RS3G14 Triple Schmitt-Trigger Inverter
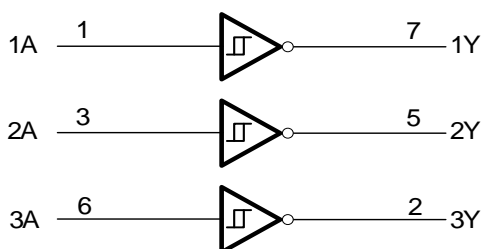
1 FEATURES

- **Operating Voltage Range:1.65V to 5.5V**
- **Low Power Consumption:1µA (Max)**
- **Operating Temperature Range:**
  -40°C to +125°C
- **Input Accept Voltage to 5.5V**
- **High Output Drive: ±24mA at V_{CC}=3.0V**
- **I_{off} Supports Partial-Power-Down Mode Operation**
- **Micro SIZE PACKAGES: MSOP-8、 DFN1.4×1.0-8L**

2 APPLICATIONS

- **AC Receiver and Home Theaters**
- **Blu-ray Players and Home Theaters**
- **Desktops or Notebook PCs**
- **Digital Video Cameras (DVC)**
- **Mobile Phones**
- **Personal Navigation Device (GPS)**
- **Portable Media Player**

Functional Block Diagram

3 DESCRIPTIONS

The RS3G14 Triple Schmitt-trigger inverter is designed for 1.65V to 5.5V V_{CC} operation.

The RS3G14 device contains three inverter and performs the Boolean function $Y=\overline{A}$. The device functions as three independent inverters with Schmitt-trigger inputs, so the device has different input threshold levels for positive-going (V_{T+}) and negative going (V_{T-}) signals to provide hysteresis(ΔV_T) which makes the device tolerant to slow or noisy input signals.

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.

The RS3G14 is available in Green MSOP-8 and DFN1.4×1.0-8L packages. It operates over an ambient temperature range of -40°C to +125°C.

Device Information [1]

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS3G14	MSOP-8	3.00mm×3.00mm
	DFN1.4×1.0-8L	1.40mm×1.00mm

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

4 FUNCTION TABLE

INPUT	OUTPUT
A	**Y**
H	L
L	H

$Y=\overline{A}$
H=High Voltage Level
L=Low Voltage Level

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5 Revision History

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

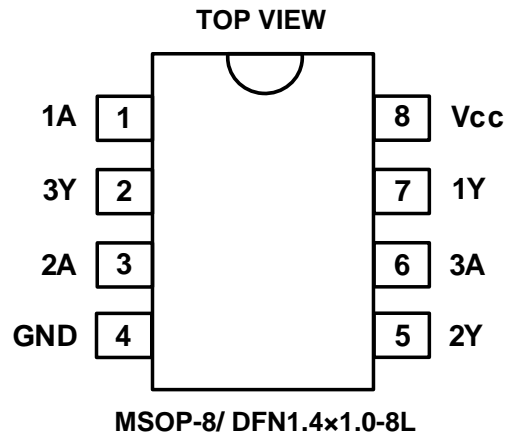| Version	Change Date	Change Item
A.1	2022/06/09	Initial version completed
A.2	2022/09/01	1. Change TSSOP8 package to MSOP8 package 2. Change ORDERING NUMBER

6 PACKAGE/ORDERING INFORMATION [1]

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING [2]	PACKAGE OPTION
RS3G14	RS3G14XM	-40°C ~+125°C	MSOP-8	RS3G14	Tape and Reel,4000
	RS3G14XUTDS8	-40°C ~+125°C	DFN1.4x1.0-8L	3G14	Tape and Reel,5000

NOTE:

(1) This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the right-hand navigation.

(2) 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.

7 PIN CONFIGURATIONS

TOP VIEW

```
            _____
    1A  | 1          8 |  Vcc
    3Y  | 2          7 |  1Y
    2A  | 3          6 |  3A
    GND | 4          5 |  2Y
            ‾‾‾‾‾‾‾‾‾‾‾‾
```

MSOP-8/ DFN1.4×1.0-8L

PIN DESCRIPTION

PIN			
MSOP-8/ DFN1.4×1.0-8L	NAME	I/O TYPE [1]	FUNCTION
1	1A	I	Input 1
2	3Y	O	Output 3
3	2A	I	Input 2
4	GND	P	Ground
5	2Y	O	Output 2
6	3A	I	Input 3
7	1Y	O	Output 1
8	V_{CC}	P	Power Pin

(1) I=input, O=output, P=Power.

