



SGM8703

1.4V, Micro-Power, Rail-to-Rail I/O, CMOS Input, Push-Pull Output Comparator with Latch Enable

GENERAL DESCRIPTION

The SGM8703 is an ultra-low power comparator, which consumes only 300nA (TYP) supply current at 1.4V. The device can operate from 1.4V to 5.5V single supply, and is guaranteed to operate at 1.4V, 2.5V and 5V. It supports rail-to-rail input operation. The above features make the SGM8703 a good choice for battery-powered applications.

The SGM8703 has a latch enable input (\overline{LE}) and a push-pull output structure. When driving any resistive or capacitive load, it is capable of consuming the absolute minimum power.

The SGM8703 has a great trade-off between low power and high speed, and the propagation delay is only 6 μ s with 100mV overdrive at 1.4V.

In addition, the SGM8703 fits in a small package, so it is also suitable for mobile phone and handheld electronic devices.

The SGM8703 is available in a Green SOT-23-6 package. It is rated over the -40 °C to +85 °C temperature range.

FEATURES

- **Ultra-Low Supply Current:**
300nA (TYP) at $V_S = 1.4V$
- **Supply Voltage Range:** 1.4V to 5.5V
- **Push-Pull Output**
- **Output Drive Capability:** 19mA (TYP) at $V_S = 5V$
- **Rail-to-Rail Input and Output**
- **Propagation Delay:** 6 μ s (TYP) at $V_S = 1.4V$
- **Latch Function Included**
- **-40°C to +85°C Operating Temperature Range**
- **Available in a Green SOT-23-6 Package**

APPLICATIONS

Infrared Receivers
Window Detectors
RC Timers
Monitoring and Alarm Systems
Multivibrators

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8703	SOT-23-6	-40°C to +85°C	SGM8703YN6G/TR	S5DXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code.

YYY X X

Date Code - Month
Date Code - Year
Serial Number

Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, $+V_S$ to $-V_S$	6V
V_{IN} Differential.....	$\pm 2.5V$
Voltage at Input/Output Pins ($-V_S$) - 0.3V to ($+V_S$) + 0.3V	
Junction Temperature.....	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility	
HBM.....	3000V
MM.....	400V

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range -40°C to +85°C

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

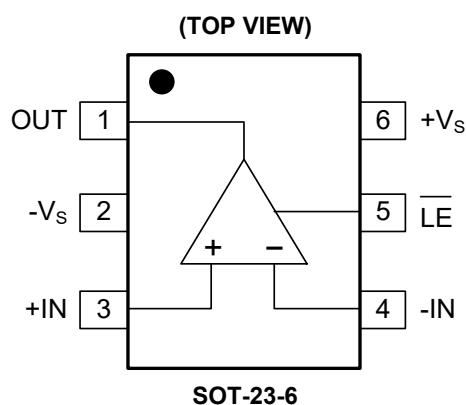
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures

