Four Channel Differential Line Driver

PRODUCT DESCRIPTION

The MS2576/MS2576T/MS2576S is a low-dissipation four-channel line driver, which is applied to equalized or unequalized 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 select and active-low select(G,GN).
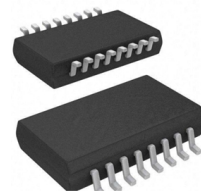
SOP16

FEATURES

- Meet or Exceed the demands of ANSI TIA/EIA-422-B,TIA/EIA-423-B and ITU Suggestion V.10 and V.11
- Low Dissipation
- Complementary Output
- Power Supply: 2.5V-5.5V
- Tri-state Outputs
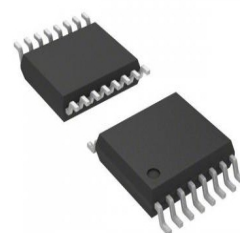- Fail-safe for Open Input
- Lead SOP16,TSSOP16,SSOP16 Package

TSSOP16

APPLICATIONS

- Reliability Automobile
- Factory Automation Equipment
- Motor Encoder
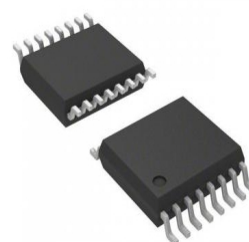- AC and Servo Motor Driver

SSOP16

PRODUCT SPECIFICATION

Part Number	Package	Marking
MS2576	SOP16	MS2576
MS2576T	TSSOP16	MS2576T
MS2576S	SSOP16	MS2576S

PIN CONFIGURATION
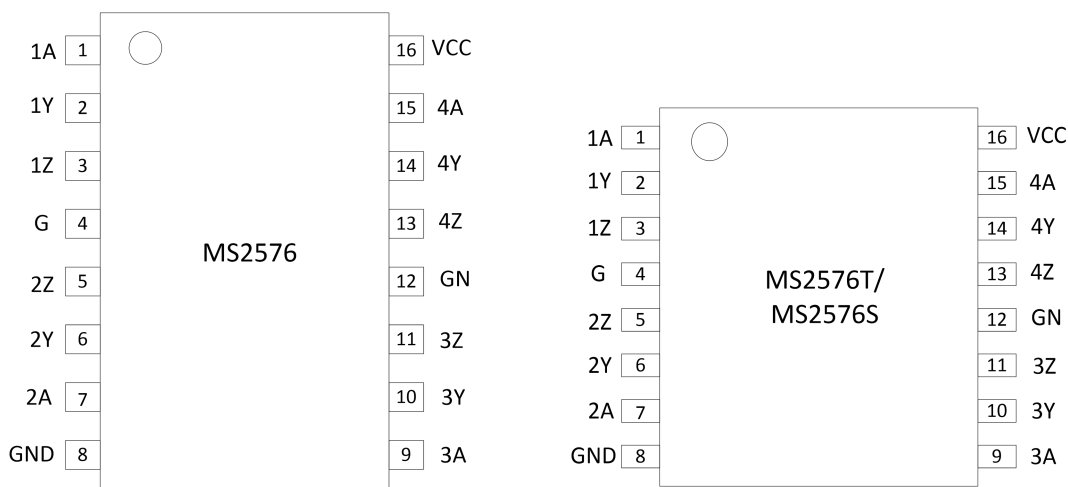
PIN DESCRIPTION

Pin	Name	Type	Description
1	1A	I	Data Input of 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	Non-inverting Output of Driver 2
7	2A	I	Data Input of Driver 2
8	GND	-	Ground
9	3A	I	Data Input of 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	Non-inverting Output of Driver 4
15	4A	I	Data Input of Driver 4
16	VCC	-	Power Supply

BLOCK DIAGRAM
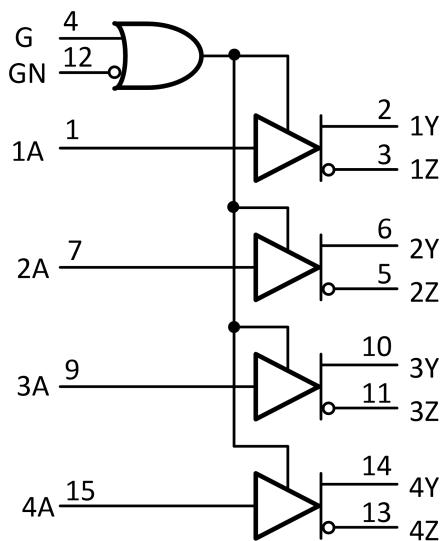
Function Table

Input	Enable		Output	
A	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	Range	Unit
Power Supply Voltage	VCC	2.5 ~ 7.0	V
Maximum Input Voltage	VINMAX	7.0	V
Maximum Shutdown(Hi-Z) Output	VOZMAX	-7 ~ 12	V
Soldering Temperature(10s)	TSOLDERING	260	°C
Storage Temperature	Tstg	-65 ~ +150	°C
ESD(HBM)(Y,Z Pin)	ESD(HBM)	±20k	V

