

RS2G14 Dual Schmitt-Trigger Inverter

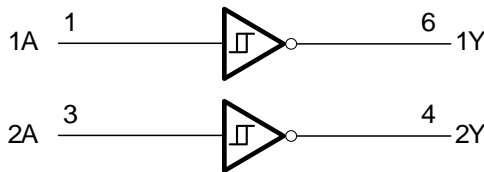
1 FEATURES

- **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:** SOT23-6, SC70-6

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 RS2G14 Dual Schmitt-trigger inverter is designed for 1.65V to 5.5V V_{CC} operation.

The RS2G14 device contains two inverter and performs the Boolean function $Y = \bar{A}$. The device functions as two 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 RS2G14 is available in Green SOT23-6 and SC70-6 packages. It operates over an ambient temperature range of -40°C to +125°C.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS2G14	SOT23-6(6)	1.60mm×2.92mm
	SC70-6(6)	2.10mm×1.25mm

(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 = \bar{A}
H=High Voltage Level
L=Low Voltage Level

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5 Revision History

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

Version	Change Date	Change Item
A.1	2021/01/20	Initial version completed
A.2	2022/04/27	1. Added the TAPE AND REEL INFORMATION 2. Update PACKAGE MARKING on Page 5@RevA.1
A.3	2022/07/13	1. Change ORDERING NUMBER on Page 5@RevA.2 2. Update the ESD Ratings

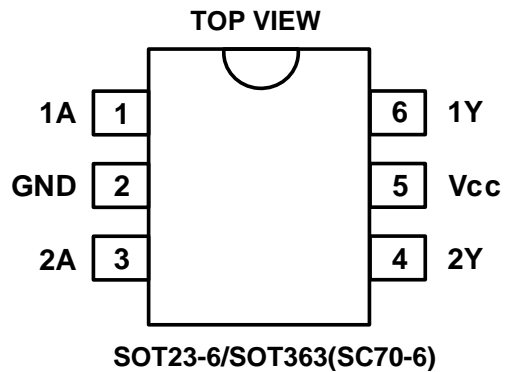
6 PACKAGE/ORDERING INFORMATION ⁽¹⁾

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING ⁽²⁾	PACKAGE OPTION
RS2G14	RS2G14XH6	-40°C ~+125°C	SOT23-6	2G14	Tape and Reel,3000
	RS2G14XC6	-40°C ~+125°C	SC70-6(SOT363)	2G14	Tape and Reel,3000

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



PIN DESCRIPTION

PIN	NAME	I/O TYPE ⁽¹⁾	FUNCTION
SOT23-6/SOT363(SC70-6)			
1	1A	I	Input 1
2	GND	P	Ground
3	2A	I	Input 2
4	2Y	O	Output 2
5	V _{CC}	P	Power Pin
6	1Y	O	Output 1

(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
V _O	Voltage range applied to any output in the high-impedance or power-off state ⁽²⁾	-0.5	6.5	V
V _O	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		-50	mA
I _{OK}	Output clamp current		-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_{θJA}, and T_A. The maximum allowable power dissipation at any ambient temperature is P_D = (T_{J(MAX)} - T_A) / R_{θJA}. All numbers apply for packages soldered directly onto a PCB.

8.2 ESD Ratings

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

		VALUE	UNIT
V _(ESD)	Electrostatic discharge		
	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±6000	V
	Charged device model (CDM), per ANSI/ESDA/JEDEC JS-002 ⁽²⁾	±1500	V
	Machine model (MM)	±200	V

- (1) JEDEC document JEP155 states that 500 V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250 V CDM allows safe manufacturing with a standard ESD control process.



ESD SENSITIVITY CAUTION

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

8.3 Thermal Information:

THERMAL METRIC ⁽¹⁾		RS2G14		UNIT
		6PINS		
		SOT23-6	SOT363(SC70-6)	
R _{θJA}	Junction-to-ambient thermal resistance	273.8	214.7	°C/W
R _{θJC(top)}	Junction-to-case(top) thermal resistance	126.8	127.1	°C/W
R _{θJB}	Junction-to-board thermal resistance	85.9	60.0	°C/W
Ψ _{JT}	Junction-to-top characterization parameter	10.9	33.4	°C/W
Ψ _{JB}	Junction-to-board characterization parameter	84.9	59.8	°C/W
R _{θJC(bot)}	Junction-to-case(bottom) thermal resistance	N/A	N/A	°C/W

- (1) Thermal resistance varies with operating conditions.