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

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION

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

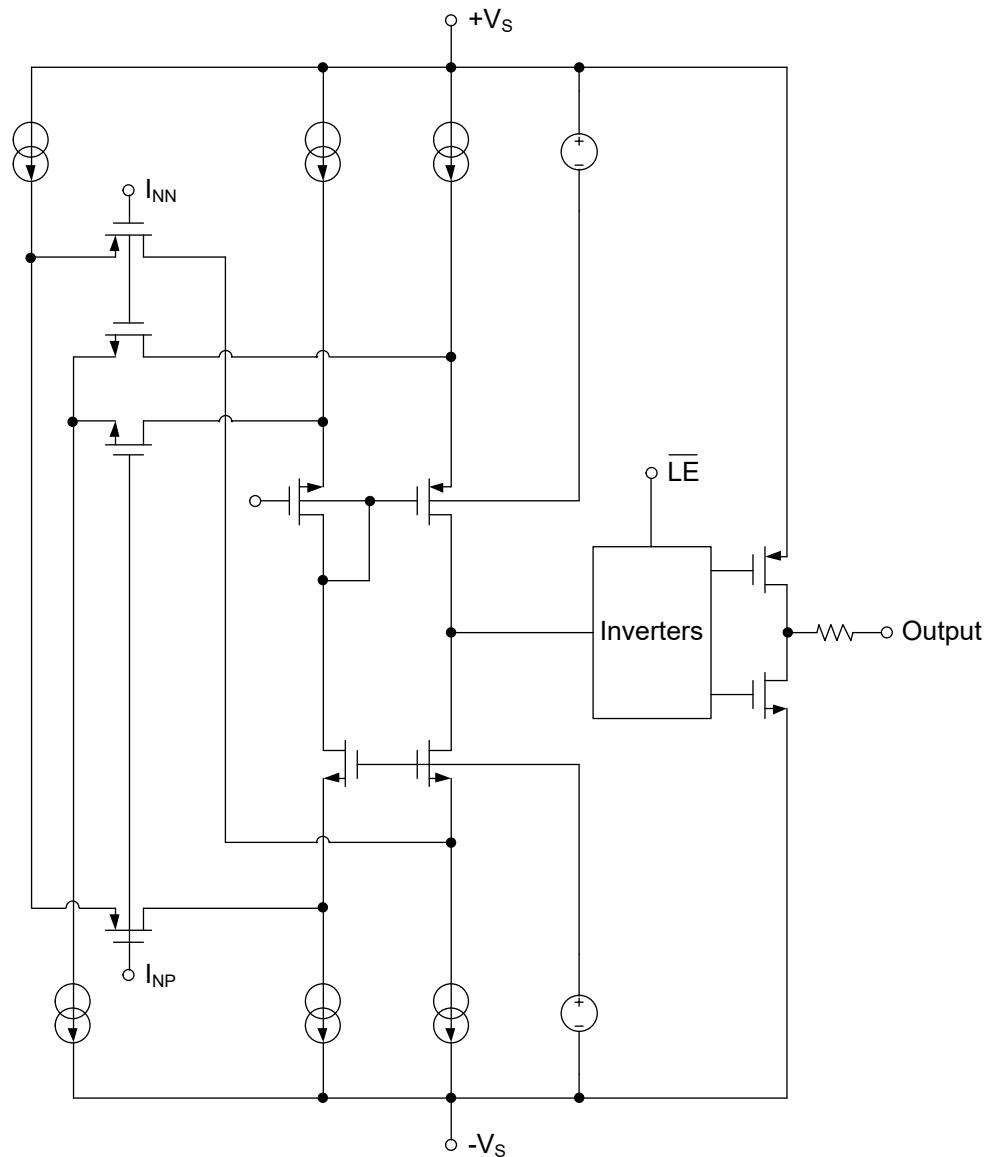
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	I_S	$V_{CM} = 0.3\text{V}$		300	1000	nA
		$V_{CM} = 1.1\text{V}$		250	1000	
Input Offset Voltage	V_{OS}	$V_{CM} = 0\text{V}$	-3	0.5	3	mV
		$V_{CM} = 1.4\text{V}$	-3	0.5	3	
Input Offset Average Drift				2		$\mu\text{V}/^\circ\text{C}$
Common 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 5.5V , $V_{CM} = 0\text{V}$	66	95		dB
Latch Enable Pin High Input Voltage	V_{IH}		1.0			V
Latch Enable Pin Low Input Voltage	V_{IL}				0.25	V
Latch Enable Pin Bias Current	I_{IH}, I_{IL}	$V_{\overline{LE}} = 0\text{V}$ and $V_{\overline{LE}} = 1.4\text{V}$, $V_{CM} = 0\text{V}$		3		nA
Large-Signal Voltage Gain	A_{VO}			100		dB
Output Swing High	V_{OH}	$V_S = 1.8\text{V}$, $I_{OUT} = 500\mu\text{A}$	1.598	1.669		V
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	1.581			
		$V_S = 1.8\text{V}$, $I_{OUT} = 1\text{mA}$	1.324	1.508		
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	1.288			
Output Swing Low	V_{OL}	$V_S = 1.8\text{V}$, $I_{OUT} = -500\mu\text{A}$		82	112	mV
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$			127	
		$V_S = 1.8\text{V}$, $I_{OUT} = -1\text{mA}$		167	225	
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$			253	
Output Current	I_{OUT}	Source		0.7		mA
		Sink		2		
Propagation Delay (High to Low)		Overdrive = 10mV		12		μs
		Overdrive = 100mV		6		
Propagation Delay (Low to High)		Overdrive = 10mV		26		μs
		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		
Fall Time	t_{FALL}	Overdrive = 10mV , $C_L = 30\text{pF}$, $R_L = 1\text{M}\Omega$		155		ns
		Overdrive = 100mV , $C_L = 30\text{pF}$, $R_L = 1\text{M}\Omega$		155		

