RS2G126 Dual Bus Buffer Gate With 3-State Outputs

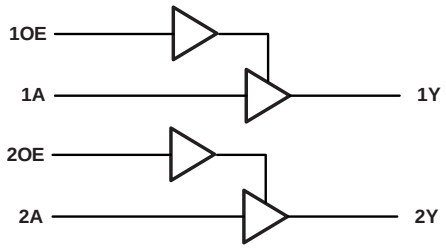
FEATURES

- **Operating Voltage Range:1.65V to 5.5V**
- **Low Power Consumption:1μA (Max)**
- **Operating Temperature Range: -40°C to +125°C**
- **Inputs Accept Voltage to 5.5V**
- **±24mA Output Drive at V_{CC}=3.0V**
- **Latch-up Performance Exceeds 100mA**
- **PACKAGE: TSSOP-8**

APPLICATIONS

- **AV Receiver**
- **Cable Modem Termination Systems**
- **Digital Picture Frame (DPF)**
- **High-Speed Data Acquisition and Generation**
- **Motor Controls: High-Voltage**
- **Personal Navigation Device (GPS)**
- **Portable Media Player**
- **Video Communication Systems**

Simplified Schematic



DESCRIPTION

The dual buffer is designed for 1.65V to 5.5V V_{CC} operation. The RS2G126 device is dual line drivers with 3-state output. The outputs are disabled when the output-enable input is low.

This device is fully specified for partial-power-down applications using I_{off}. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

To ensure the high-impedance state during power up or power down, OE should be tied to GND through a pulldown resistor, the minimum value of the resistor is determined by the current-sourcing capability of the driver.

The RS2G126 is available in Green TSSOP-8 package. It operates over an ambient temperature range of -40°C to +125°C.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS2G126	TSSOP-8	4.40mm×3.00mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

FUNCTION TABLE

INPUTS		OUTPUT
OE	A	Y
H	H	H
H	L	L
L	X	Z

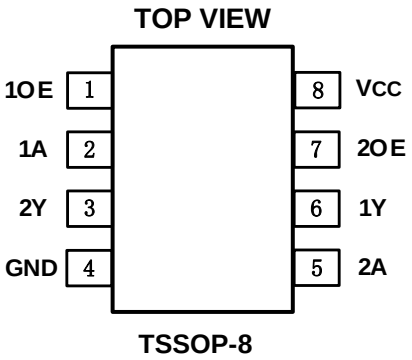
H=HIGH Logic Level
L =LOW Logic Level
X=Don't Care
Z=High-impedance OFF-state

Revision History

Note: Page numbers for previous revisions may different from page numbers in the current version.

Version	Change Date	Change Item
A.1	2021/2/5	Initial version completed

PIN CONFIGURATIONS



PIN DESCRIPTION

PIN TSSOP-8	NAME	I/O TYPE	FUNCTION
1	1OE	I	Output Enable for buffer 1
2	1A	I	Input of buffer 1
3	2Y	O	Output of buffer 2
4	GND	-	Ground
5	2A	I	Input of buffer 2
6	1Y	O	Output of buffer 1
7	2OE	I	Output Enable for buffer 2
8	V_{CC}	-	Power Pin

Specifications

Absolute Maximum Ratings (1)

over operating free-air temperature range (unless otherwise noted) (1)(2)

			MIN	MAX	UNIT
V_{CC}	Supply voltage range		-0.5	6.5	V
V_I	Input voltage range (2)		-0.5	6.5	V
Vo	Voltage range applied to any output in the high-impedance or power-off state(2)		-0.5	6.5	V
Vo	Voltage range applied to any output in the high or low state (2)(3)		-0.5	V_{CC}+0.5	V
I_{IK}	Input clamp current	V_I<0		-50	mA
I_{OK}	Output clamp current	V_O<0		-50	mA
I_O	Continuous output current			±50	mA
	Continuous current through V_{CC} or GND			±100	mA
T_J	Junction temperature		-65	150	°C
T_{stg}	Storage temperature		-65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

(3) The value of V_{CC} is provided in the *Recommended Operating Conditions table*.

ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM)	±8000	V
		Machine model (MM)	±500	V

Thermal Information:

THERMAL METRIC		RS2G126 8PINS TSSOP-8	UNIT
$R_{\Theta JA}$	Junction-to-ambient thermal resistance	200.8	°C/W
$R_{\Theta JC(top)}$	Junction-to-case(top) thermal resistance	95.3	°C/W
$R_{\Theta JB}$	Junction-to-board thermal resistance	128.5	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	26.5	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	125.9	°C/W
$R_{\Theta JC(bot)}$	Junction-to-case(bottom) thermal resistance	N/A	°C/W

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING (1)	PACKAGE OPTION
RS2G126	RS2G126XQ	-40°C ~+125°C	TSSOP-8	RS2G126	Tape and Reel,4000

NOTE:

(1) There may be additional marking, which relates to the lot trace code information(data code and vendor code)，the logo or the environmental category on the device.

