RS6G14 6-channel Schmitt-Trigger Inverter
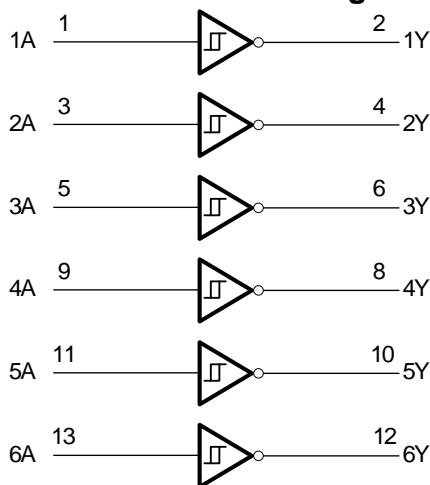
FEATURES

- **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**
- **PACKAGES: SOIC-14(SOP14)、TSSOP-14**

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

DESCRIPTION

The RS6G14 6-channel Schmitt-trigger inverter is designed for 1.65V to 5.5V V_{CC} operation.

The RS6G14 device contains six inverters and performs the Boolean function Y= $\overline{A}$. The device functions as six 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 RS6G14 is available in Green SOIC-14(SOP14) and TSSOP-14 packages. It operates over an ambient temperature range of -40°C to +125°C.

Device Information [1]

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS6G14	SOIC-14(SOP14)	8.65mm×3.90mm
	TSSOP-14	5.00mm×4.40mm

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

FUNCTION TABLE

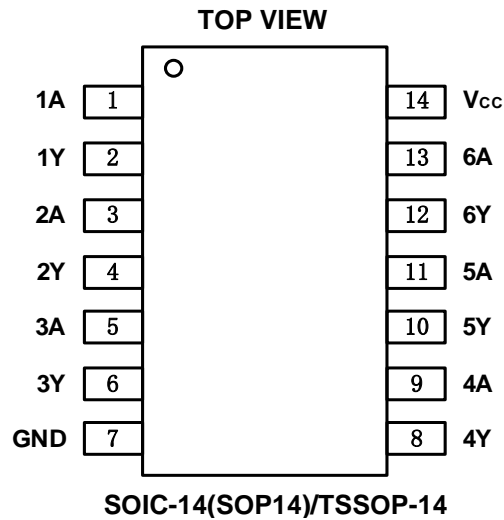| INPUT	OUTPUT
A	Y
H	L
L	H

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

Revision History

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

Version	Change Date	Change Item
A.1	2021/01/20	Initial version completed
A.2	2021/11/26	Added the TAPE AND REEL INFORMATION

PIN CONFIGURATIONS

TOP VIEW

1A	1	14	Vcc
1Y	2	13	6A
2A	3	12	6Y
2Y	4	11	5A
3A	5	10	5Y
3Y	6	9	4A
GND	7	8	4Y

SOIC-14(SOP14)/TSSOP-14

PIN DESCRIPTION

NAME	PIN	I/O	DESCRIPTION
	SOIC-14(SOP14)/TSSOP-14		
1A	1	I	Input 1
1Y	2	O	output 1
2A	3	I	Input 2
2Y	4	O	output 2
3A	5	I	Input 3
3Y	6	O	output 3
GND	7	P	Ground
4Y	8	O	output 4
4A	9	I	Input 4
5Y	10	O	output 5
5A	11	I	Input 5
6Y	12	O	output 6
6A	13	I	Input 6
Vcc	14	P	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			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		RS6G14		UNIT
		14PINS		
		SOIC-14(SOP14)	TSSOP-14	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	122.2	141.2	°C/W
$R_{\theta JC(top)}$	Junction-to-case(top) thermal resistance	80.9	78.8	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	80.6	85.8	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	40.4	27.7	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	80.3	85.5	°C/W
$R_{\theta JC(bot)}$	Junction-to-case(bottom) thermal resistance	N/A	N/A	°C/W

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING [1]	PACKAGE OPTION
RS6G14	RS6G14XP	-40°C ~+125°C	SOIC-14(SOP14)	RS6G14	Tape and Reel,4000
	RS6G14XQ	-40°C ~+125°C	TSSOP-14	RS6G14	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 (Full=-40°C to +125°C, typical 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		
Input voltage	V_I		0	5.5	V
Output voltage	V_O		0	V_{CC}	V
Operating temperature	T_A		-40	+125	°C