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

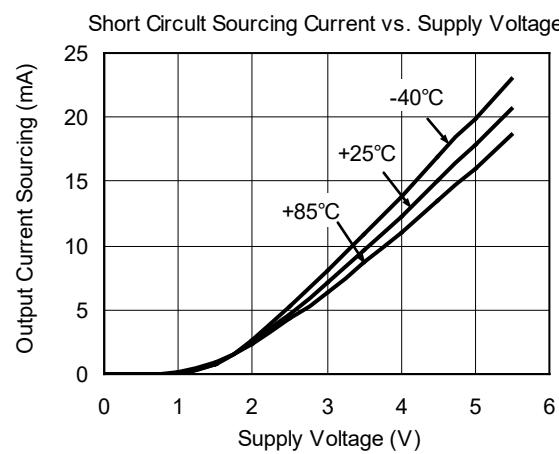
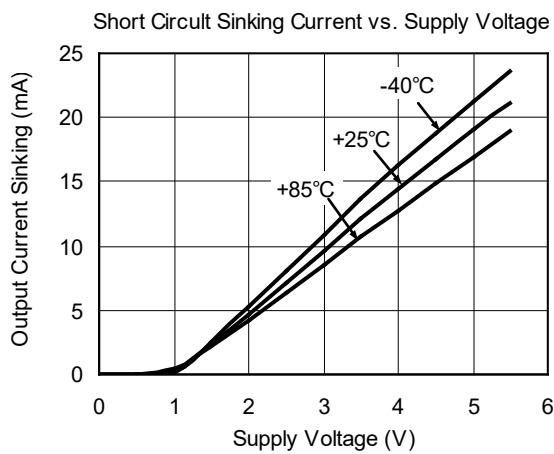
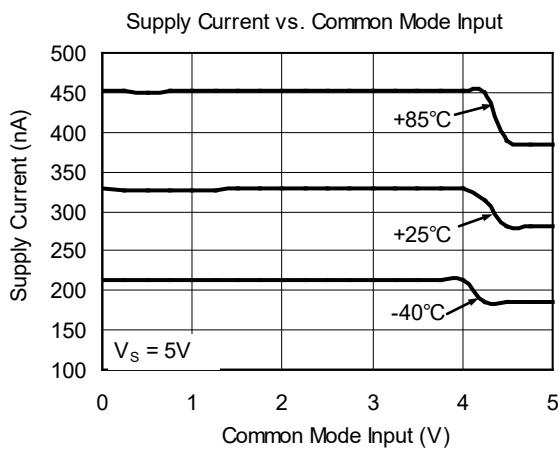
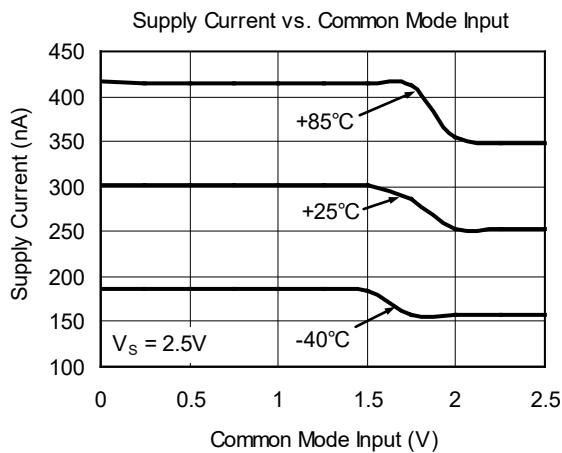
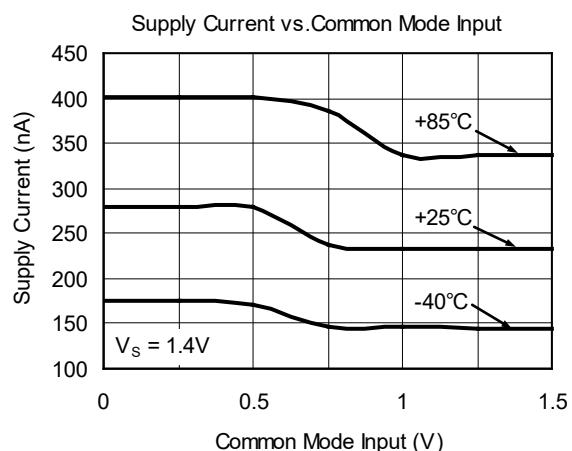
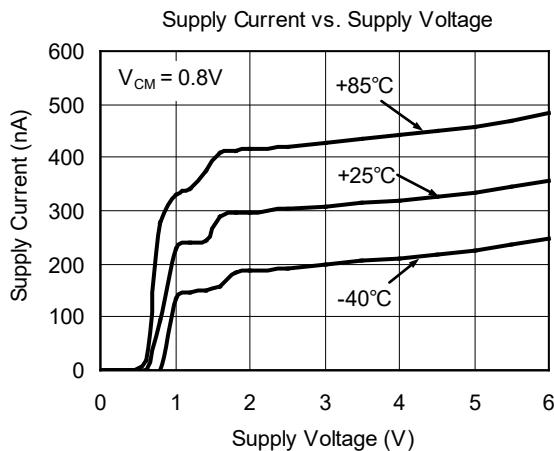
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	I_S	$V_{CM} = 0.3\text{V}$		310		nA
		$V_{CM} = 2.2\text{V}$		260		
Input Offset Voltage	V_{OS}	$V_{CM} = 0\text{V}$		0.5		mV
		$V_{CM} = 2.5\text{V}$		0.5		
Input Offset Average Drift				2		$\mu\text{V}/^\circ\text{C}$
Common Mode Rejection 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 5.5V , $V_{CM} = 0\text{V}$		95		dB
Latch Enable Pin High Input Voltage	V_{IH}		1.2			V
Latch Enable Pin Low Input Voltage	V_{IL}				0.4	V
Latch Enable Pin Bias Current	I_{IH}, I_{IL}	$V_{\overline{LE}} = 0\text{V}$ and $V_{\overline{LE}} = 2.5\text{V}$, $V_{CM} = 0\text{V}$		15		nA
Large-Signal Voltage Gain	A_{VO}			100		dB
Output Swing High	V_{OH}	$I_{OUT} = 500\mu\text{A}$		2.419		V
		$I_{OUT} = 1\text{mA}$		2.333		
Output Swing Low	V_{OL}	$I_{OUT} = -500\mu\text{A}$		66		mV
		$I_{OUT} = -1\text{mA}$		133		
Output Current	I_{OUT}	Source		5.3		mA
		Sink		7.7		
Propagation Delay (High to Low)		Overdrive = 10mV		12		μs
		Overdrive = 100mV		5		
Propagation Delay (Low to High)		Overdrive = 10mV		28		μs
		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		
Fall Time	t_{FALL}	Overdrive = 10mV , $C_L = 30\text{pF}$, $R_L = 1\text{M}\Omega$		85		ns
		Overdrive = 100mV , $C_L = 30\text{pF}$, $R_L = 1\text{M}\Omega$		70		

ELECTRICAL CHARACTERISTICS (continued)(At $T_A = +25^\circ\text{C}$, $+V_S = 5\text{V}$, $-V_S = 0\text{V}$, $V_{\text{LE}} = 5\text{V}$, $V_{\text{CM}} = +V_S/2$ and $V_{\text{OUT}} = -V_S$, unless otherwise noted.)

