

High-Speed, Four-Channel Differential Line Driver

PRODUCT DESCRIPTION

The MS2574/MS2574T/MS2574SS 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 drive 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 (G) and active low (GN).

The MS2574 is available in SOP16 package, the MS2574T is available in TSSOP16 package and the MS2574SS is available in SSOP16 package.

FEATURES

- Maximum Transmission Rate: 50MHz
- Complementary Output
- 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
MS2574SS	SSOP16	MS2574SS



SOP16

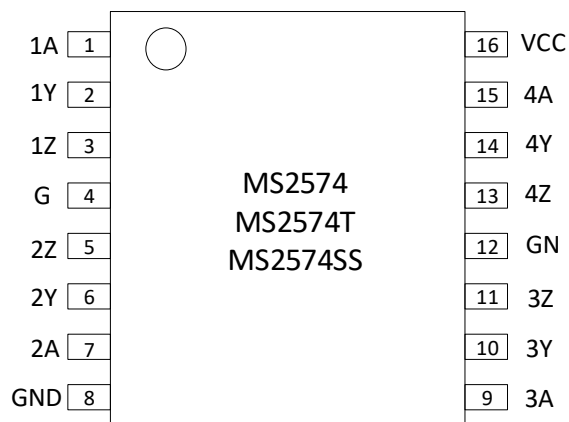


TSSOP16



SSOP16

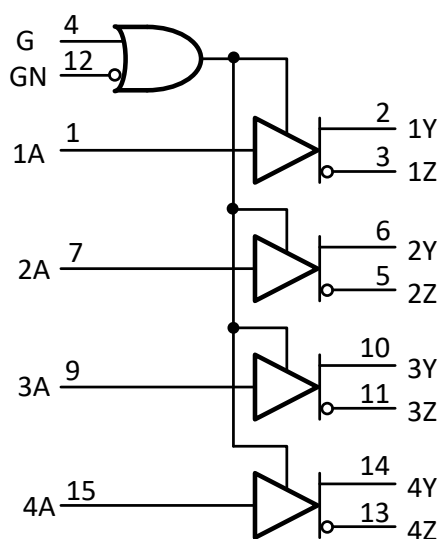
PIN CONFIGURATION



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_{SOLDER}	260	°C
Storage Temperature		T_{STG}	-65 ~ +150	°C
ESD(HBM) (Output Y, Z Pin)		V_{HBM}	±18	kV
Thermal Resistance, Junction-to-Ambient Temperature	SOP16	$R_{\theta JA}$	77.97	°C/W
	TSSOP16		101.324	

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
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

Unless otherwise noted, $T_A=25^{\circ}\text{C}$.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input Clamp Voltage	V_{IK}	$V_{CC}=5\text{V}$, $I_I=-18\text{mA}$		-0.8	-1.2	V
		$V_{CC}=3.3\text{V}$, $I_I=-18\text{mA}$		-0.8	-1.2	
High-Level Output Voltage	V_{OH}	$V_{CC}=5\text{V}$, $I_{OH}=-20\text{mA}$	4.5	4.7		V
		$V_{CC}=3.3\text{V}$, $I_{OH}=-20\text{mA}$	2.7	2.9		
Low-Level Output Voltage	V_{OL}	$V_{CC}=5\text{V}$, $I_{OL}=20\text{mA}$		0.2	0.4	V
		$V_{CC}=3.3\text{V}$, $I_{OL}=20\text{mA}$		0.2	0.4	
Off-state(Hi-Z) Output Current	I_{OZ}	$V_{CC}=3.3\text{V}\sim 5$ V	$V_O=0.5\text{V}$ $V_O=2.5\text{V}$		20	μA
High-Level Input Current	I_{IH}	$V_{CC}=3.3\text{V}\sim 5\text{V}$, $V_I=2.7\text{V}$			20	μA
Low-Level Input Current	I_{IL}	$V_{CC}=3.3\text{V}\sim 5\text{V}$, $V_I=0.4\text{V}$			-20	μA
Output Short-Circuit Current ¹	I_{OS}	$V_{CC}=3.3\text{V}\sim 5\text{V}$, Y and Z shorted	30		150	mA
		$V_{CC}=3.3\text{V}\sim 5\text{V}$, Y or Z to GND	30		150	
Power Supply Current	I_{CC}	$V_{CC}=5.5\text{V}$, Input low, all outputs floating		70	100	μA
		$V_{CC}=3\text{V}$, Input low, all outputs floating		40	70	

Note 1: Only one output is shorted at most, and the duration time shouldn't exceed 1s.

