



# SGM8702

## Micro-Power, CMOS Input, RRIO, 1.4V, Open Drain Output Comparator

### GENERAL DESCRIPTION

The SGM8702 is an ultra low power comparator with a typical power supply current of 300nA. It has the best-in-class power supply current versus propagation delay performance. The propagation delay is as low as 6 $\mu$ s with 100mV overdrive at 1.4V supply.

Designed to operate over a wide range of supply voltages, from 1.4V to 5.5V, with guaranteed operation at 1.4V, 2.5V and 5.0V, the SGM8702 is ideal for use in a variety of battery-powered applications. With rail-to-rail common mode voltage range, the SGM8702 is well suited for single-supply operation. Its small packages make the SGM8702 ideal for use in handheld electronics and mobile phone applications.

Featuring an open drain output stage, the SGM8702 allows for operation with absolute minimum power consumption when driving any capacitive or resistive load.

SGM8702 is available in Green SOT-23-5 and SC70-5 space-saving packages. It is rated over the -40°C to +85°C temperature range.

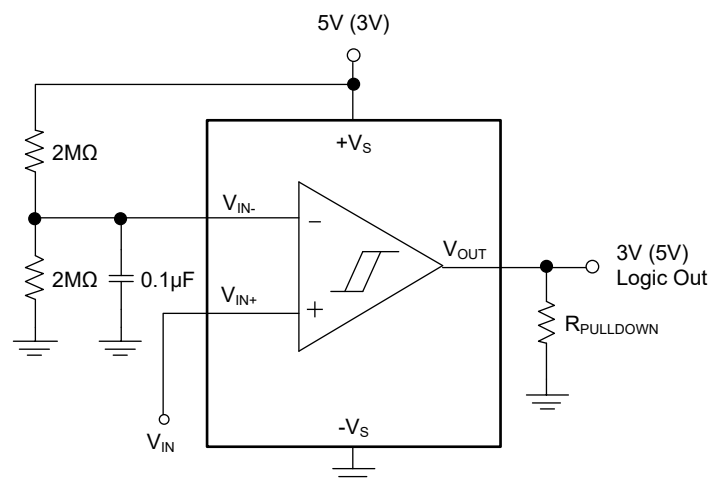
### FEATURES

- **Ultra Low Power Consumption:**  
300nA (TYP) at  $V_S = 1.4V$
- **Wide Supply Voltage Range: 1.4V to 5.5V**
- **Propagation Delay: 6 $\mu$ s (TYP) at  $V_S = 1.4V$**
- **Open Drain Output Current Drive:**  
18mA (TYP) at  $V_S = 5V$
- **Rail-to-Rail Input**
- **P-MOSFET Open Drain Output Structure**
- **-40°C to +85°C Operating Temperature Range**
- **Available in Green SOT-23-5 and SC70-5 Packages**

### APPLICATIONS

- RC Timers
- Window Detectors
- IR Receiver
- Multivibrators
- Alarm and Monitoring Circuits

### TYPICAL APPLICATION





**ELECTRICAL CHARACTERISTICS**(At  $T_A = +25^\circ\text{C}$ ,  $+V_S = 1.4\text{V}$ ,  $-V_S = 0\text{V}$ ,  $V_{CM} = +V_S/2$ ,  $V_{OUT} = +V_S$  and  $R_L = 1\text{k}\Omega$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	$I_S$	$V_{CM} = 0.3\text{V}$		300	1000	nA
		$V_{CM} = 1.1\text{V}$		250	1000	
Input Offset Voltage	$V_{OS}$	$V_{CM} = 0\text{V}$	-3	0.5	3	mV
		$V_{CM} = 1.4\text{V}$	-3	0.5	3	
Input Offset Average Drift				2		$\mu\text{V}/^\circ\text{C}$
Common Mode Rejection Ratio	CMRR	$V_{CM}$ Stepped from 0V to 0.3V		65		dB
		$V_{CM}$ Stepped from 0.8V to 1.4V		75		
		$V_{CM}$ Stepped from 0V to 1.4V		75		
Power Supply Rejection Ratio	PSRR	$V_S = 1.8\text{V}$ to $5.5\text{V}$ , $V_{CM} = 0\text{V}$	66	95		dB
Large Signal Voltage Gain	$A_{VO}$			100		dB
Output Swing High	$V_{OH}$	$V_S = 1.8\text{V}$ , $I_{OUT} = 500\mu\text{A}$	1.606	1.666		V
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	1.589			
		$V_S = 1.8\text{V}$ , $I_{OUT} = 1\text{mA}$	1.348	1.498		
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	1.312			
Output Current	$I_{OUT}$	Source		0.7		mA
Leakage Current	$I_{Leakage}$	$V_{OUT} = 0\text{V}$		1		nA
Propagation Delay (High to Low)		Overdrive = 10mV		12		$\mu\text{s}$
		Overdrive = 100mV		6		
Propagation Delay (Low to High)		Overdrive = 10mV		26		$\mu\text{s}$
		Overdrive = 100mV		17		
Rise Time	$t_{Rise}$	Overdrive = 10mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		220		ns
		Overdrive = 100mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		220		