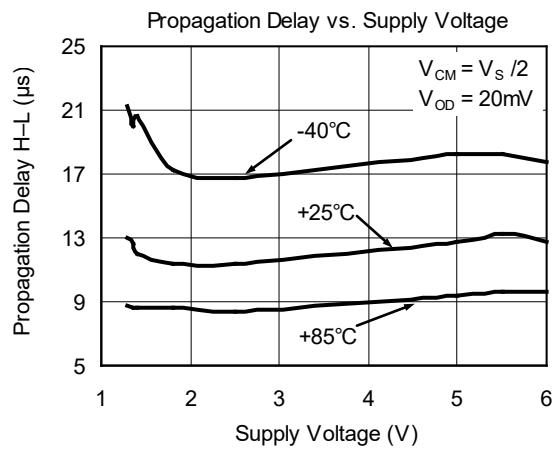
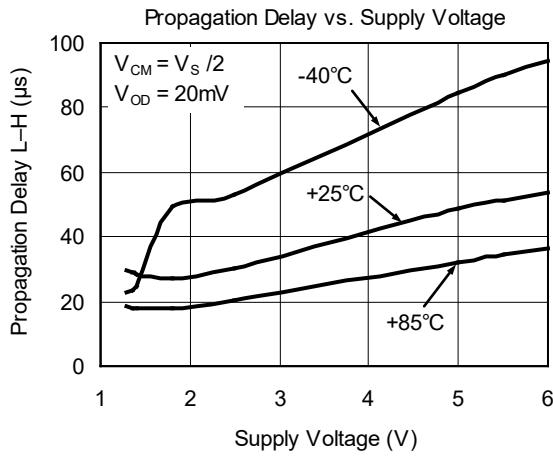
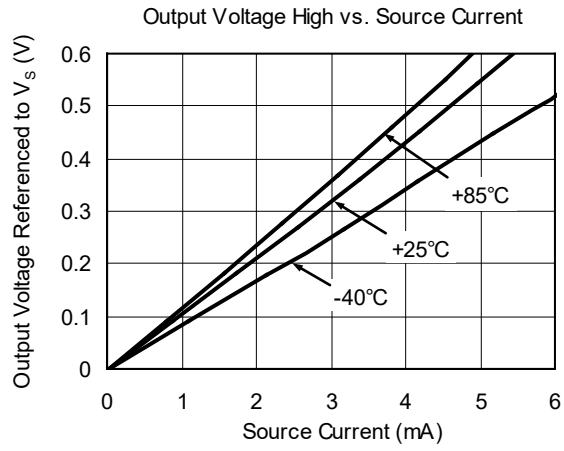
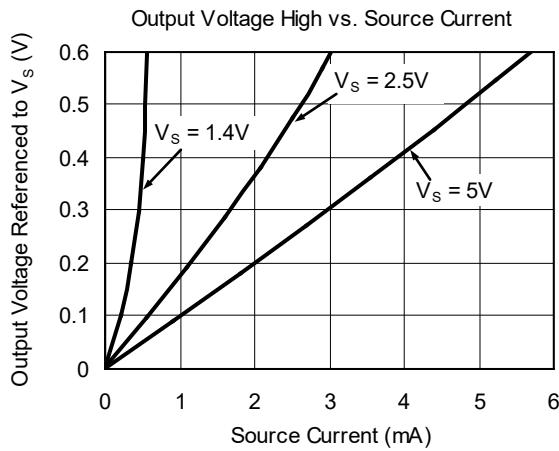
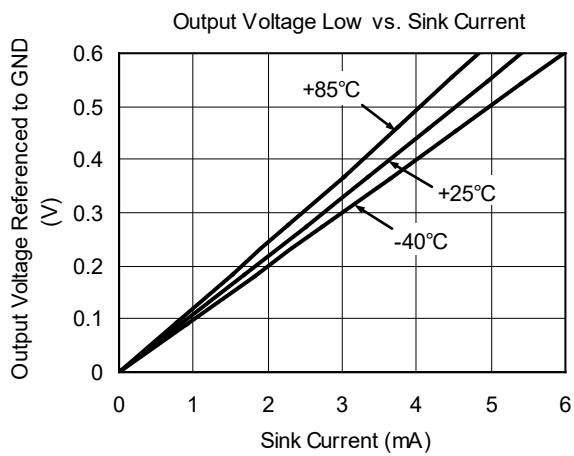
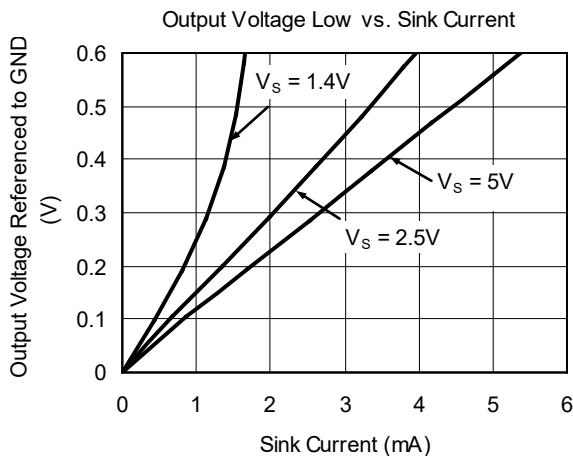
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	I_S	$V_{\text{CM}} = 0.3\text{V}$		350	2000	nA
		$V_{\text{CM}} = 4.7\text{V}$		300	2000	
Input Offset Voltage	V_{OS}	$V_{\text{CM}} = 0\text{V}$	-3	0.5	3	mV
		$V_{\text{CM}} = 5\text{V}$	-3	0.5	3	
Input Offset Average Drift				2		$\mu\text{V}/^\circ\text{C}$
Common Mode Rejection Ratio	CMRR	V_{CM} stepped from 0V to 3.9V		85		dB
		V_{CM} stepped from 4.4V to 5V		85		
		V_{CM} stepped from 0V to 5V		85		
Power Supply Rejection Ratio	PSRR	$V_S = 1.8\text{V}$ to 5.5V , $V_{\text{CM}} = 0\text{V}$	66	95		dB
Latch Enable Pin High Input Voltage	V_{IH}		2.0			V
Latch Enable Pin Low Input Voltage	V_{IL}				0.8	V
Latch Enable Pin Bias Current	$I_{\text{IH}}, I_{\text{IL}}$	$V_{\text{LE}} = 0\text{V}$ and $V_{\text{LE}} = 5\text{V}$, $V_{\text{CM}} = 0\text{V}$		60		nA
Latch Propagation Delay	t_{LPD}	$V_S = 3\text{V}$		90		ns
Large-Signal Voltage Gain	A_{VO}			105		dB
Output Swing High	V_{OH}	$I_{\text{OUT}} = 500\mu\text{A}$	4.923	4.952		V
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	4.916			
		$I_{\text{OUT}} = 1\text{mA}$	4.864	4.904		
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	4.848			
Output Swing Low	V_{OL}	$I_{\text{OUT}} = -500\mu\text{A}$		52	80	mV
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$			90	
		$I_{\text{OUT}} = -1\text{mA}$		104	130	
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$			143	
Output Current	I_{OUT}	Source	14	18		mA
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	12.1			
		Sink	15	19		
		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	12.9			
Propagation Delay (High to Low)		Overdrive = 10mV		13		μs
		Overdrive = 100mV		6		
Propagation Delay (Low to High)		Overdrive = 10mV		42		μs
		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		
Fall Time	t_{FALL}	Overdrive = 10mV , $C_L = 30\text{pF}$, $R_L = 1\text{M}\Omega$		70		ns
		Overdrive = 100mV , $C_L = 30\text{pF}$, $R_L = 1\text{M}\Omega$		60		