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Range			Unit
		Min	Typ	Max	
Supply Voltage	VCC	2.5		5.5	V
High-Level Output Current	IOH			-150	mA
Low-Level Output Current	IOL			150	mA
Operating Temperature	TA	-45		125	°C

ELECTRICAL CHARACTERISTICS (VCC=5V)

VCC=5V, T_A=25°C

Parameter	Symbol	Condition		Min	Typ	Max	Unit
Clamp Input Voltage	VIK	VCC=5V, II=-18mA			-0.8		V
High-Level Output Voltage	VOH	VCC=5V, IOH=-20mA		3.9			V
Low-Level Output Voltage	VOL	VCC=5V, IOH=-20mA				0.8	V
Off-state(Hi-Z) Output Current	IOZ	VCC=5V	VO=0.5V			20	µA
			VO=2.5V				
High-Level Input Voltage	VIH	VCC=5V		2			V
Low-Level Input Voltage	VIL	VCC=5V				0.8	V
High-Level Input Current	IIH	VCC=5V, VI=2.7V			0	20	µA
Low-Level Input Current	IIL	VCC=5V, VI=0.4V			0	-20	µA
Shorted Output Current	IOS	VCC=5V, Note 1		45		150	mA
Supply Current	ICC	VCC=5V, all Outputs Open			2	10	uA

Switch Characteristics

Parameter	Symbol	Condition		Typ	Max	Unit
Propagation Delay Time, Low-to-High-Level	tPLH	CL=30pF, Open S1,S2		16	25	ns
Propagation Delay Time, High-to-Low-Level	tPHL			18	25	
Output Enable Time to High Level	tPZH	CL=30pF	RL=75Ω	15	25	ns
Output Enable Time to Low Level	tPZL		RL=180Ω	16	25	
Output Disable Time from High Level	tPHZ	CL=10pF, Close S1,S2		10	25	ns
Output Disable Time from Low Level	tPLZ			11	25	
Output-to-Output Skew	tSKEW	CL=30pF, Open S1,S2		1	5	ns

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

ELECTRICAL CHARACTERISTICS (VCC=3.3V)

VCC=3.3V, T_A=25°C

Parameter	Symbol	Condition		Min	Typ	Max	Unit
Clamp Input Voltage	VIK	VCC=3.3V, II=-18mA			-0.9		V
High-Level Output Voltage	VOH	VCC=3.3V, IOH=-20mA		2.2			V
Low-Level Output Voltage	VOL	VCC=3.3V, IOH=-20mA				0.9	V
Off-state(Hi-Z) Output Current	IOZ	VCC=3.3V	VO=0.5V			20	μA
			VO=2.5V				
Input Current at the Maximum Input Voltage	II	VCC=3.3V, VI=3.3V				10	μA
High-Level Input Voltage	VIH	VCC=3.3V		1.5			V
Low-Level Input Voltage	VIL	VCC=3.3V				0.8	V
High-Level Input Current	IIH	VCC=3.3V, VI=2.7V			0	20	μA
Low-Level Input Current	IIL	VCC=3.3V, VI=0.4V			0	-20	μA
Shorted Output Current	IOS	VCC=3.3V ,Note 1		30		80	mA
Supply Current	ICC	VCC=3.3V, all Outputs Open			0.1	10	uA

Switch Characteristics

Parameter	Symbol	Condition		Typ	Max	Unit
Propagation Delay Time, Low-to-High-Level	tPLH	CL=30pF, Open S1,S2		25	30	ns
Propagation Delay Time, High-to-Low-Level	tPHL			25	30	
Output Enable Time to High Level	tPZH	CL=30pF	RL=75Ω	12	20	ns
Output Enable Time to Low Level	tPZL		RL=180Ω	16	25	
Output Disable Time from High Level	tPHZ	CL=10pF, Close S1,S2		13	25	ns
Output Disable Time from Low Level	tPLZ			22	30	
Output-to-Output Skew	tSKEW	CL=30pF, Open S1,S2		1	5	ns