8 SPECIFICATIONS

8.1 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 [4]		-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*.

(4) The maximum power dissipation is a function of $T_{J(MAX)}$, $R_{\theta JA}$, and T_A. The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(MAX)} - T_A) / R_{\theta JA}$. All numbers apply for packages soldered directly onto a PCB.

9 ELECTRICAL CHARACTERISTICS

over recommended operating free-air temperature range (Full=-40°C to +125°C, typical values are at T_A = +25°C, unless otherwise noted.) [1]

9.1 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		
Input voltage	V_I		0	5.5	V
Output voltage	V_O		0	V_{CC}	V
Operating temperature	T_A		-40	+125	°C

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

RS3G14

9.2 DC Characteristics

PARAMETER		TEST CONDITIONS	V_{CC}	TEMP	MIN[2]	TYP[3]	MAX[2]	UNIT
V_{T+}	Positive going input threshold voltage		1.65V	Full	0.75		1.05	V
			2.3V		1.25		1.55	
			3V		1.5		2.1	
			4.5V		2.3		3.0	
			5.5V		2.8		3.4	
V_{T-}	Negative going input threshold voltage		1.65V	Full	0.3		0.6	V
			2.3V		0.35		0.65	
			3V		0.45		0.75	
			4.5V		0.7		1.0	
			5.5V		0.85		1.15	
ΔV_T	Hysteresis (V_{T+}-V_{T-})		1.65V	Full	0.35		0.6	V
			2.3V		0.6		1.2	
			3V		1.05		1.65	
			4.5V		1.6		2.0	
			5.5V		1.95		2.25	
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 input	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	0	+25°C		±0.1	±1	µA
				Full			±10	
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

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.
(2) Limits are 100% production tested at 25°C. Limits over the operating temperature range are ensured through correlations using statistical quality control (SQC) method.
(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.
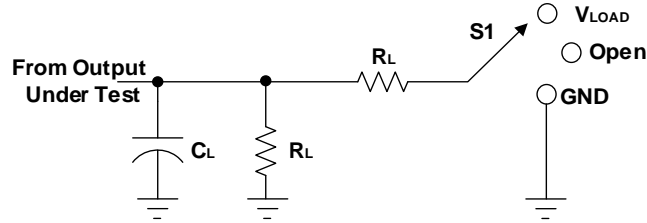
9.3 AC Characteristics