ELECTRICAL CHARACTERISTICS

over recommended operating free-air temperature range (TYP values are at T_A = +25°C, unless otherwise noted.) (1)

Recommended Operating Conditions

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	MAX	UNIT
Supply voltage	V_{CC}	Operating	1.65	5.5	V
		Data retention only	1.5	5.5	
High-level input voltage	V_{IH}	V_{CC}=1.65V to 1.95V	0.65xV_{CC}		V
		V_{CC}=2.3V to 2.7V	1.7		
		V_{CC}=3V to 3.6V	2.2		
		V_{CC}=4.5V to 5.5V	0.7xV_{CC}		
Low-level input voltage	V_{IL}	V_{CC}=1.65V to 1.95V		0.15xV_{CC}	V
		V_{CC}=2.3V to 2.7V		0.3	
		V_{CC}=3V to 3.6V		0.4	
		V_{CC}=4.5V to 5.5V		0.15xV_{CC}	
Input voltage	V_I		0	5.5	V
Output voltage	V_O		0	V_{CC}	V
Input transition rise or fall	t_r, t_f	V_{CC}=1.8V± 0.15V,2.5V ± 0.2V		20	ns/V
		V_{CC}=3.3V± 0.3V		10	
		V_{CC}=5V± 0.5V		5	
Operating temperature	T_A		-40	+125	°C

DC Characteristics

PARAMETER		TEST CONDITIONS	V_{CC}	TEMP	MIN	TYP	MAX	UNIT
V_{OH}		I_{OH} = –100μA	1.65V to 5.5V	Full	V_{CC}-0.1			V
		I_{OH} = –4mA	1.65V		1.2			
		I_{OH} = –8mA	2.3V		1.9			
		I_{OH} = –16mA	3V		2.4			
		I_{OH} = –24mA			2.3			
		I_{OH} = –32mA	4.5V		3.8			
V_{OL}		I_{OL} = 100μA	1.65V to 5.5V	Full			0.1	V
		I_{OL} = 4mA	1.65V				0.45	
		I_{OL} = 8mA	2.3V				0.3	
		I_{OL} = 16mA	3V				0.4	
		I_{OL} = 24mA					0.55	
		I_{OL} = 32mA	4.5V				0.55	
I_I	A or OE inputs	V_I=5.5V or GND	0V to 5.5V	+25°C		±0.1	±1	μA
				Full			±5	
I_{off}		V_I or V_O=5.5V	0V	+25°C		±0.1	±1	μA
				Full			±10	
I_{OZ}		V_O=0V to 5.5V	3.6V	Full			10	μA
I_{CC}		V_I=5.5V or GND, I_O=0	1.65V to 5.5V	+25°C		0.1	1	μA
				Full			10	
ΔI_{CC}		One input at V_{CC}-0.6V, Other inputs at V_{CC} or GND	3V to 5.5V	Full			500	μA

Switching Characteristics, C_L=15pF

over recommended operating free-air temperature range (-40°C to 125°C, unless otherwise noted.) (1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}=1.8V ±0.15V	V_{CC}=2.5V ±0.2V	V_{CC}=3.3V ±0.3V	V_{CC}=5V ±0.5V	UNIT
			TYP	TYP	TYP	TYP	
t_{pd}	A	Y	6.1	3.7	3.9	2.1	ns

Switching Characteristics, C_L=30pF or 50pF

over recommended operating free-air temperature range (-40°C to 125°C, unless otherwise noted.) (1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}=1.8V±0.15V	V_{CC}=2.5V ±0.2V	V_{CC}=3.3V ±0.3V	V_{CC}=5V ±0.5V	UNIT
			TYP	TYP	TYP	TYP	
t_{pd}	A	Y	8.6	5.3	4.0	2.9	ns
t_{en}	OE	Y	9.5	5.8	5.0	3.3	ns
t_{dis}	OE	Y	7.4	4.3	4.4	3.0	ns

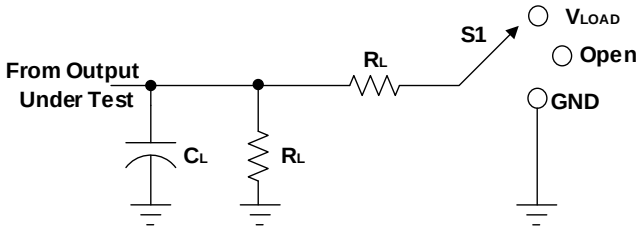
Operating Characteristics

T_A=25°C

PARAMETER			TEST CONDITIONS	V_{CC}=1.8V	V_{CC}=2.5V	V_{CC}=3.3V	V_{CC}=5V	UNIT
				TYP	TYP	TYP	TYP	
C_{pd}	Power dissipation capacitance	Output enabled	f=10MHZ	18	18	18	21	pF
		Output disabled		2	2	3	4	