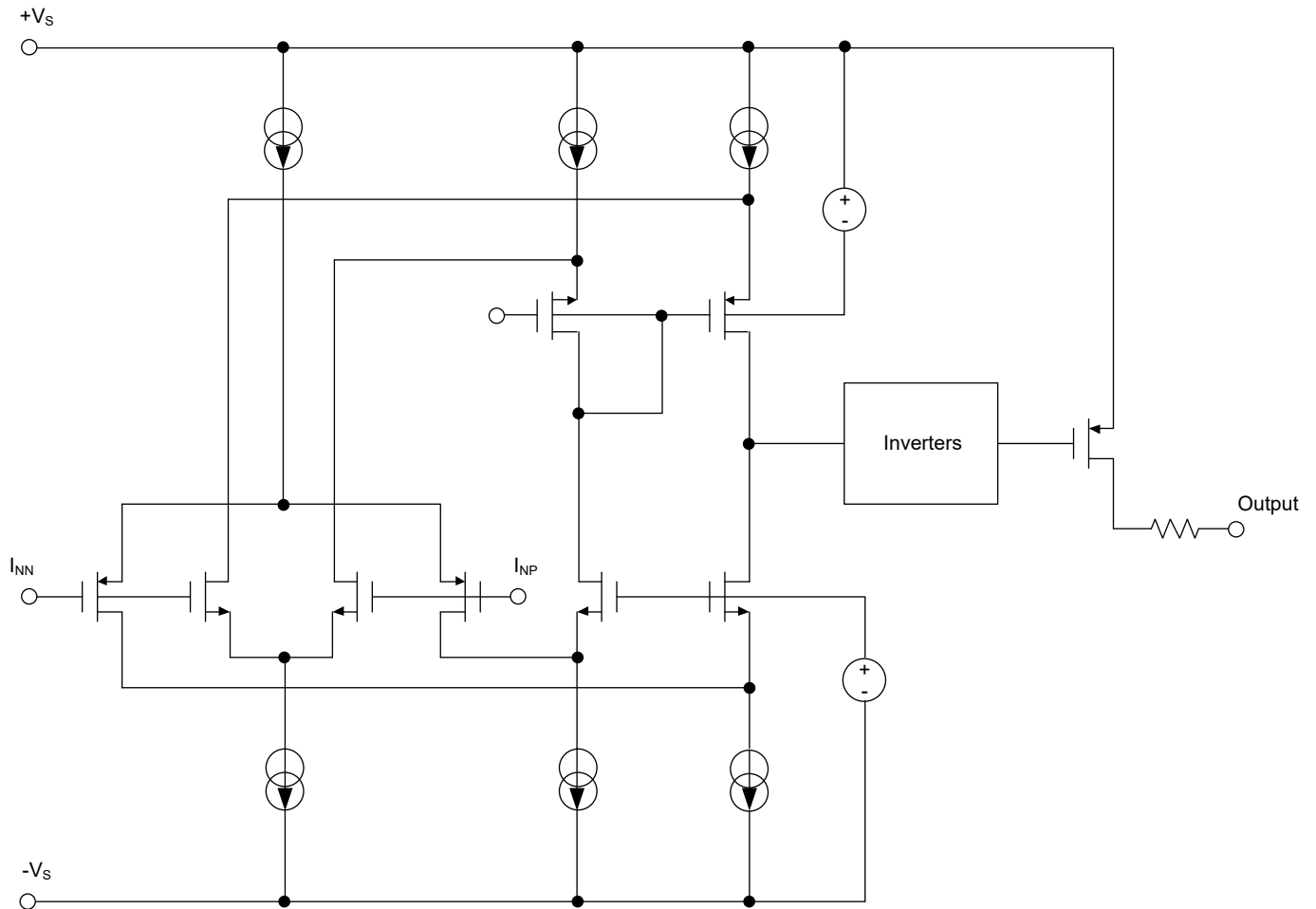
**ELECTRICAL CHARACTERISTICS (continued)**(At  $T_A = +25^\circ\text{C}$ ,  $+V_S = 2.5\text{V}$ ,  $-V_S = 0\text{V}$ ,  $V_{CM} = +V_S/2$ ,  $V_{OUT} = +V_S$  and  $R_L = 1\text{k}\Omega$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	$I_S$	$V_{CM} = 0.3\text{V}$		310		nA
		$V_{CM} = 2.2\text{V}$		260		
Input Offset Voltage	$V_{OS}$	$V_{CM} = 0\text{V}$		0.5		mV
		$V_{CM} = 2.5\text{V}$		0.5		
Input Offset Average Drift				2		$\mu\text{V}/^\circ\text{C}$
Common Mode Rejection Ratio	CMRR	$V_{CM}$ Stepped from 0V to 1.4V		75		dB
		$V_{CM}$ Stepped from 1.9V to 2.5V		80		
		$V_{CM}$ Stepped from 0V to 2.5V		80		
Power Supply Rejection Ratio	PSRR	$V_S = 1.8\text{V}$ to $5.5\text{V}$ , $V_{CM} = 0\text{V}$		95		dB
Large Signal Voltage Gain	$A_{VO}$			100		dB
Output Swing High	$V_{OH}$	$I_{OUT} = 500\mu\text{A}$		2.417		V
		$I_{OUT} = 1\text{mA}$		2.329		
Output Current	$I_{OUT}$	Source		5.3		mA
Leakage Current	$I_{Leakage}$	$V_{OUT} = 0\text{V}$		2		nA
Propagation Delay (High to Low)		Overdrive = 10mV		12		$\mu\text{s}$
		Overdrive = 100mV		5		
Propagation Delay (Low to High)		Overdrive = 10mV		28		$\mu\text{s}$
		Overdrive = 100mV		19		
Rise Time	$t_{Rise}$	Overdrive = 10mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		120		ns
		Overdrive = 100mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		120		

