RS6G07 6-channel Buffer and Driver with Open-Drain Outputs

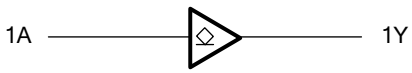
FEATURES

- **Operating Voltage Range:1.65V to 5.5V**
- **Low Power Consumption:1μA (Max)**
- **Operating Temperature Range: -40°C to +125°C**
- **Inputs and Open-Drain Outputs Accept Voltage to 5.5V**
- **High Output Drive: ±24mA at V_{CC}=3.0V**
- **PACKAGES: SOIC-14(SOP14)、TSSOP-14**

APPLICATIONS

- **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 RS6G07 6-channel buffer and driver is designed for 1.65V to 5.5V V_{CC} operation.

The RS6G07 device is open drain and can be connected to other open-drain outputs to implement active-low wired-OR or active-high wired-AND functions. The 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 RS6G07 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)
RS6G07	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**
L	L
H	Z

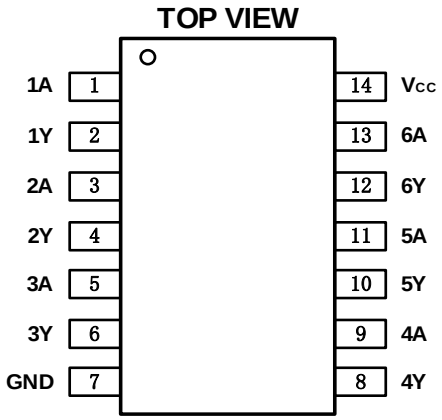
H=High Voltage Level
L=Low Voltage Level
Z=High-impedance OFF-state

Revision History

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

VERSION	Change Date	Change Item
A.1	2021/4/20	Initial version completed

Pin Configuration and Functions (Top View)



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	Open-drain output 1
2A	3	I	Input 2
2Y	4	O	Open-drain output 2
3A	5	I	Input 3
3Y	6	O	Open-drain output 3
GND	7	P	Ground
4Y	8	O	Open-drain output 4
4A	9	I	Input 4
5Y	10	O	Open-drain output 5
5A	11	I	Input 5
6Y	12	O	Open-drain 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		-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 (1)		RS6G07 14PINS		UNIT
		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
RS6G07	RS6G07XP	-40°C ~+125°C	SOIC-14(SOP14)	RS6G07	Tape and Reel,4000
	RS6G07XQ	-40°C ~+125°C	TSSOP-14	RS6G07	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

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

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 B 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_{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

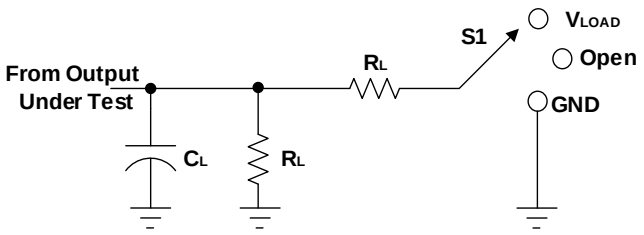
AC Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS		TEMP	MIN	TYP	MAX	UNIT
Propagation Delay	t_{pd}	V_{CC}=1.8V±0.15V	C_L=30pF, R_L=1kΩ	Full		6.4		ns
		V_{CC}=2.5V±0.2V	C_L=30pF, R_L=500Ω	Full		4.5		
		V_{CC}=3.3V±0.3V	C_L=50pF, R_L=500Ω	Full		4.2		
		V_{CC}=5V±0.5V	C_L=50pF, R_L=500Ω	Full		3.7		
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		3		pF
		V_{CC}=2.5V				3		
		V_{CC}=3.3V				4		
		V_{CC}=5V				6		

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

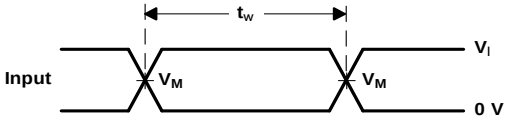
Parameter Measurement Information

Open-Drain

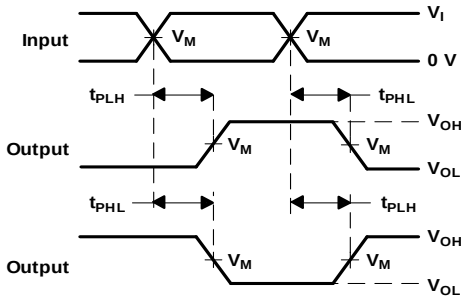


TEST	S1
t_{PLH}/t_{PHL}	V_{LOAD}
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	V_{LOAD}

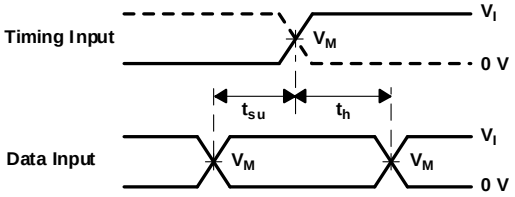
V_{CC}	INPUTS		V_M	V_{LOAD}	C_L		R_L		V_Δ
	V_I	t_r/t_f							
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	15pF	30pF	1MΩ	1kΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	15pF	30pF	1MΩ	500Ω	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	15pF	50pF	1MΩ	500Ω	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2 x V_{CC}	15pF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