Switch Characteristics

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

Parameter	Symbol	Condition	Typ	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	

- Test conditions are $V_{CC}=3.3V\sim 5V$, $T_A=25^\circ C$.
- Unless other noted, off-state is high-impedance state for each output terminal.
- 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.

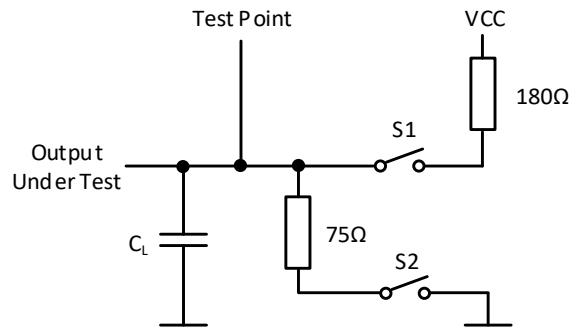


Figure 1. Switch Characteristic Test Circuit

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

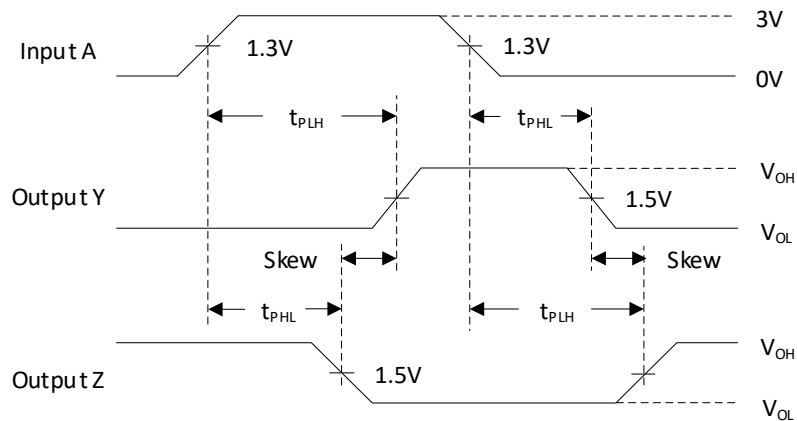


Figure 2. Propagation Delay Time and Skew Time

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).

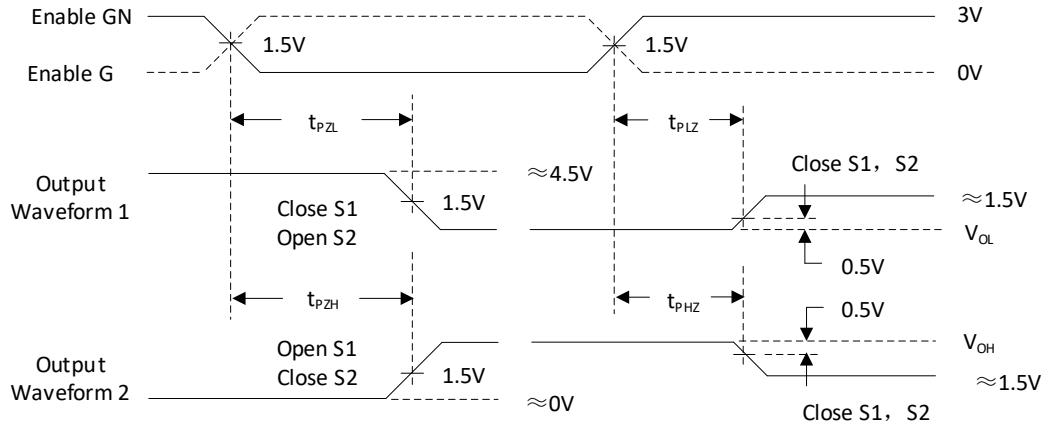
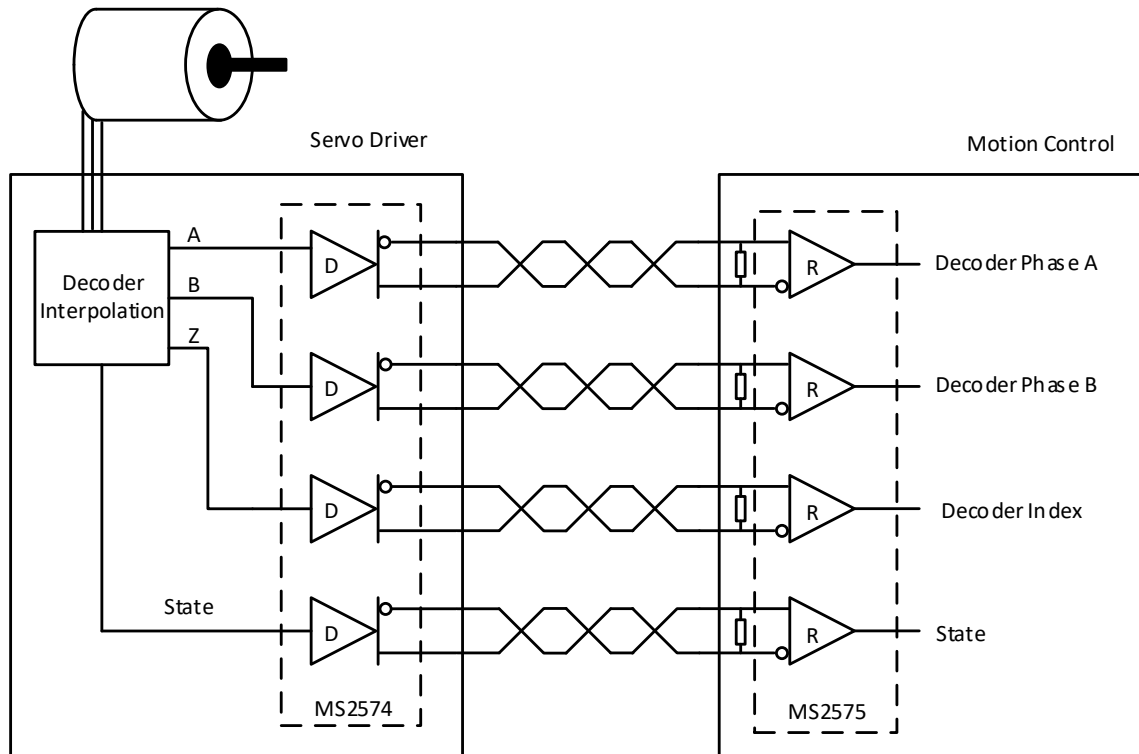