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

TEST CIRCUIT

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 meets the following demands: PRR≤1MHz, Z_O≈50Ω, tr≤15ns, tf≤6ns; Each enable terminal is tested alone.
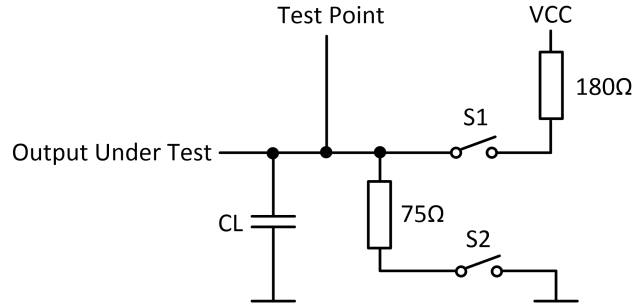

Figure 1. Switch Characteristic Test Circuit

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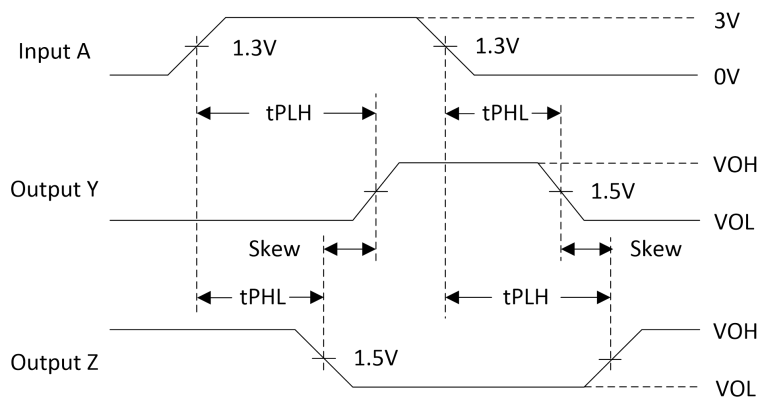

Figure 2. Propagation Delay Time and Skew

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).
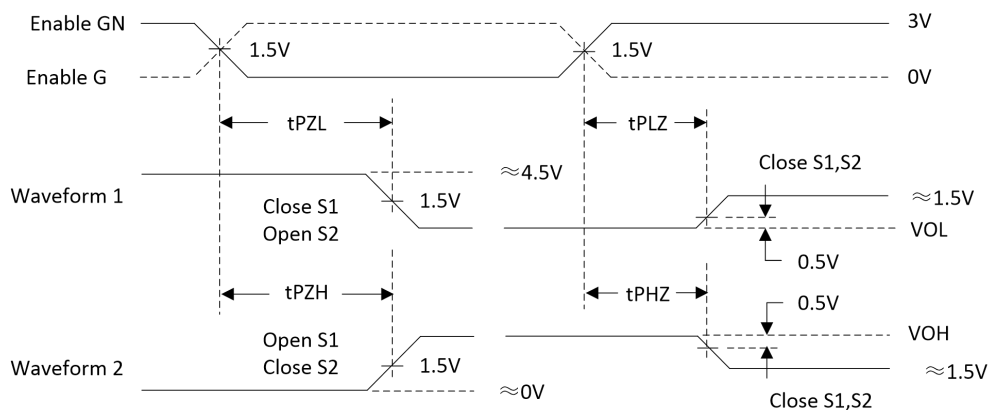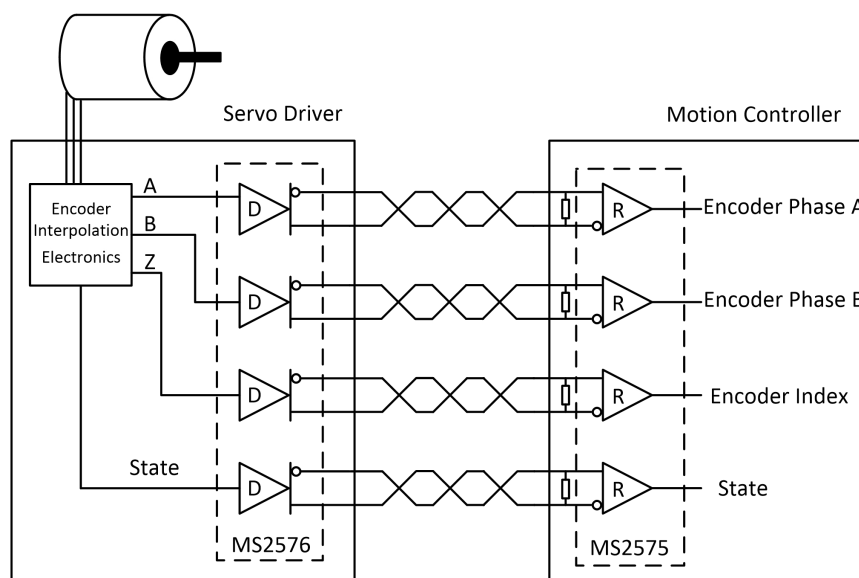