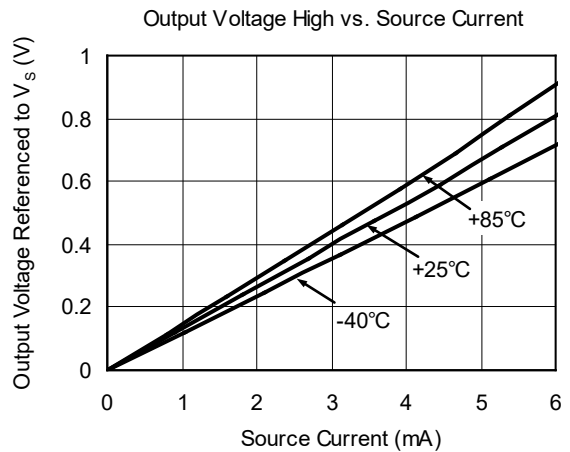
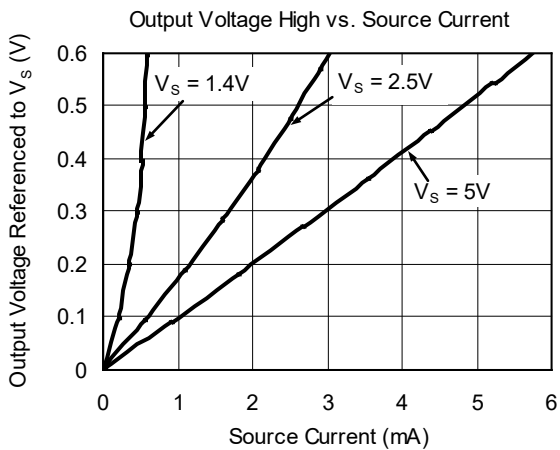
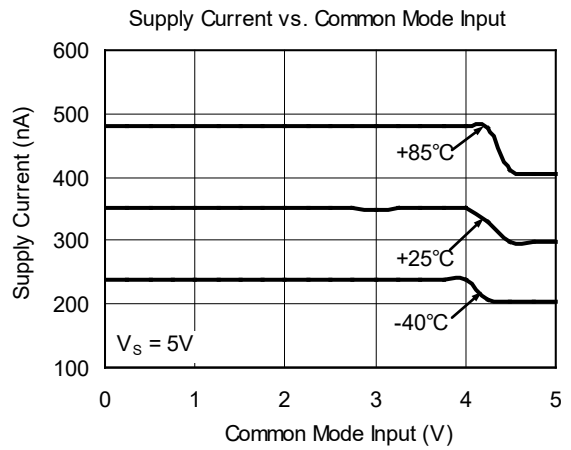
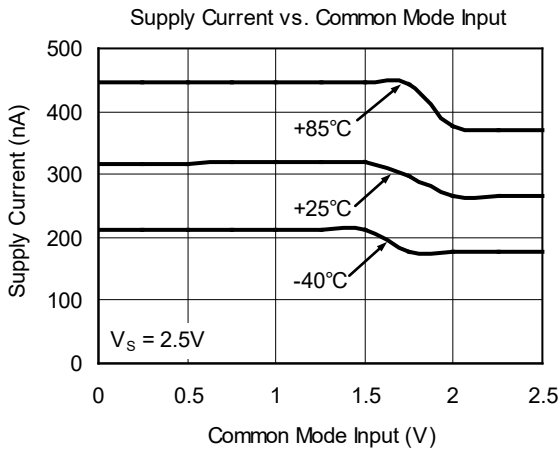
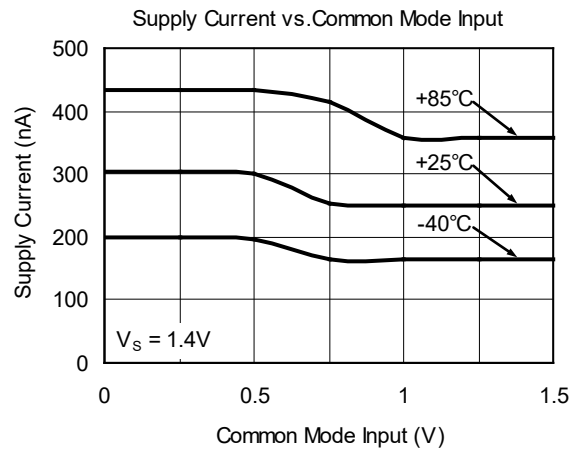
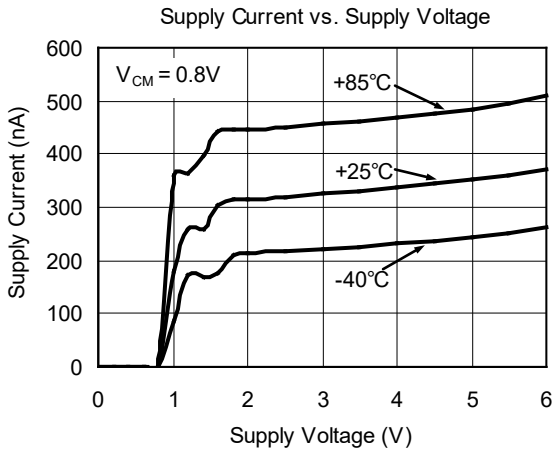
**ELECTRICAL CHARACTERISTICS (continued)**(At  $T_A = +25^\circ\text{C}$ ,  $+V_S = 5.0\text{V}$ ,  $-V_S = 0\text{V}$ ,  $V_{CM} = +V_S/2$ ,  $V_{OUT} = +V_S$  and  $R_L = 1\text{k}\Omega$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	$I_S$	$V_{CM} = 0.3\text{V}$		350	2000	nA
		$V_{CM} = 4.7\text{V}$		300	2000	
Input Offset Voltage	$V_{OS}$	$V_{CM} = 0\text{V}$	-3	0.5	3	mV
		$V_{CM} = 5\text{V}$	-3	0.5	3	
Input Offset Average Drift				2		$\mu\text{V}/^\circ\text{C}$
Common Mode Rejection Ratio	CMRR	$V_{CM}$ Stepped from 0V to 3.9V		85		dB
		$V_{CM}$ Stepped from 4.4V to 5.0V		85		
		$V_{CM}$ Stepped from 0V to 5.0V		85		
Power Supply Rejection Ratio	PSRR	$V_S = 1.8\text{V}$ to $5.5\text{V}$ , $V_{CM} = 0\text{V}$	66	95		dB
Large Signal Voltage Gain	$A_{VO}$			105		dB
Output Swing High	$V_{OH}$	$I_{OUT} = 500\mu\text{A}$	4.889	4.951		V
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	4.883			
		$I_{OUT} = 1\text{mA}$	4.861	4.902		
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	4.845			
Output Current	$I_{OUT}$	Source	14	18		mA
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	12.1			
Leakage Current	$I_{Leakage}$	$V_{OUT} = 0\text{V}$		5		nA
Propagation Delay (High to Low)		Overdrive = 10mV		13		$\mu\text{s}$
		Overdrive = 100mV		6		
Propagation Delay (Low to High)		Overdrive = 10mV		42		$\mu\text{s}$
		Overdrive = 100mV		33		
Rise Time	$t_{Rise}$	Overdrive = 10mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		85		ns
		Overdrive = 100mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		85		