SIMPLIFIED SCHEMATIC DIAGRAM

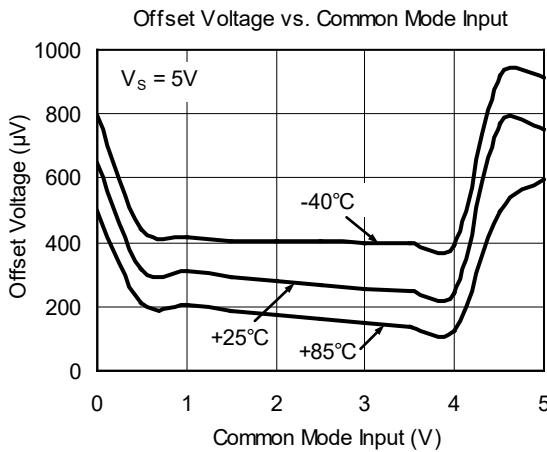
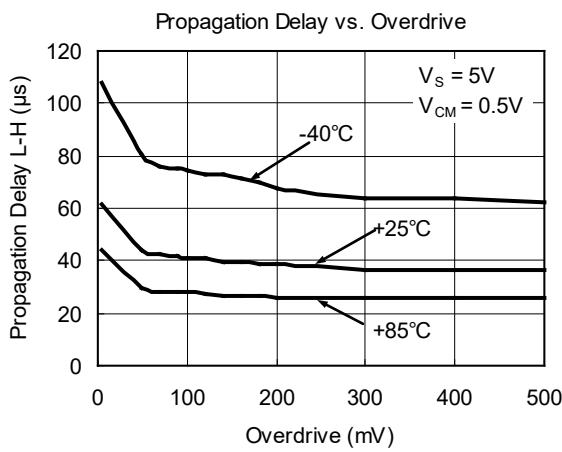
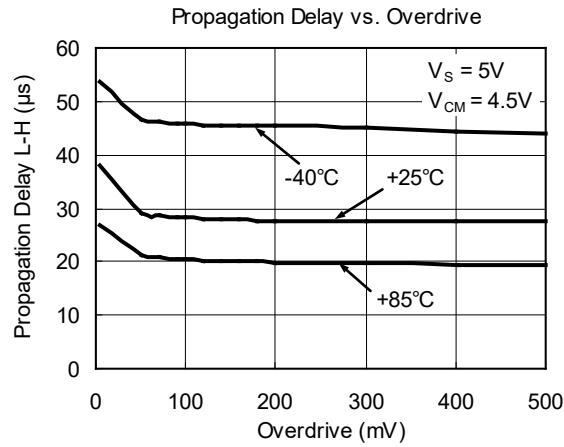
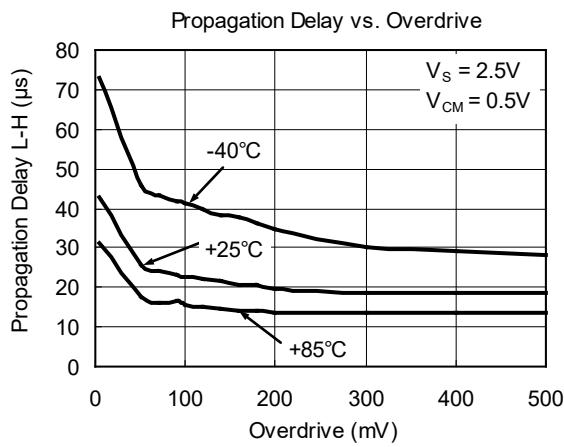
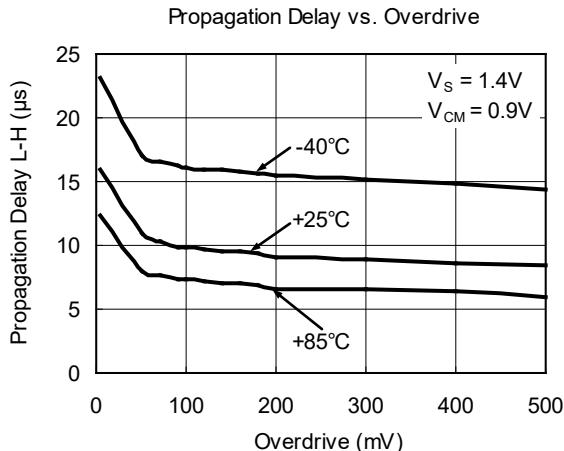
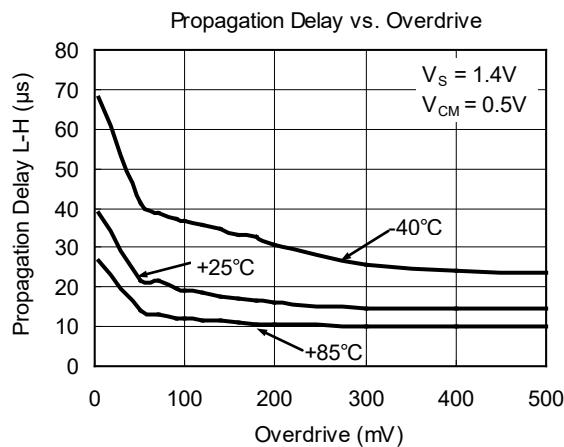
TYPICAL PERFORMANCE CHARACTERISTICS



