SGM8705
Micro-Power, CMOS Input, RRIO, 1.4V, Push-Pull Output Comparator

GENERAL DESCRIPTION

The SGM8705 is a dual low power comparator with a typical power supply current of 300nA (per channel). It has the best-in-class power supply current versus propagation delay performance. The propagation delay is as low as 6μs 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 SGM8705 is ideal for use in a variety of battery-powered applications. With rail-to-rail common mode voltage range, the SGM8705 is well suited for single-supply operation. Its small packages make this device ideal for use in handheld electronics and mobile phone applications.

Featuring a push-pull output stage, the SGM8705 allows for operation with absolute minimum power consumption when driving any capacitive or resistive load.

SGM8705 is available in Green SOIC-8 and MSOP-8 packages. It is rated over the -40℃ to +85℃ temperature range.

FEATURES

- **Ultra Low Power Consumption:**
  300nA/Channel (TYP) at V_S = 1.4V
- **Wide Supply Voltage Range: 1.4V to 5.5V**
- **Propagation Delay: 6μs (TYP) at V_S = 1.4V**
- **Push-Pull Output Current Drive:**
  19mA (TYP) at V_S = 5V
- **Rail-to-Rail Input**
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in Green SOIC-8 and MSOP-8 Packages**

APPLICATIONS

RC Timers
Window Detectors
IR Receiver
Multivibrators
Alarm and Monitoring Circuits

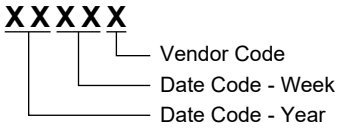
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8705	SOIC-8	-40℃ to +85℃	SGM8705YS8G/TR	SGM8705YS8 XXXXX	Tape and Reel, 2500
	MSOP-8	-40℃ to +85℃	SGM8705YMS8G/TR	SGM8705 YMS8 XXXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXXX = Date Code and Vendor Code.

SOIC-8/MSOP-8



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 ..... ±2.5V
Voltage at Input/Output Pins ..... $(-V_S)$ - 0.3V to $(+V_S)$ + 0.3V
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 4000V
MM 400V

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range ..... -40℃ to +85℃

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

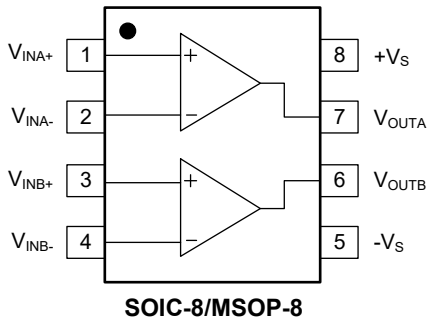
This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

DISCLAIMER

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

PIN CONFIGURATIONS

(TOP VIEW)



SOIC-8/MSOP-8

ELECTRICAL CHARACTERISTICS

(At T_A = +25℃, $+V_S$ = 1.4V, $-V_S$ = 0V, V_{CM} = $+V_S$/2 and V_{OUT} = $-V_S$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current (per channel)	I_S	V_{CM} = 0.3V		300	1000	nA
		V_{CM} = 1.1V		250	1000	
Input Offset Voltage	V_{OS}	V_{CM} = 0V	-3	0.5	3	mV
		V_{CM} = 1.4V	-3	0.5	3	
Input Offset Average Drift				2		μV/℃
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 = 1.8V to 5.5V, V_{CM} = 0V	66	95		dB
Large Signal Voltage Gain	A_{VO}			100		dB
Output Swing High	V_{OH}	V_S = 1.8V, I_{OUT} = 500μA	1.598	1.669		V
		-40℃ ≤ T_A ≤ +85℃	1.581			
		V_S = 1.8V, I_{OUT} = 1mA	1.324	1.508		
		-40℃ ≤ T_A ≤ +85℃	1.288			
Output Swing Low	V_{OL}	V_S = 1.8V, I_{OUT} = -500μA		82	112	mV
		-40℃ ≤ T_A ≤ +85℃			127	
		V_S = 1.8V, I_{OUT} = -1mA		167	225	
		-40℃ ≤ T_A ≤ +85℃			253	
Output Current	I_{OUT}	Source		0.7		mA
		Sink		2.0		
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 = 30pF, R_L = 1MΩ		220		ns
		Overdrive = 100mV, C_L = 30pF, R_L = 1MΩ		220		
Fall Time	t_{Fall}	Overdrive = 10mV, C_L = 30pF, R_L = 1MΩ		155		ns
		Overdrive = 100mV, C_L = 30pF, R_L = 1MΩ		155		