SIMPLIFIED SCHEMATIC DIAGRAM

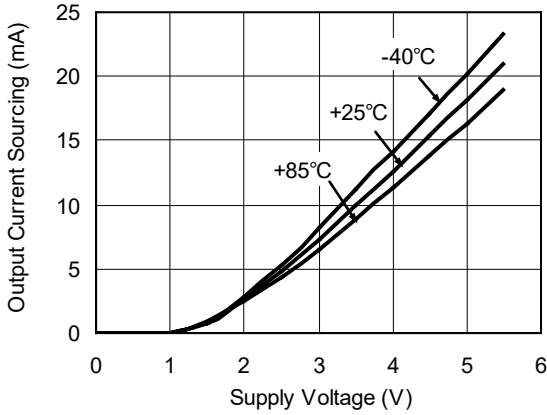


TYPICAL PERFORMANCE CHARACTERISTICS

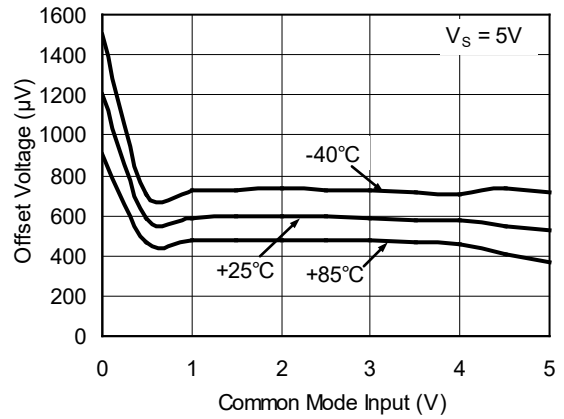


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

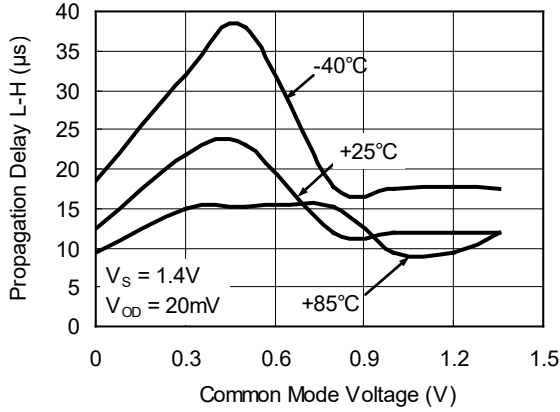
Short Circuit Sourcing Current vs. Supply Voltage



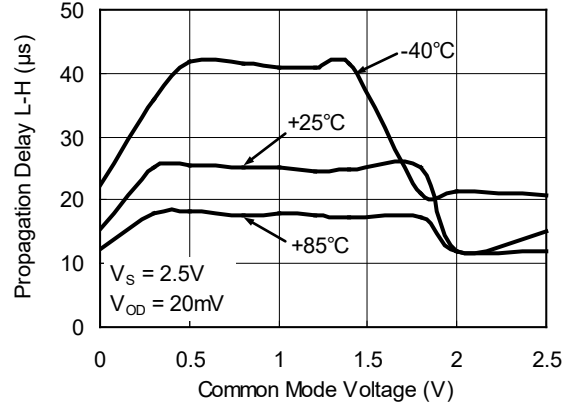
Offset Voltage vs. Common Mode Input



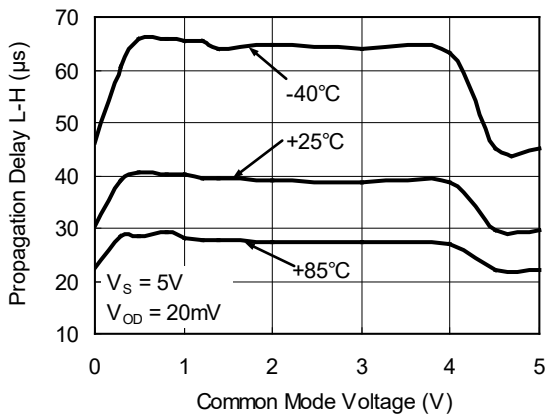
Propagation Delay L-H (µs) vs. Common Mode Input



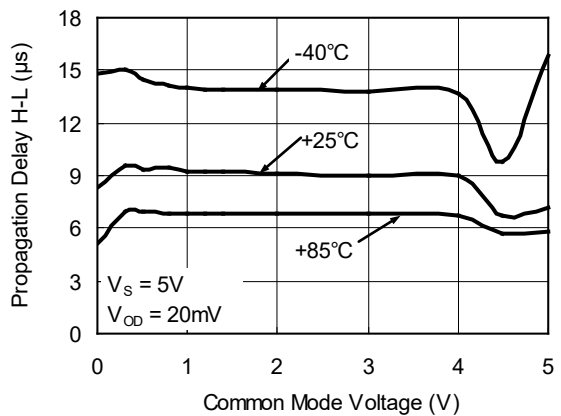
Propagation Delay L-H (µs) vs. Common Mode Input