Figure 3. Enable and Disable Time Waveform

TYPICAL APPLICATION DIAGRAM

The following diagram shows a decoder circuit for servo system.

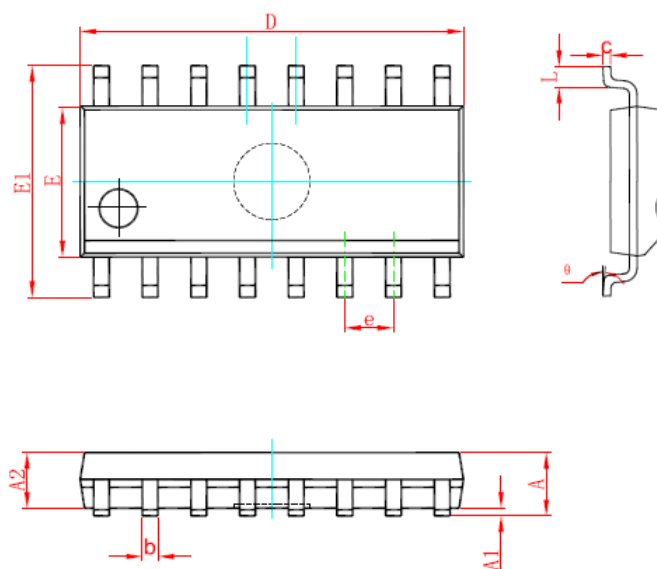


Note:

Place chip as close to interface as possible, which could reduce line resistance to decrease bus signal reflection.

PACKAGE OUTLINE DIMENSIONS

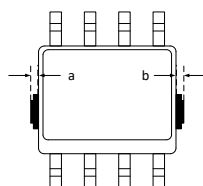
SOP16



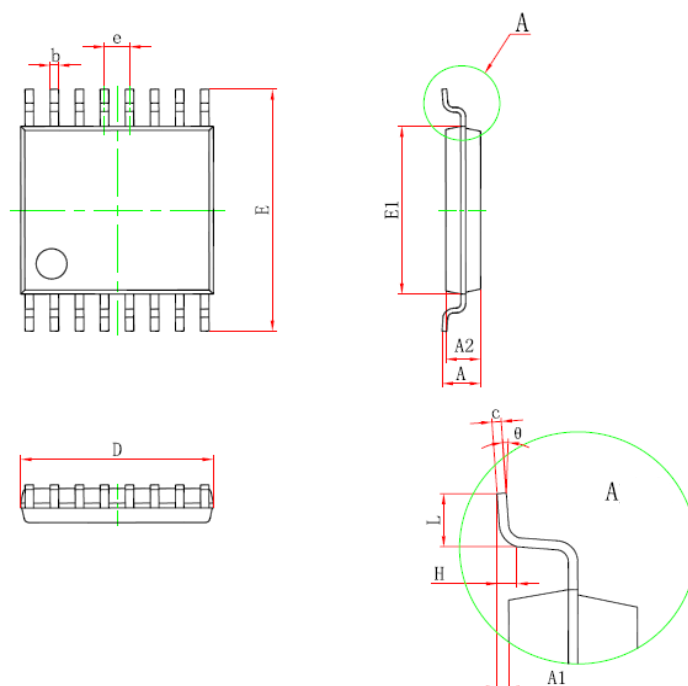
Symbol	Dimension in Millimeters		Dimension in Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	9.800	10.200	0.386	0.402
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)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