Figure 3. Enable and Disable Time Waveform

TYPICAL APPLICATION DIAGRAM

The following diagram shows an encoder circuit for servo system.

Note: 1.The circuit needs 5V power supply. The bus operation frequency is 10MHz or less.

Ensure that the corresponding pins of driver and receiver are connected correctly.

2. 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 the A-B port for fail-safe.

PACKAGE OUTLINE DIMENSIONS

SOP16
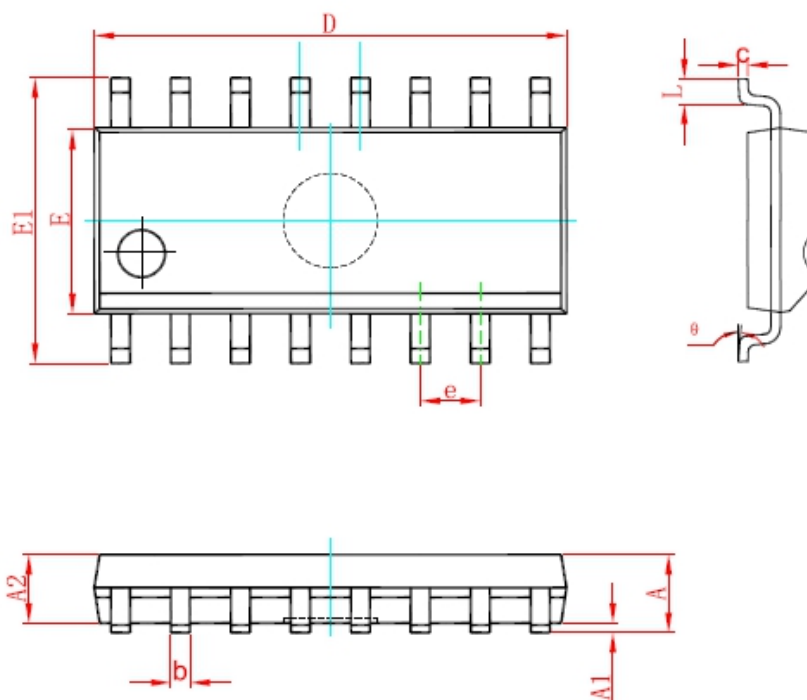
Symbol	Dimension in Millimeter		Dimension in Inch	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	9.800	10.200	0.386	0.402
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

TSSOP16
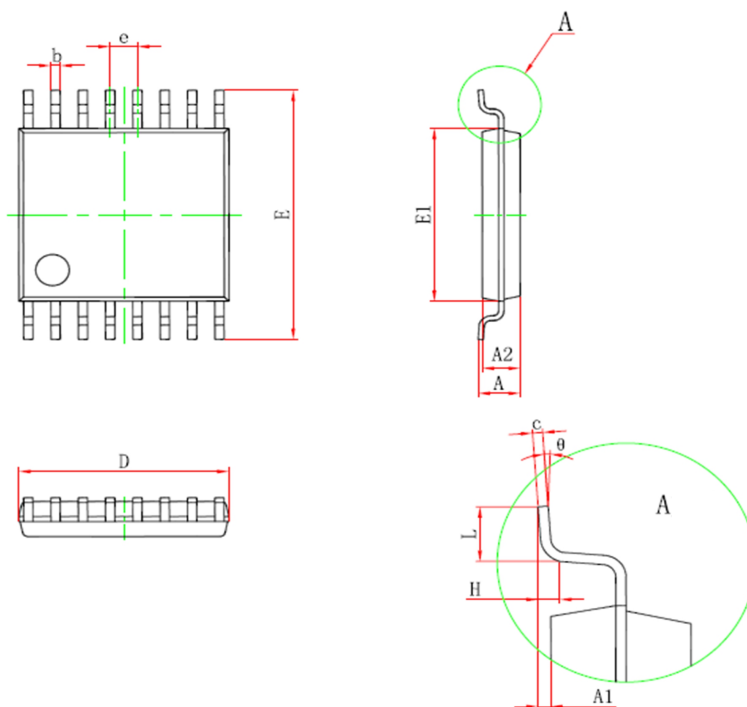
Symbol	Dimension in Millimeter		Dimension in Inch	
	Min	Max	Min	Max
D	4.900	5.100	0.193	0.201
E	6.250	6.550	0.246	0.258
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
E1	4.300	4.500	0.169	0.177
A		1.200		0.047
A2	0.800	1.000	0.031	0.039
A1	0.050	0.150	0.002	0.006
e	0.65(BSC)		0.026(BSC)	
L	0.400	1.270	0.016	0.050
H	0.25(TYP)		0.01(TYP)	
θ	1°	7°	1°	7°