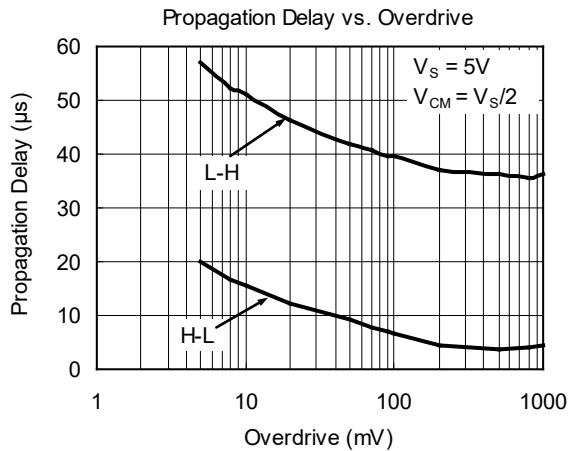
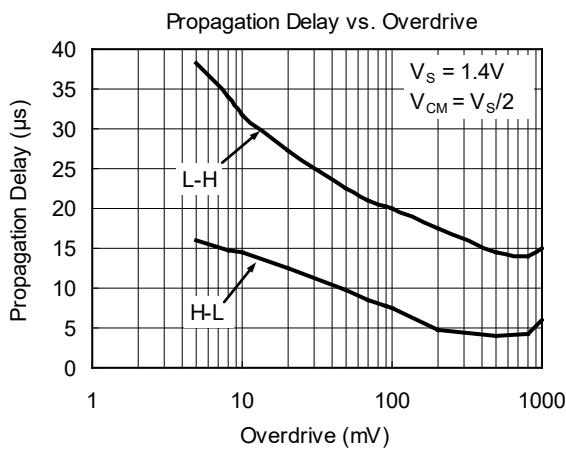
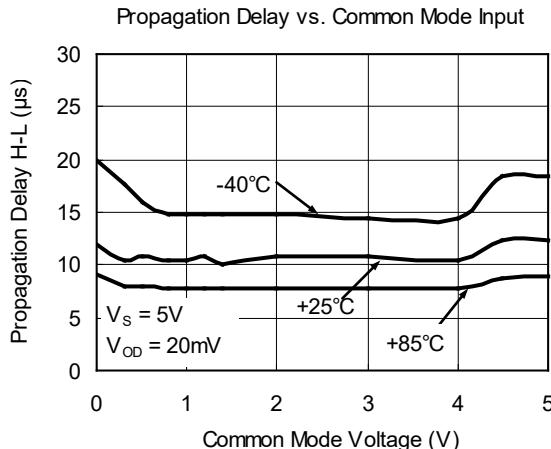
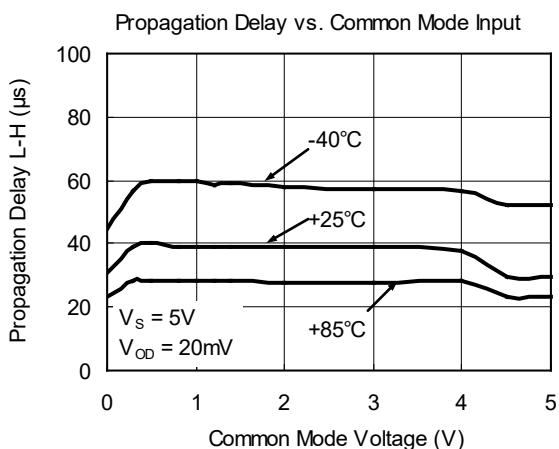
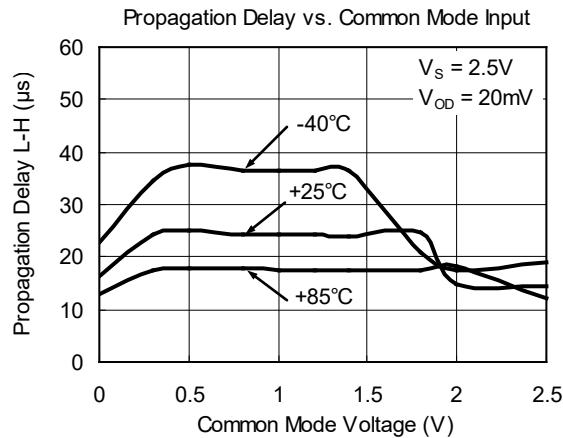
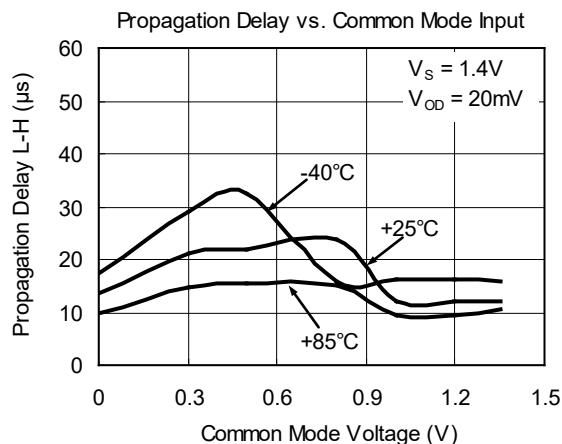
TYPICAL PERFORMANCE CHARACTERISTICS (continued)