DC Characteristics

PARAMETER		TEST CONDITIONS	V_{CC}	TEMP	MIN	TYP	MAX	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

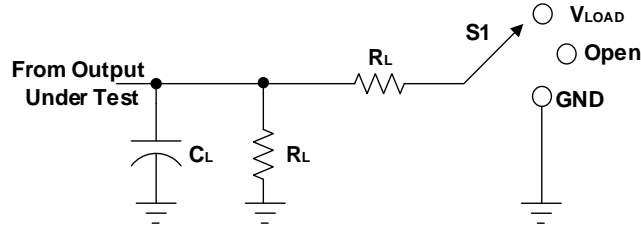|			Full			10	
ΔI_{CC}	One input at V_{CC}-0.6V, Other inputs at V_{CC} or GND	3V to 5.5V	Full			500	μA

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		

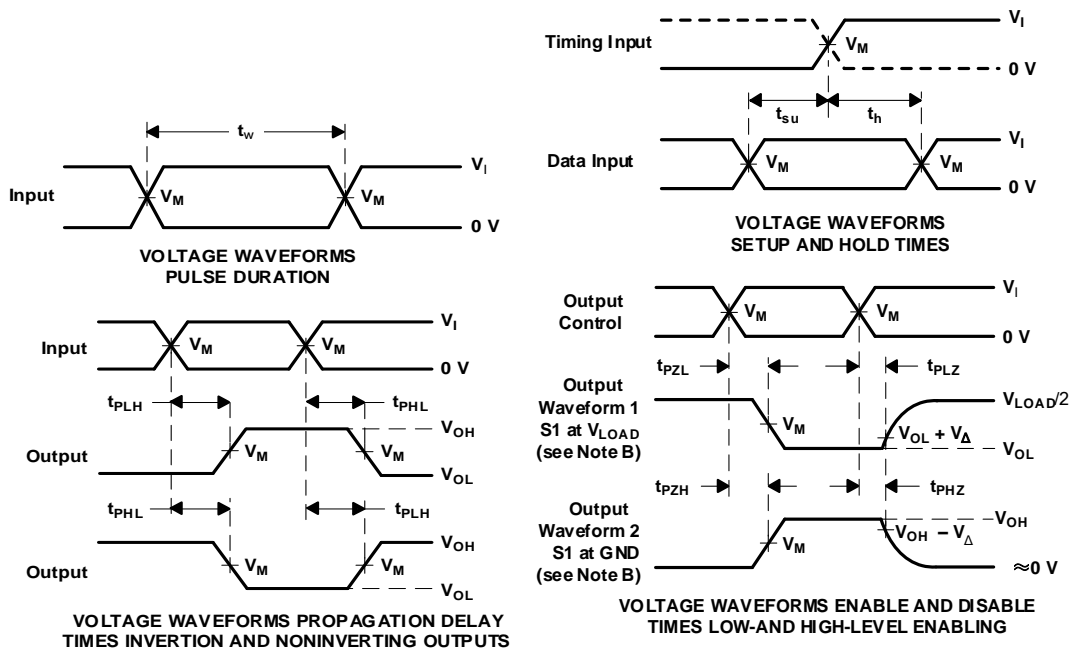(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