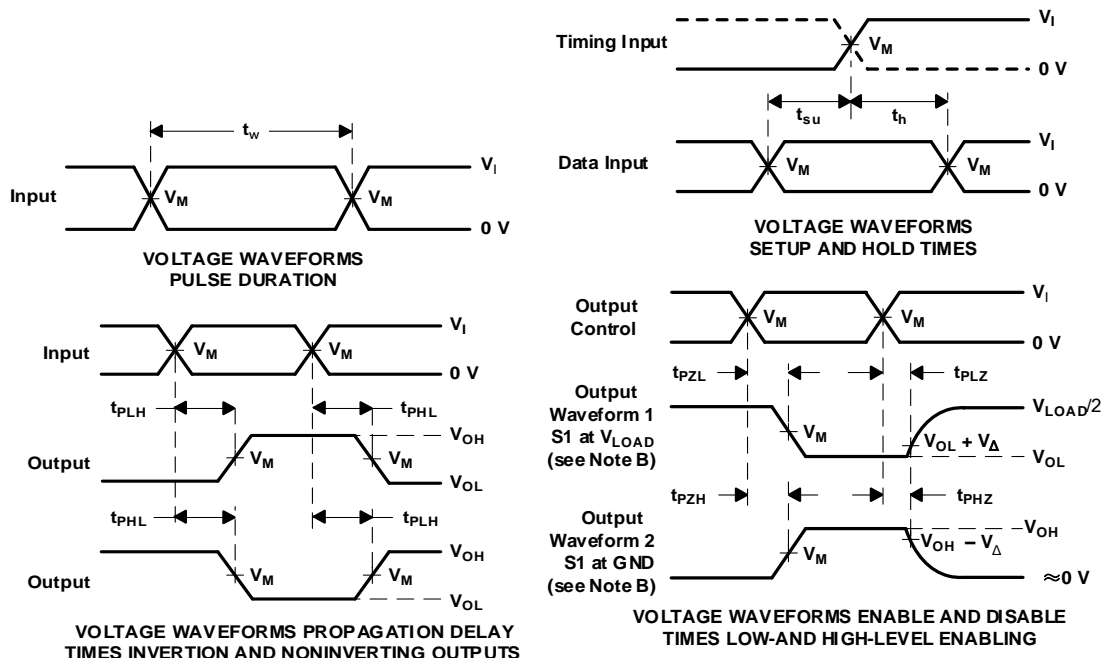| PARAMETER	SYMBOL	TEST CONDITIONS		TEMP	MIN	TYP	MAX	UNIT
Propagation Delay	t_{pd}	V_{CC}=1.8V±0.15V	C_L=30pF, R_L=500Ω	Full		7.5		ns
		V_{CC}=2.5V±0.2V	C_L=30pF, R_L=500Ω	Full		3.6		
		V_{CC}=3.3V±0.3V	C_L=50pF, R_L=500Ω	Full		3.1		
		V_{CC}=5V±0.5V	C_L=50pF, R_L=500Ω	Full		2.7		
Input Capacitance	C_i	V_{CC}=3.3V	V_I=V_{CC} or GND	+25°C		4		pF
Power dissipation capacitance	C_{pd}	V_{CC}=1.8V	f=10MHz	+25°C		20		pF
		V_{CC}=2.5V				21		
		V_{CC}=3.3V				22		
		V_{CC}=5V				25		

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

10 Parameter Measurement Information

TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PIZ}/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}	30pF	1kΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	30pF	500Ω	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	50pF	500Ω	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2 x V_{CC}	50pF	500Ω	0.3V

VOLTAGE WAVEFORMS PULSE DURATION

VOLTAGE WAVEFORMS SETUP AND HOLD TIMES

VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES INVERTION AND NONINVERTING OUTPUTS

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}.
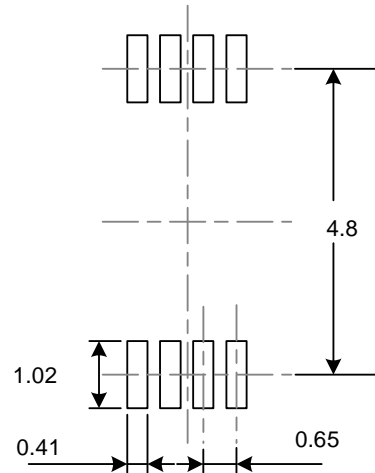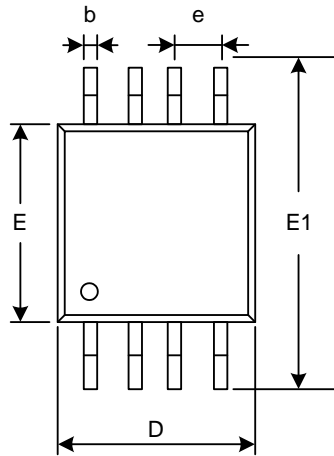
    F. t_{PZL} and t_{PZH} are the same as t_{en}.

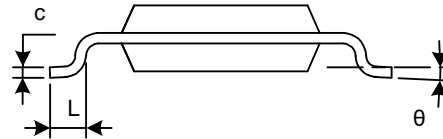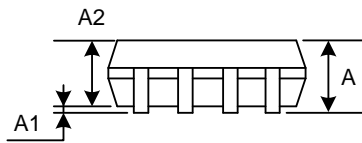   G. t_{PLH} and t_{PHL} are the same as t_{pd}