ELECTRICAL CHARACTERISTICS (continued)

(At T_A = +25℃, $+V_S$ = 2.5V, $-V_S$ = 0V, V_{CM} = $+V_S$/2 and V_{OUT} = $-V_S$, unless otherwise noted.)

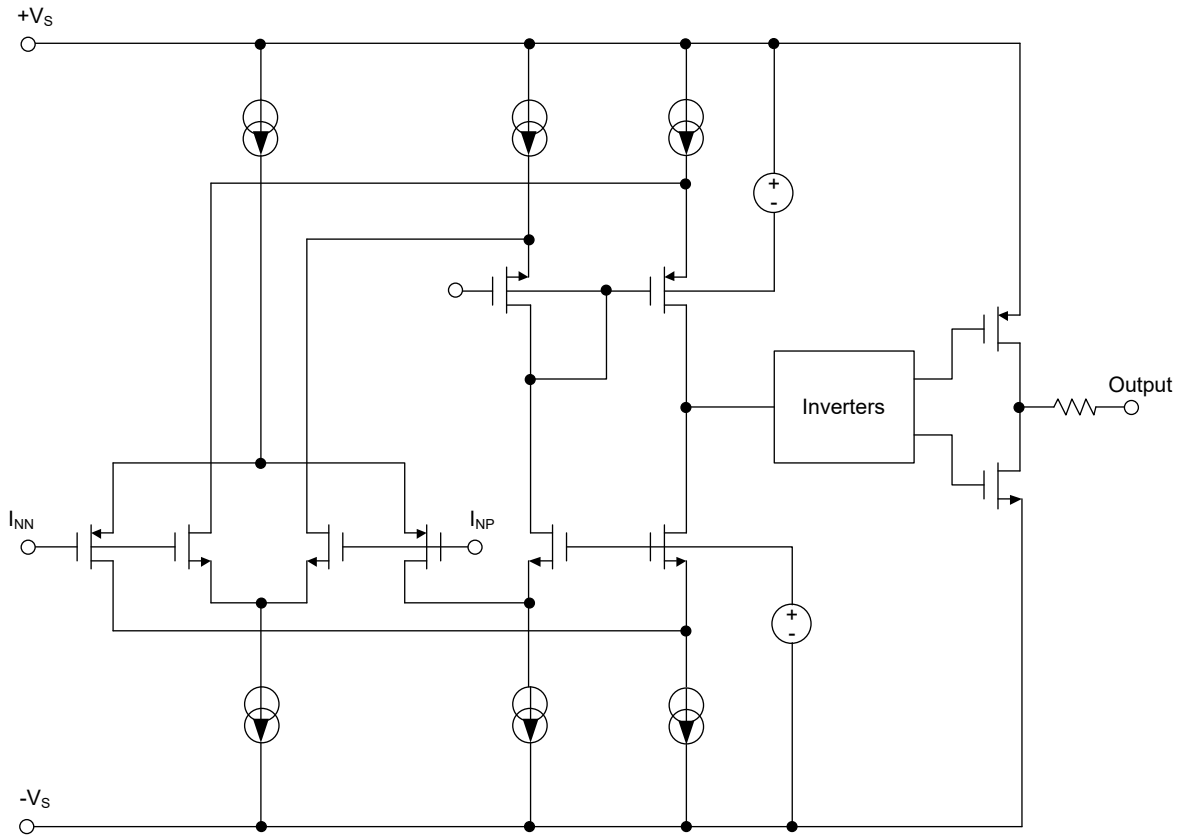
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current (per channel)	I_S	V_{CM} = 0.3V		310		nA
		V_{CM} = 2.2V		260		
Input Offset Voltage	V_{OS}	V_{CM} = 0V		0.5		mV
		V_{CM} = 2.5V		0.5		
Input Offset Average Drift				2		μV/℃
Common Mode Rejection Ratio	CMRR	V_{CM} Stepped from 0V to 1.4V		75		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 = 1.8V to 5.5V, V_{CM} = 0V		95		dB
Large Signal Voltage Gain	A_{VO}			100		dB
Output Swing High	V_{OH}	I_{OUT} = 500μA		2.419		V
		I_{OUT} = 1mA		2.333		
Output Swing Low	V_{OL}	I_{OUT} = -500μA		66		mV
		I_{OUT} = -1mA		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 = 30pF, R_L = 1MΩ		120		ns
		Overdrive = 100mV, C_L = 30pF, R_L = 1MΩ		120		
Fall Time	t_{Fall}	Overdrive = 10mV, C_L = 30pF, R_L = 1MΩ		85		ns
		Overdrive = 100mV, C_L = 30pF, R_L = 1MΩ		70		