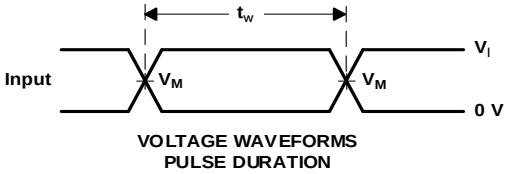
(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

Parameter Measurement Information

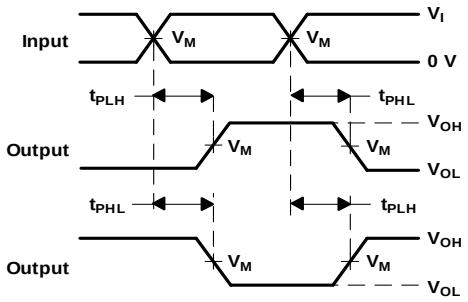


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

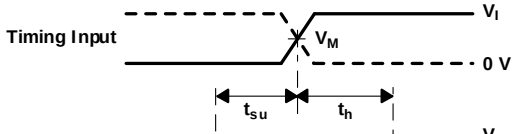
V_{CC}	INPUTS		V_M	V_{LOAD}	C_L		R_L		V_Δ
	V_I	t_r/t_f							
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	15pF	30pF	1MΩ	1kΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	15pF	30pF	1MΩ	500Ω	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	15pF	50pF	1MΩ	500Ω	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2 x V_{CC}	15pF	50pF	1MΩ	500Ω	0.3V



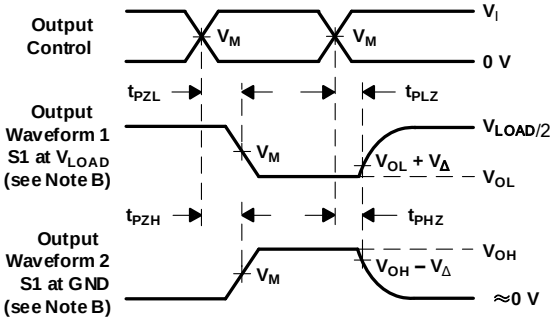
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS PROPAGATION DELAY
TIMES INVERTION AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES

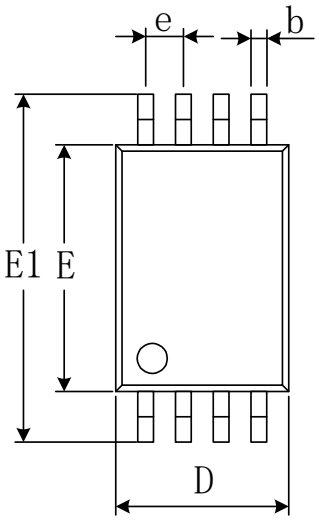


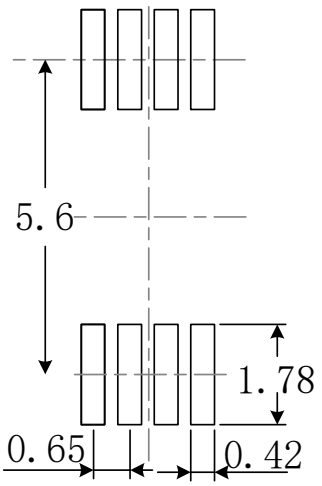
VOLTAGE WAVEFORMS ENABLE AND DISABLE
TIMES LOW-AND HIGH-LEVEL ENABLING

NOTES: A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω.
D. The outputs are measured one at a time, with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
F. t_{PZL} and t_{PZH} are the same as t_{en}.
G. t_{PLH} and t_{PHL} are the same as t_{pd}.
H. All parameters and waveforms are not applicable to all devices.

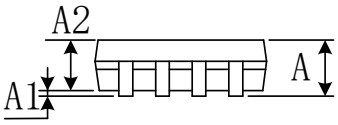
Figure 1. Load Circuit and Voltage Waveforms

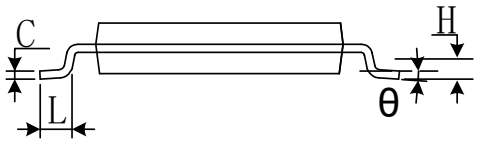
PACKAGE OUTLINE DIMENSIONS
TSSOP-8





RECOMMENDED LAND PATTERN (Unit: mm)





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	2.900	3.100	0.114	0.122
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650(BSC)		0.026(BSC)	
L	0.500	0.700	0.020	0.028
H	0.25(TYP)		0.01(TYP)	
θ	1°	7°	1°	7°