SSOP16
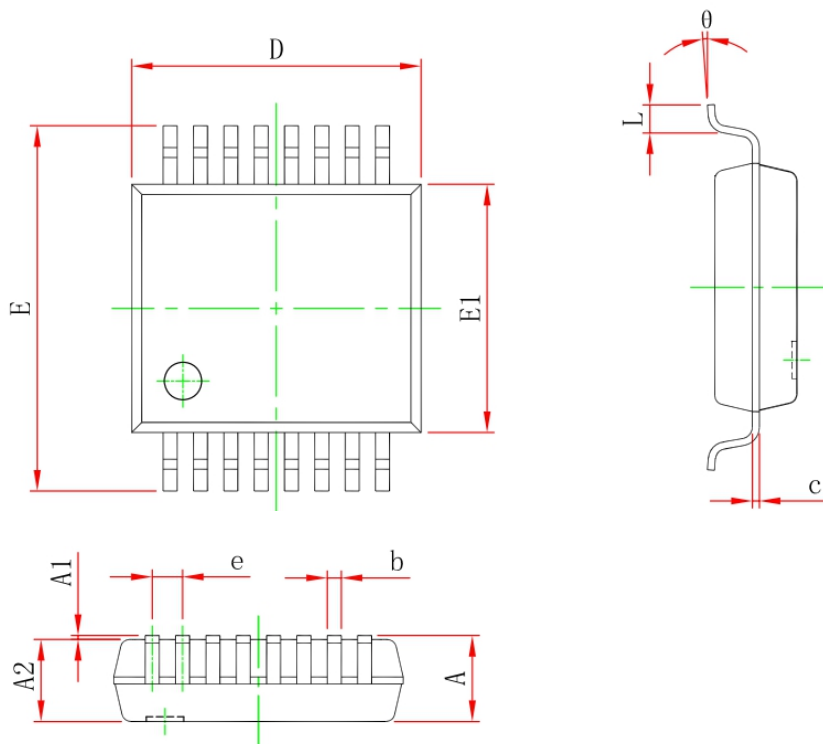
Symbol	Dimension in Millimeter		Dimension in Inch	
	Min	Max	Min	Max
A	--	2.000	--	0.079
A1	0.050	--	0.002	--
A2	1.650	1.850	0.065	0.073
b	0.220	0.380	0.009	0.015
c	0.090	0.250	0.004	0.010
D	5.900	6.500	0.232	0.256
E	7.400	8.200	0.291	0.323
E1	5.000	5.600	0.197	0.220
e	0.650(BSC)		0.026(BSC)	
L	0.550	0.950	0.022	0.037
θ	1°	8°	1°	8°

MARKING and PACKAGING SPECIFICATIONS

1. Marking Drawing Description
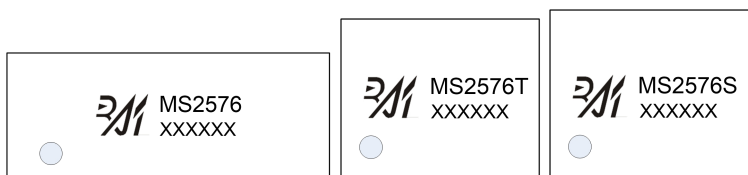
Product Name: MS2576, MS2576T, MS2576S

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
MS2576	SOP16	4000	1	4000	8	32000
MS2576T	TSSOP16	3000	1	3000	8	24000
MS2576S	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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