ELECTRICAL CHARACTERISTICS (continued)

(At T_A = +25℃, $+V_S$ = 5.0V, $-V_S$ = 0V, V_{CM} = $+V_S$/2 and V_{OUT} = $-V_S$, unless otherwise noted.)

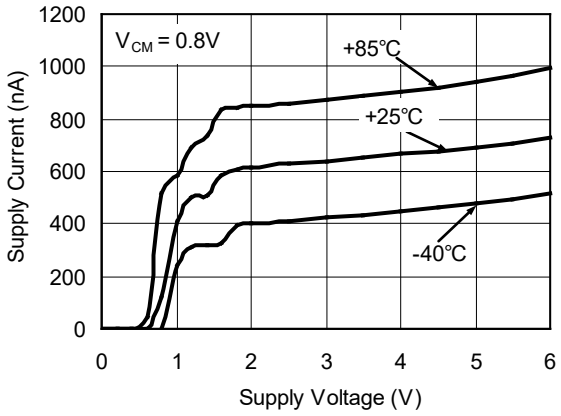
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current (per channel)	I_S	V_{CM} = 0.3V		350	1500	nA
		V_{CM} = 4.7V		300	1500	
Input Offset Voltage	V_{OS}	V_{CM} = 0V	-3	0.5	3	mV
		V_{CM} = 5V	-3	0.5	3	
Input Offset Average Drift				2		μV/℃
Common Mode Rejection Ratio	CMRR	V_{CM} Stepped from 0V 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 = 1.8V to 5.5V, V_{CM} = 0V	66	95		dB
Large Signal Voltage Gain	A_{VO}			105		dB
Output Swing High	V_{OH}	I_{OUT} = 500μA	4.923	4.952		V
		-40℃ ≤ T_A ≤ +85℃	4.916			
		I_{OUT} = 1mA	4.864	4.904		
		-40℃ ≤ T_A ≤ +85℃	4.848			
Output Swing Low	V_{OL}	I_{OUT} = -500μA		52	80	mV
		-40℃ ≤ T_A ≤ +85℃			90	
		I_{OUT} = -1mA		104	130	
		-40℃ ≤ T_A ≤ +85℃			143	
Output Current	I_{OUT}	Source	14	18		mA
		-40℃ ≤ T_A ≤ +85℃	12.1			
		Sink	15	19		
		-40℃ ≤ T_A ≤ +85℃	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 = 30pF, R_L = 1MΩ		85		ns
		Overdrive = 100mV, C_L = 30pF, R_L = 1MΩ		85		
Fall Time	t_{Fall}	Overdrive = 10mV, C_L = 30pF, R_L = 1MΩ		70		ns
		Overdrive = 100mV, C_L = 30pF, R_L = 1MΩ		60		