9 ELECTRICAL CHARACTERISTICS

over recommended operating free-air temperature range (Full ⁽⁴⁾ = -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

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}		IoH = -100μA	1.65V to 5.5V	Full	V _{CC} -0.1			V
		IoH = -4mA	1.65V		1.2			
		IoH = -8mA	2.3V		1.9			
		IoH = -16mA	3V		2.4			
		IoH = -24mA			2.3			
		IoH = -32mA	4.5V		3.8			
V _{OL}		IoL = 100μA	1.65V to 5.5V	Full			0.1	V
		IoL = 4mA	1.65V			0.45		
		IoL = 8mA	2.3V			0.3		
		IoL = 16mA	3V			0.4		
		IoL = 24mA				0.55		
		IoL = 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

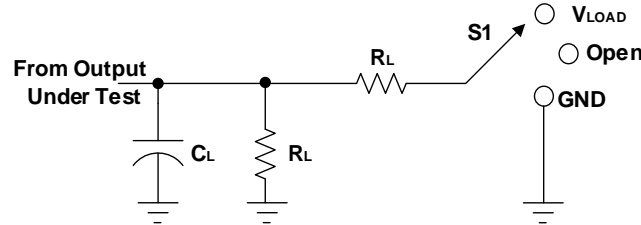
			Full			10	
ΔI_{CC}	One input at $V_{CC}-0.6V$, Other inputs at V_{CC} or GND	3V to 5.5V	Full			500	μA

9.3 AC Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS		TEMP	MIN ⁽²⁾	TYP ⁽³⁾	MAX ⁽²⁾	UNIT
Propagation Delay	t_{pd}	$V_{CC}=1.8V\pm 0.15V$	$C_L=30pF, R_L=500\Omega$	Full		7.5		ns
		$V_{CC}=2.5V\pm 0.2V$	$C_L=30pF, R_L=500\Omega$	Full		3.6		
		$V_{CC}=3.3V\pm 0.3V$	$C_L=50pF, R_L=500\Omega$	Full		3.1		
		$V_{CC}=5V\pm 0.5V$	$C_L=50pF, R_L=500\Omega$	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		

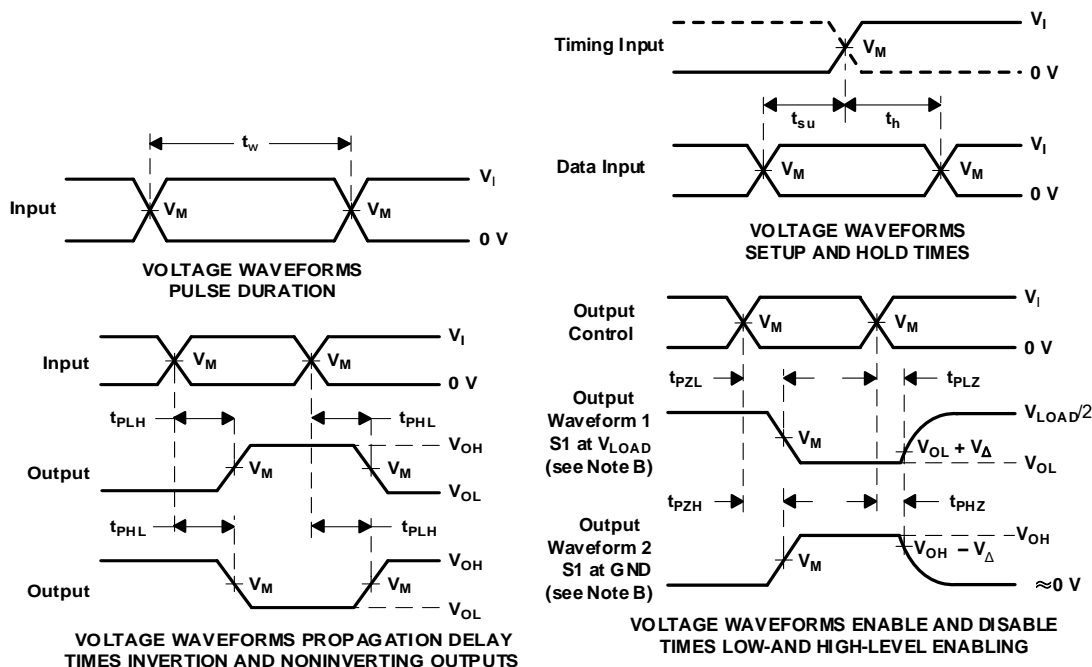
- (1) All unused inputs of the device must be held at VCC or GND to ensure proper device operation.
- (2) Limits are 100% production tested at 25°C. Limits over the operating temperature range are ensured through correlations using statistical quality control (SQC) method.
- (3) Typical values represent 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.
- (4) Specified by characterization only.