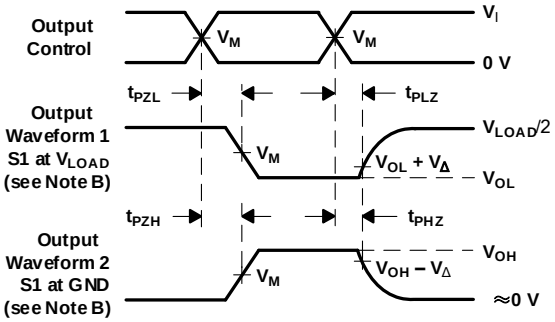
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS PROPAGATION DELAY
TIMES INVERTION AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES

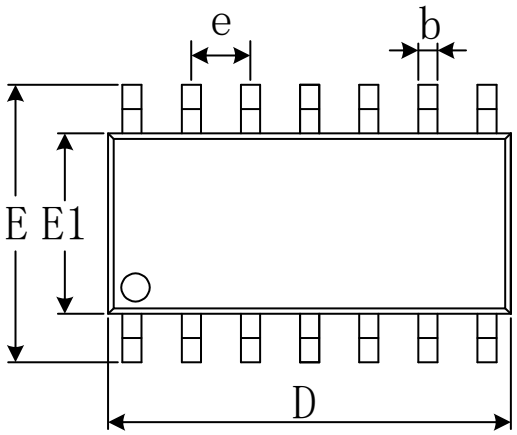


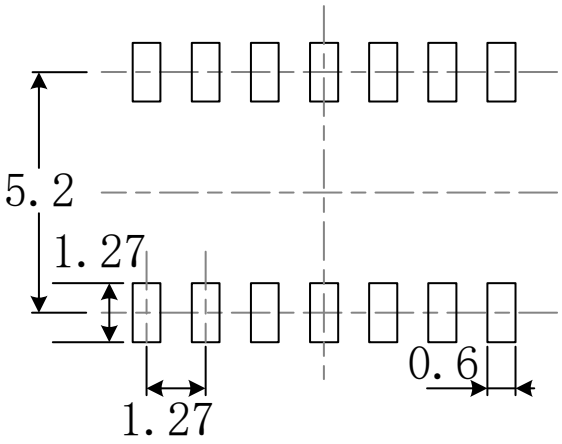
VOLTAGE WAVEFORMS ENABLE AND DISABLE
TIMES LOW-AND HIGH-LEVEL ENABLING

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.

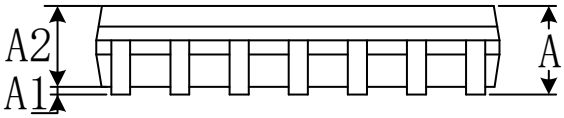
Figure 1. Load Circuit and Voltage Waveforms

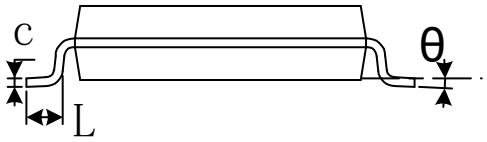
PACKAGE OUTLINE DIMENSIONS
SOIC-14(SOP14)





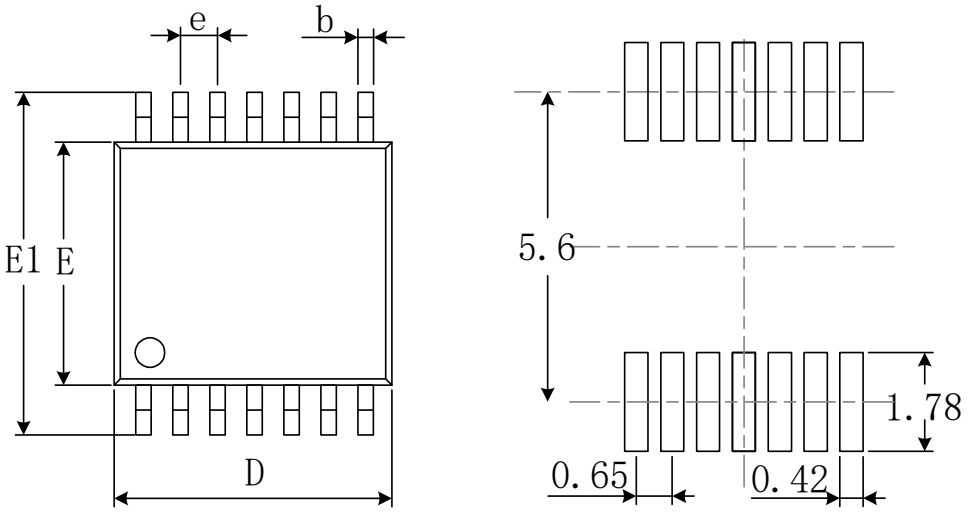
RECOMMENDED LAND PATTERN (Unit: mm)



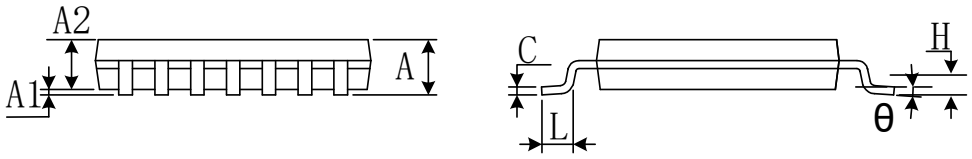


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D	8.450	8.850	0.333	0.348
e	1.270(BSC)		0.050(BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	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°