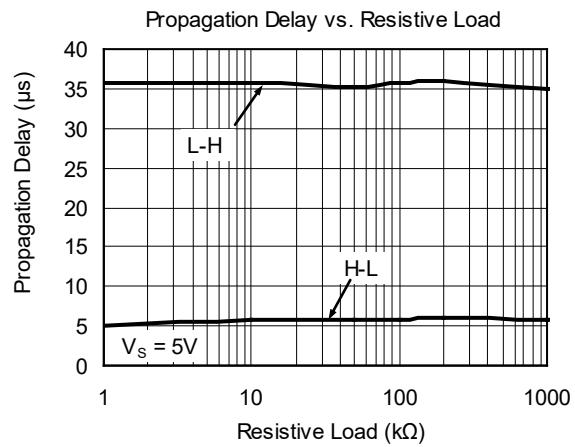
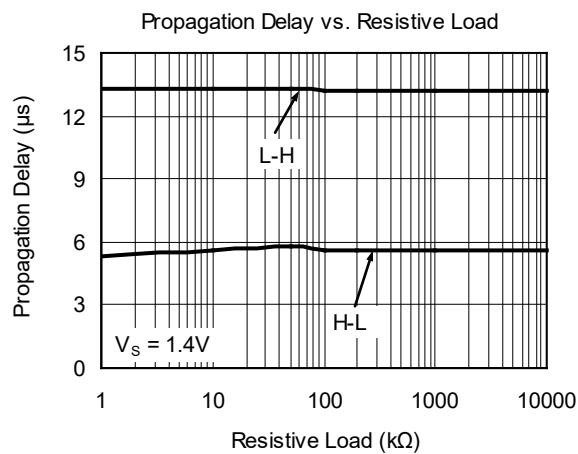
TYPICAL PERFORMANCE CHARACTERISTICS (continued)



TYPICAL PERFORMANCE CHARACTERISTICS (continued)



TYPICAL PERFORMANCE CHARACTERISTICS (continued)



TIMING DIAGRAM

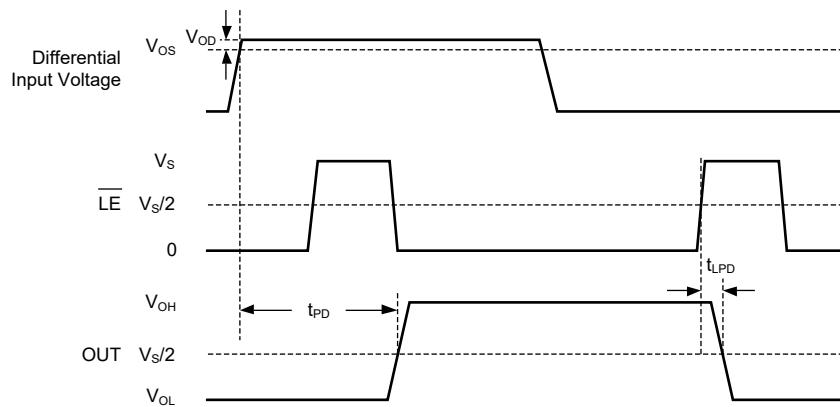


Figure 1. Timing Diagram with Latch Enable Input

REVISION HISTORY

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

DECEMBER 2013 – REV.A.1 to REV.A.2	Page
Changed Electrical Characteristics section.....	4
Added Electrical Characteristics section.....	5
Added Timing Diagram section	12