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					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1k Ω	0.15V
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 Ω	0.15V
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω	0.3V
$5V \pm 0.5V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 Ω	0.3V

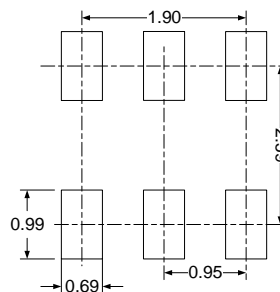
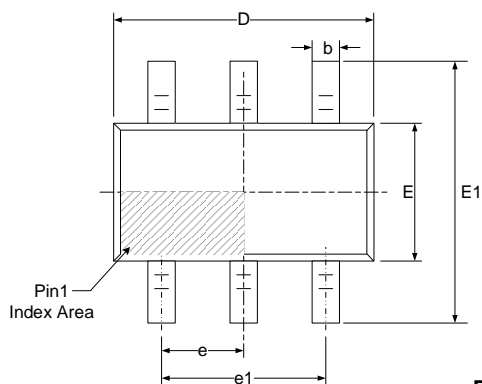
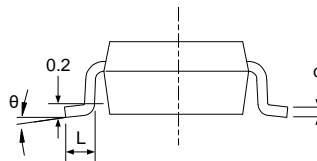
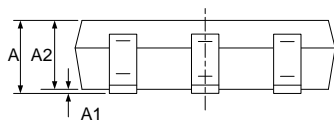


- NOTES: A. C_L includes probe and jig capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
 C. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10 \text{ MHz}$, $Z_o = 50 \Omega$.
 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.

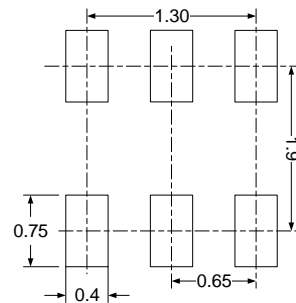
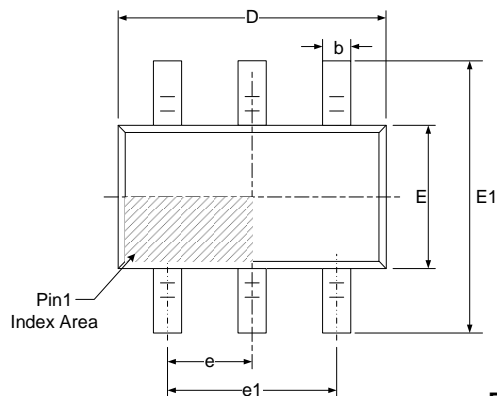
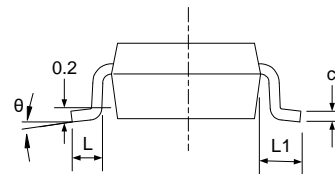
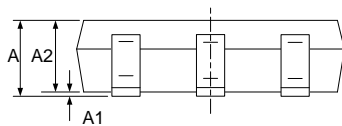
Figure 1. Load Circuit and Voltage Waveforms

11 PACKAGE OUTLINE DIMENSIONS

SOT23-6


RECOMMENDED LAND PATTERN (Unit: mm)


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT363(SC70-6)

RECOMMENDED LAND PATTERN (Unit: mm)


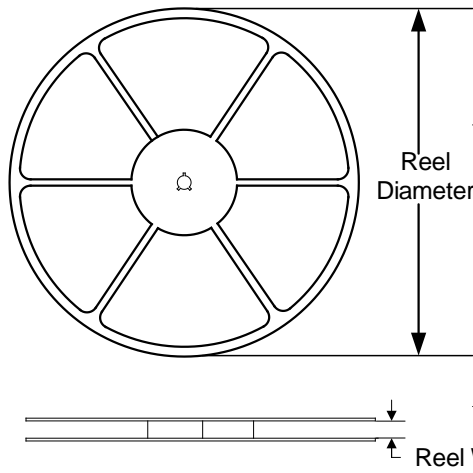
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650(BSC)		0.026(BSC)	
e1	1.300(BSC)		0.051(BSC)	
L	0.260	0.460	0.010	0.018
L1	0.525		0.021	
θ	0°	8°	0°	8°

NOTE:

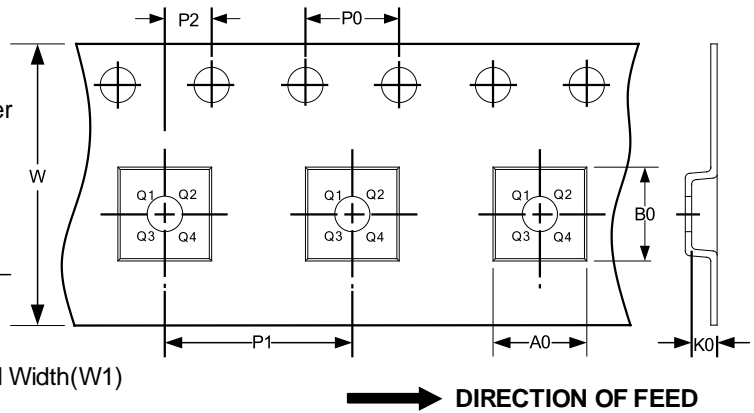
- A. All linear dimension is in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. BSC: Basic Dimension. Theoretically exact value shown without tolerances.

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
SOT363(SC70-6)	7"	9.5	2.40	2.50	1.20	4.0	4.0	2.0	8.0	Q3
SOT23-6	7"	9.5	3.17	3.23	1.37	4.0	4.0	2.0	8.0	Q3

NOTE:

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

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