    H. All parameters and waveforms are not applicable to all devices.
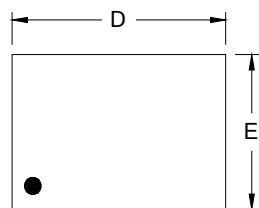
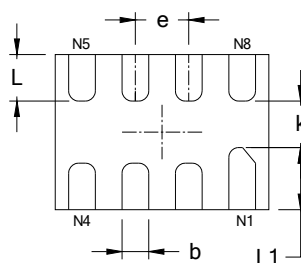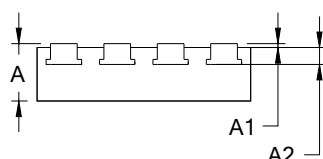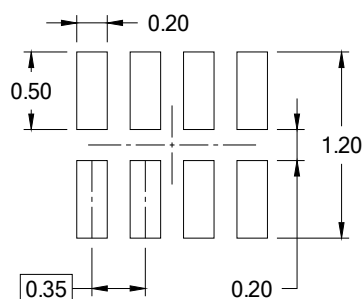**Figure 1. Load Circuit and Voltage Waveforms**

11 PACKAGE OUTLINE DIMENSIONS
MSOP-8

RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
e	0.650(BSC)		0.026(BSC)	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

DFN1.4x1.0-8L

TOP VIEW

BOTTOM VIEW

SIDE VIEW

RECOMMENDED LAND PATTERN (Unit: mm)

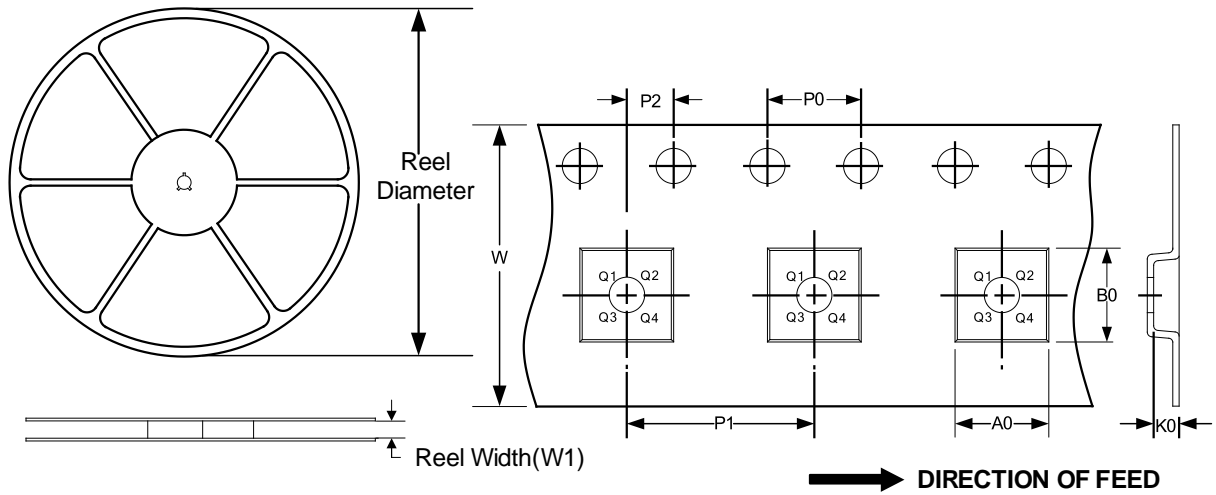| Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.340	0.400	0.013	0.016
A1	0.000	0.050	0.000	0.002
A2	0.110 REF		0.004 REF	
D	1.350	1.450	0.053	0.057
E	0.950	1.050	0.037	0.041
k	0.200 MIN		0.008 MIN	
b	0.150	0.200	0.006	0.008
e	0.350 TYP		0.014 TYP	
L	0.250	0.350	0.010	0.014
L1	0.350	0.450	0.014	0.018

NOTE:
   A. All linear dimension is in millimeters.
   B. This drawing is subject to change without notice.
   C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
   D. BSC: Basic Dimension. Theoretically exact value shown without tolerances.
   E. REF: Reference Dimension, usually without tolerance, for information purposes only.

12 TAPE AND REEL INFORMATION

REEL DIMENSIONS   TAPE DIMENSION

NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
MSOP-8	13"	12.4	5.20	3.30	1.50	4.0	8.0	2.0	12.0	Q1
DFN1.4×1.0-8L	7"	9.5	1.2	1.6	0.5	4.0	4.0	2.0	8.0	Q1

NOTE:
1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.

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