Note: In addition to the package size, a and b are allowed to have the maximum size of 0.15mm for waste glue simultaneously.

The diagram is as follows: taking SOP8 package as an example.



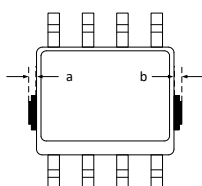
TSSOP16



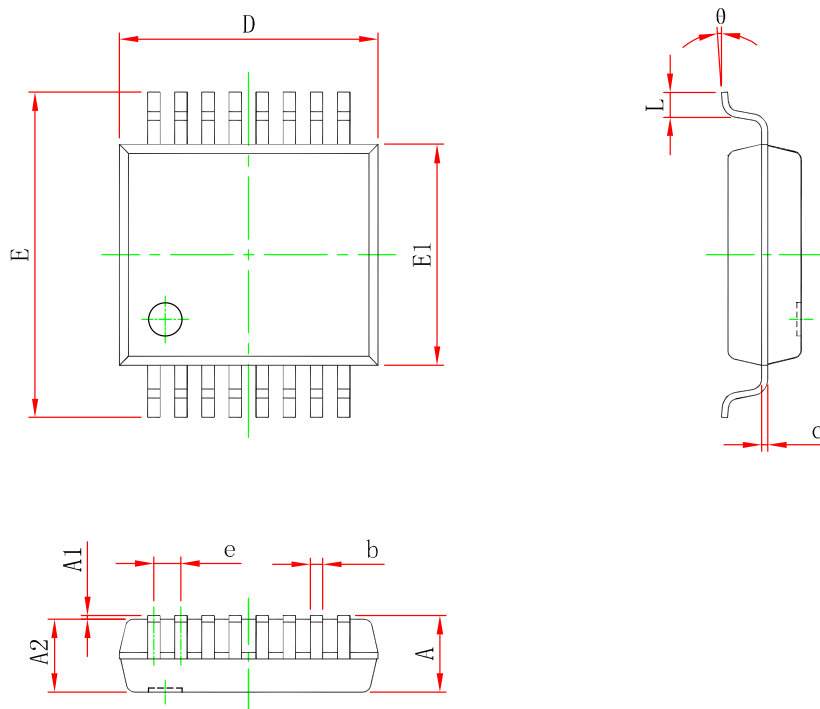
Symbol	Dimension in Millimeters		Dimension in Inches	
	Min	Max	Min	Max
D	4.900	5.100	0.193	0.201
E	6.250	6.550	0.246	0.258
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
E1	4.300	4.500	0.169	0.177
A	-	1.200	-	0.047
A2	0.800	1.000	0.031	0.039
A1	0.050	0.150	0.002	0.006
e	0.65(BSC)		0.026(BSC)	
L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

Note: In addition to the package size, a and b are allowed to have the maximum size of 0.15mm for waste glue simultaneously.

The diagram is as follows: taking SOP8 package as an example.



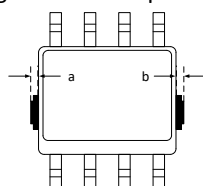
SSOP16



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	0°	8°	0°	8°

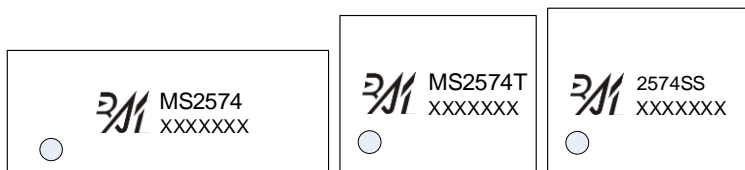
Note: In addition to the package size, a and b are allowed to have the maximum size of 0.15mm for waste glue simultaneously.

The diagram is as follows: taking SOP8 package as an example.



MARKING and PACKAGING SPECIFICATION

1. Marking Drawing Description



Product Name: MS2574, MS2574T, 2574SS

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
MS2574SS	SSOP16	2000	1	2000	8	16000

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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