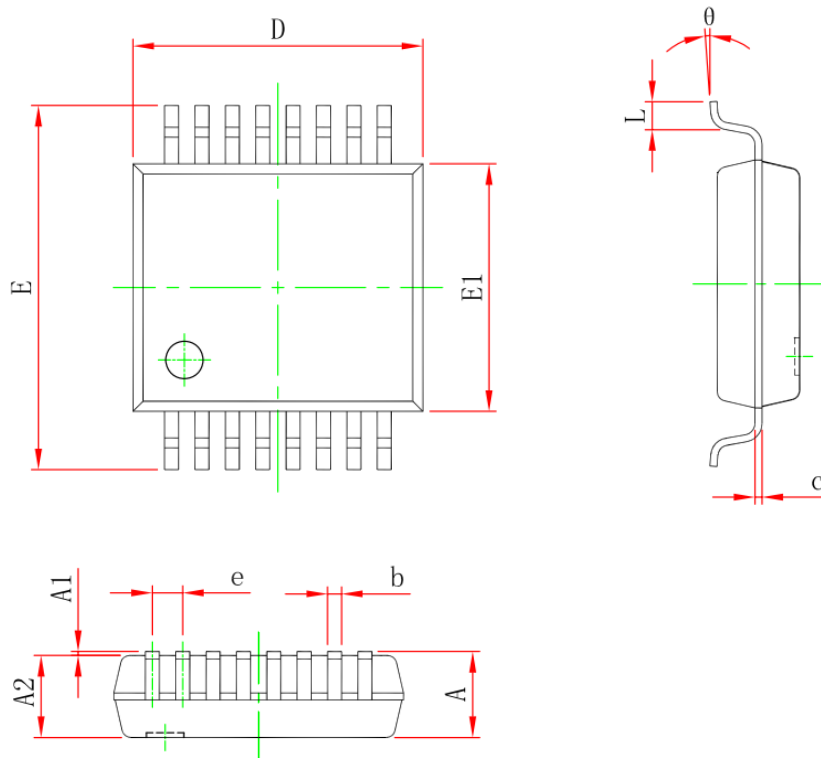
| Symbol | Dimension in Millimeters | | Dimension in Inches | |
|--------|--------------------------|--------|---------------------|-------|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 9.800 | 10.200 | 0.386 | 0.402 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

TSSOP16



| Symbol | Dimension in Millimeters | | Dimension in Inches | |
|--------|--------------------------|-------|---------------------|-------|
| | Min | Max | Min | Max |
| D | 4.900 | 5.100 | 0.193 | 0.201 |
| E | 6.250 | 6.550 | 0.246 | 0.258 |
| b | 0.190 | 0.300 | 0.007 | 0.012 |
| c | 0.090 | 0.200 | 0.004 | 0.008 |
| E1 | 4.300 | 4.500 | 0.169 | 0.177 |
| A | - | 1.200 | - | 0.047 |
| A2 | 0.800 | 1.000 | 0.031 | 0.039 |
| A1 | 0.050 | 0.150 | 0.002 | 0.006 |
| e | 0.65(BSC) | | 0.026(BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| H | 0.25(TYP) | | 0.01(TYP) | |
| θ | 1° | 7° | 1° | 7° |

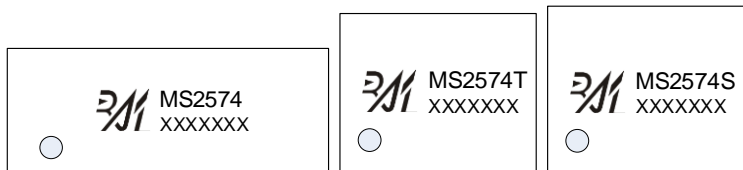
SSOP16



| Symbol | Dimension in Millimeters | | Dimension in Inches | |
|----------|--------------------------|-------|---------------------|-------|
| | Min | Max | Min | Max |
| A | - | 2.000 | - | 0.079 |
| A1 | 0.050 | - | 0.002 | - |
| A2 | 1.650 | 1.850 | 0.065 | 0.073 |
| b | 0.220 | 0.380 | 0.009 | 0.015 |
| c | 0.090 | 0.250 | 0.004 | 0.010 |
| D | 5.900 | 6.500 | 0.232 | 0.256 |
| E | 7.400 | 8.200 | 0.291 | 0.323 |
| E1 | 5.000 | 5.600 | 0.197 | 0.220 |
| e | 0.650(BSC) | | 0.026(BSC) | |
| L | 0.550 | 0.950 | 0.022 | 0.037 |
| θ | 1° | 8° | 1° | 8° |

MARKING and PACKAGING SPECIFICATION

1. Marking Drawing Description



Product Name: MS2574, MS2574T, MS2574S

Product Code: XXXXXXX

2. Marking Drawing Demand

Laser printing, contents in the middle, font type Arial.

3. Packaging Specification

| Device | Package | Piece/Reel | Reel/Box | Piece /Box | Box/Carton | Piece/Carton |
|---------|---------|------------|----------|------------|------------|--------------|
| MS2574 | SOP16 | 4000 | 1 | 4000 | 8 | 32000 |
| MS2574T | TSSOP16 | 3000 | 1 | 3000 | 8 | 24000 |
| MS2574S | SSOP16 | 2500 | 1 | 2500 | 8 | 20000 |

STATEMENT

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- The process of improving product is endless. And our company would sincerely provide more excellent product for customer.

**MOS CIRCUIT OPERATION PRECAUTIONS**

Static electricity can be generated in many places. The following precautions can be taken to effectively prevent the damage of MOS circuit caused by electrostatic discharge:

1. The operator shall ground through the anti-static wristband.
2. The equipment shell must be grounded.
3. The tools used in the assembly process must be grounded.
4. Must use conductor packaging or anti-static materials packaging or transportation.



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