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}.
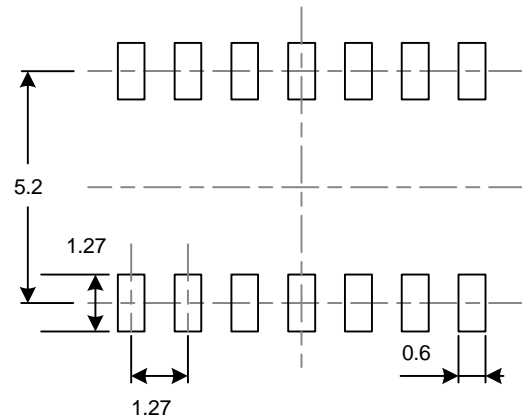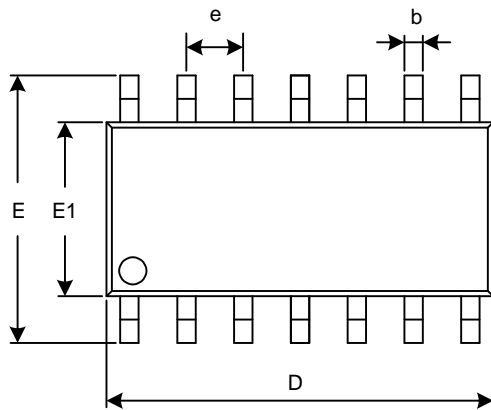   G. t_{PLH} and t_{PHL} are the same as t_{pd}
   H. All parameters and waveforms are not applicable to all devices.
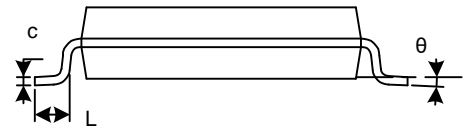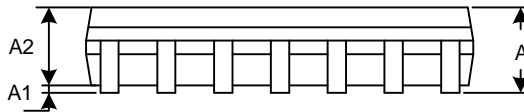
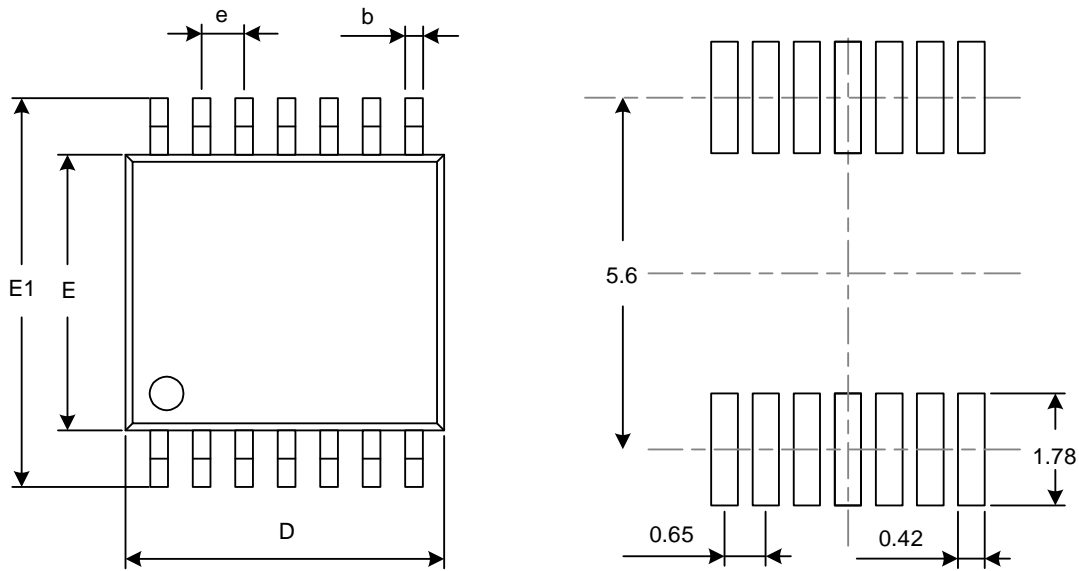**Figure 1. Load Circuit and Voltage Waveforms**
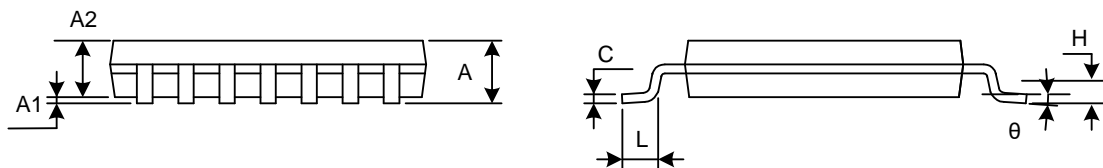
PACKAGE OUTLINE DIMENSIONS
SOIC-14(SOP14)

RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions 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	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D	8.450	8.850	0.333	0.348
e	1.270(BSC)		0.050(BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

TSSOP-14

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	4.860	5.100	0.191	0.201
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°

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
SOIC-14(SOP14)	13''	16.4	6.60	9.30	2.10	4.0	8.0	2.0	16.0	Q1
TSSOP-14	13''	12.4	6.95	5.60	1.20	4.0	8.0	2.0	12.0	Q1

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NL17SZU04P5T5G 74LVC06ADTR2G 74LVC04ADR2G NLV37WZ04USG NLX3G14FMUTCG NL17SZ04P5T5G NL17SG14P5T5G
NLV27WZU04DFT2G NLV17SG14DFT2G NLVHC1G04DFT2G MC14069UBD NLU3G14CMX1TCG NLX2G14BMX1TCG
NLX2GU04AMX1TCG 74HCT04DT 74HCT14DT 74LCX14FT(AJ) EG8015 GN14D GN4069 74HC04DM/TR HG74HC04M/TR
CD40106DM/TR CD4007BE 74HC14DN 74HC14DM/TR CD4069UBE 74HC125M/TR CD4069UBMT/TR HG74HC04MT/TR
74HC14DMT/TR 74HC04DN HT74HC04ARZ HT40106ARZ 74HC14-HXY IW4069UBN RS1GT04XC5