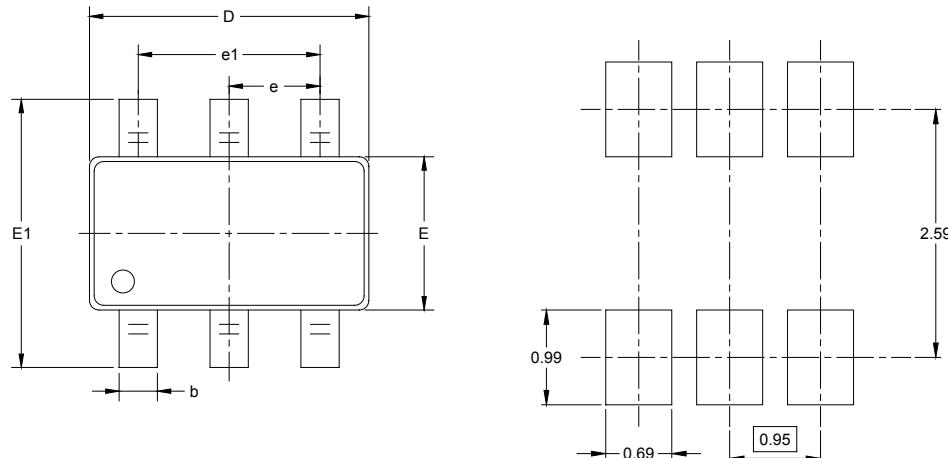
JUANUARY 2013 – REV.A to REV.A.1	Page
Added Tape and Reel Information section.....	13, 14

Changes from Original (DECEMBER 2011) to REV.A	Page
Changed from product preview to production data.....	All

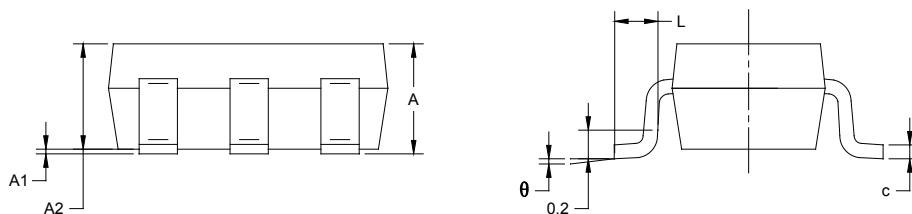
PACKAGE INFORMATION

PACKAGE OUTLINE DIMENSIONS

SOT-23-6



RECOMMENDED LAND PATTERN (Unit: mm)

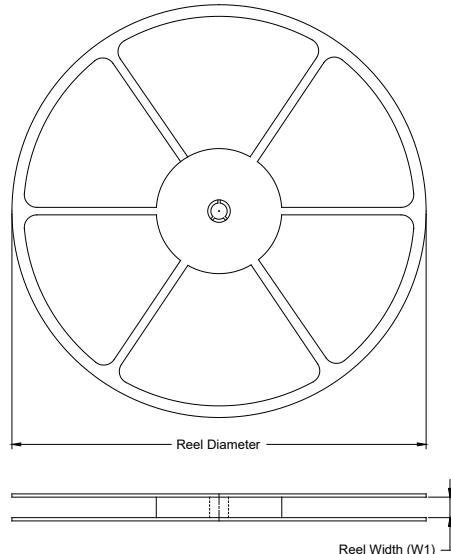


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037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

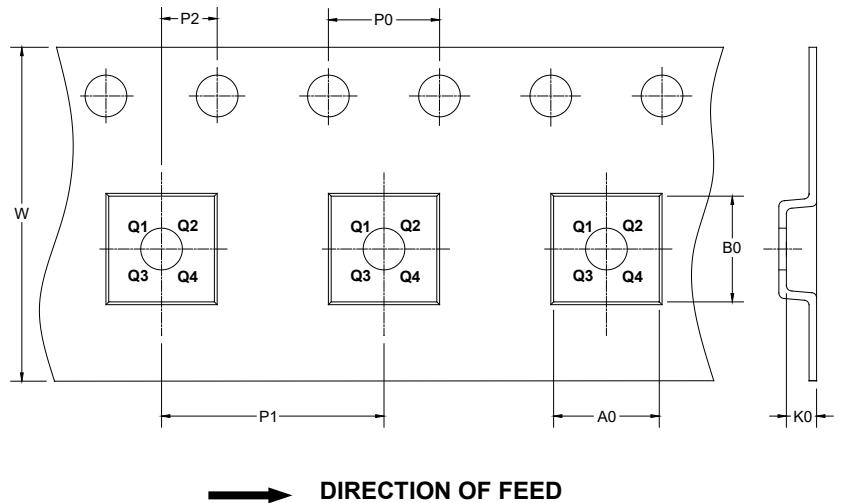
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



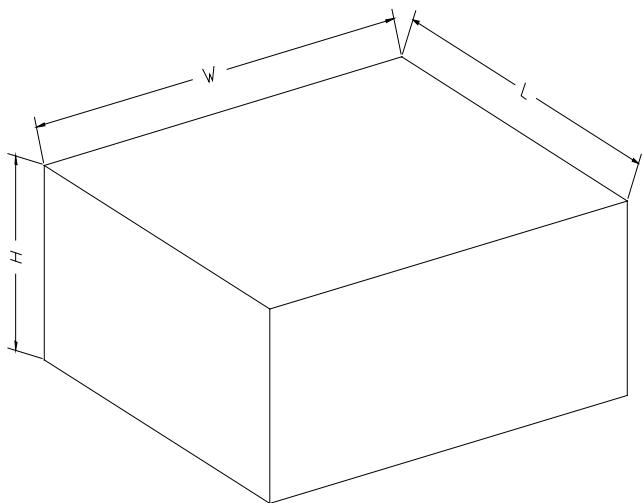
NOTE: The picture is only for reference. Please make the object as the standard.

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	DD0001
SOT-23-6	7"	9.5	3.17	3.23	1.37	4.0	4.0	2.0	8.0	Q3	

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

D0002