Propagation Delay L-H (µs) vs. Common Mode Input

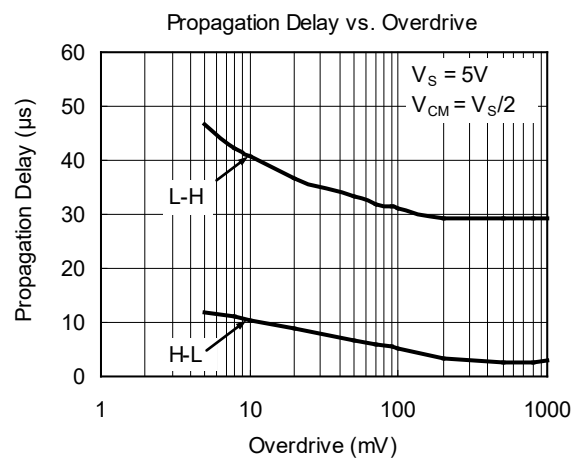
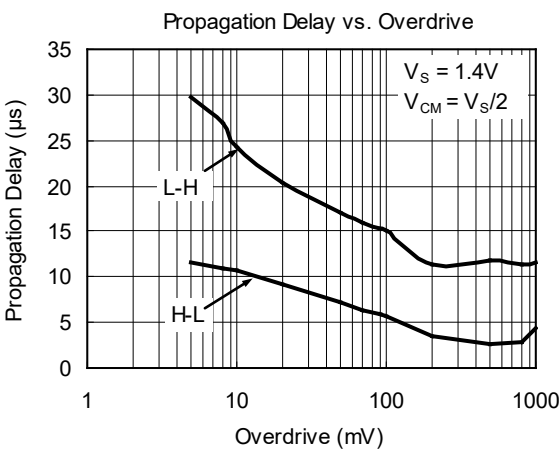
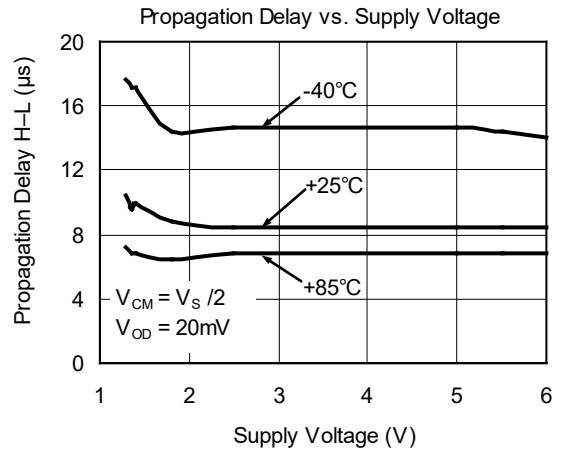
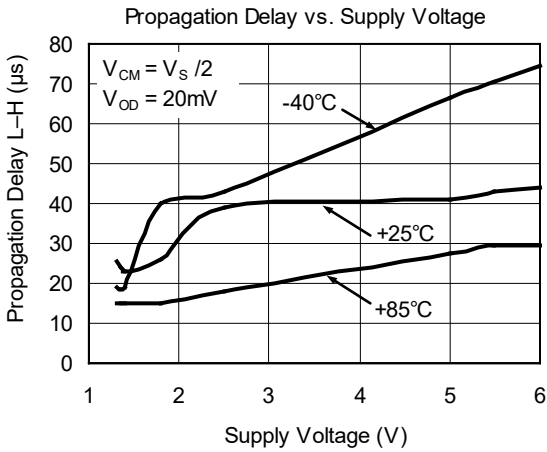
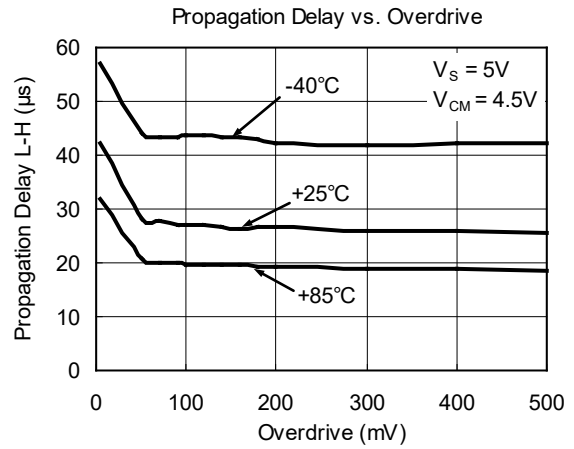
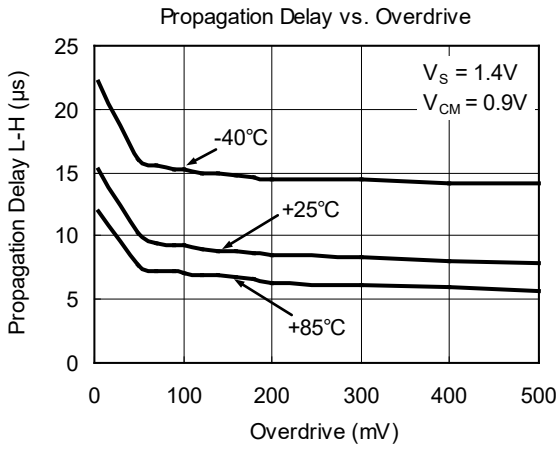


Propagation Delay H-L (µs) vs. Common Mode Input

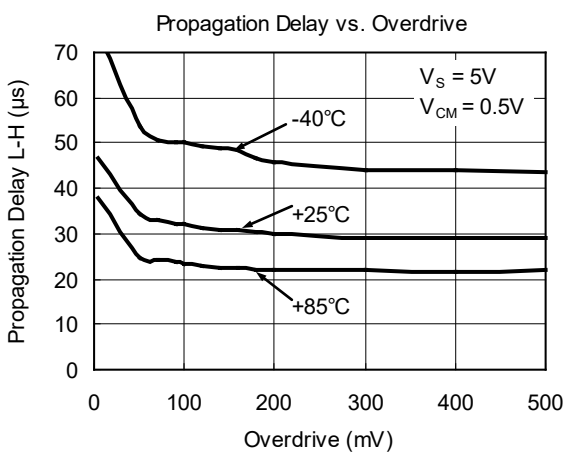
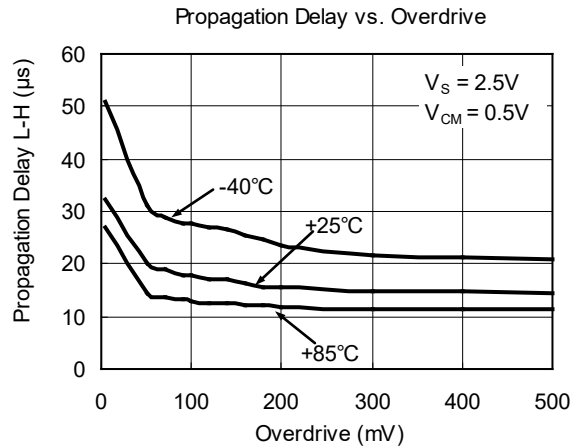
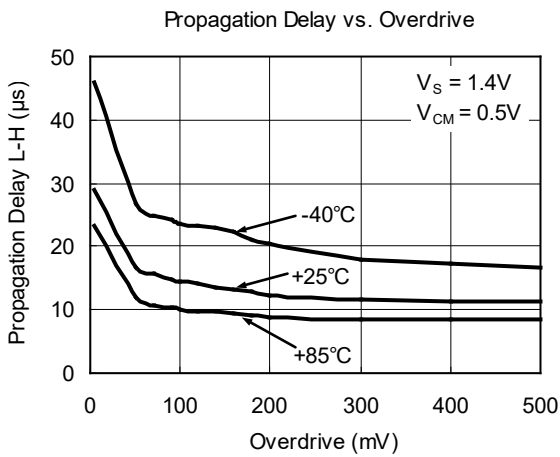
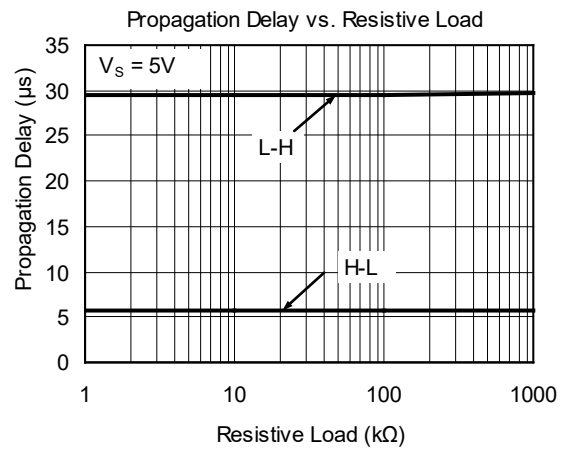
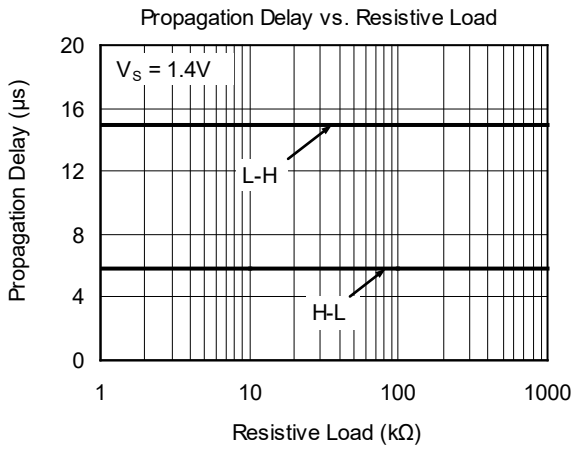




TYPICAL PERFORMANCE CHARACTERISTICS (continued)



TYPICAL PERFORMANCE CHARACTERISTICS (continued)



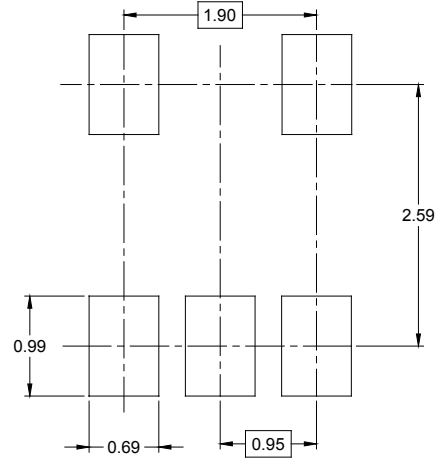
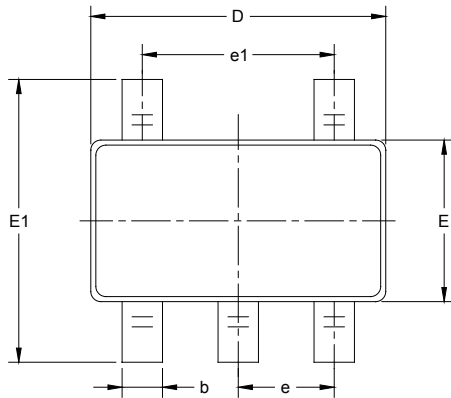
**REVISION HISTORY**

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

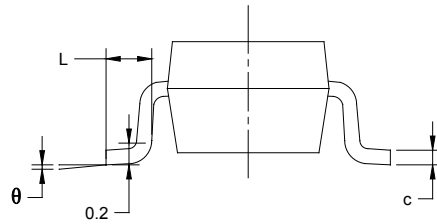
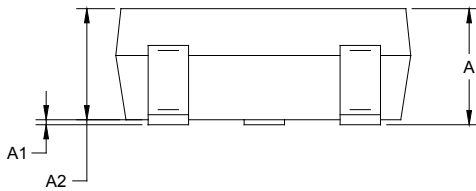
<b>NOVEMBER 2013 – REV.A.3 to REV.A.4</b>	<b>Page</b>
Changed Electrical Characteristics section .....	4
<b>NOVEMBER 2013 – REV.A.2 to REV.A.3</b>	<b>Page</b>
Added Tape and Reel Information section.....	13, 14
<b>JULY 2012 – REV.A.1 to REV.A.2</b>	<b>Page</b>
Added Typical Application section .....	1
<b>MARCH 2012 – REV.A to REV.A.1</b>	<b>Page</b>
Changed Electrical Characteristics section .....	3, 4
Added Features section.....	1
<b>Changes from Original (DECEMBER 2011) to REV.A</b>	<b>Page</b>
Changed from product preview to production data.....	All

PACKAGE OUTLINE DIMENSIONS

SOT-23-5



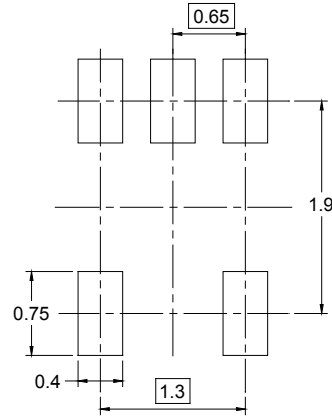
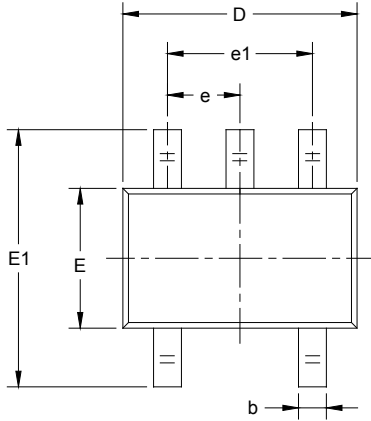
RECOMMENDED LAND PATTERN (Unit: mm)



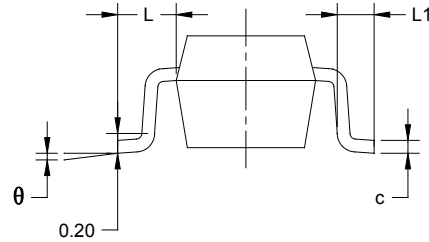
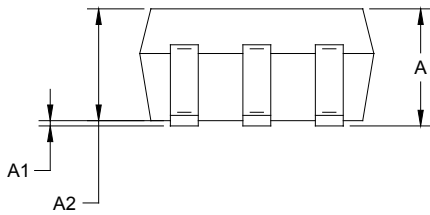
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

SC70-5



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	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
$\theta$	0°	8°	0°	8°

## TAPE AND REEL INFORMATION

### REEL DIMENSIONS



### TAPE DIMENSIONS



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 W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOT-23-5	7"	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3
SC70-5	7"	9.5	2.25	2.55	1.20	4.0	4.0	2.0	8.0	Q3

D00001

# PACKAGE INFORMATION

## CARTON BOX DIMENSIONS



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

## KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7" (Option)	368	227	224	8
7"	442	410	224	18

DD0002