SIMPLIFIED SCHEMATIC DIAGRAM

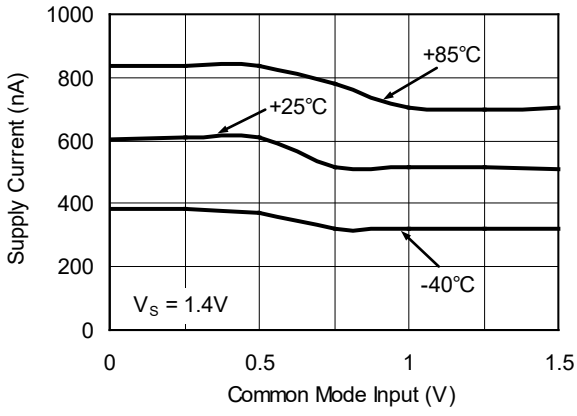


TYPICAL PERFORMANCE CHARACTERISTICS

Supply Current vs. Supply Voltage



Supply Current vs.Common Mode Input



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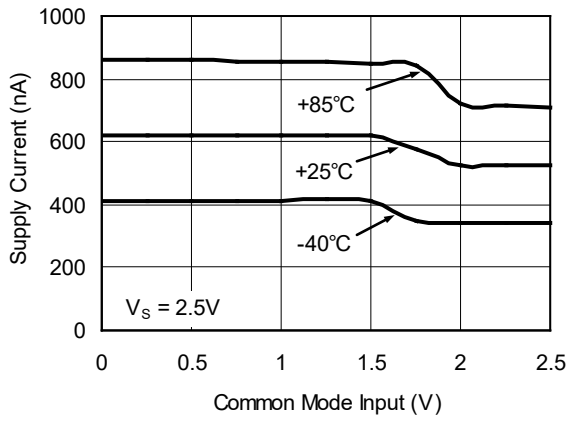
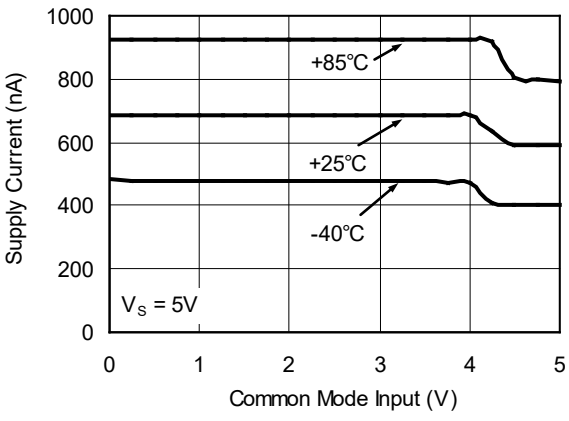
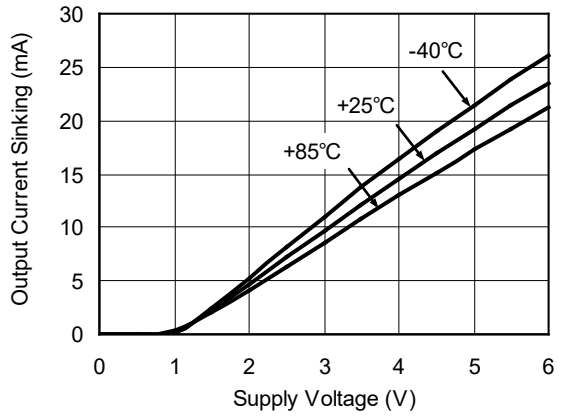


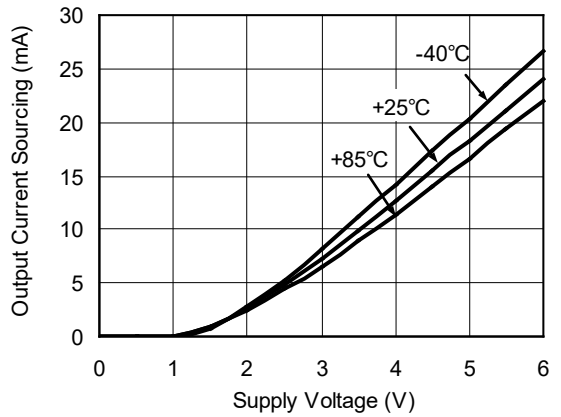
Supply Current vs. Common Mode Input



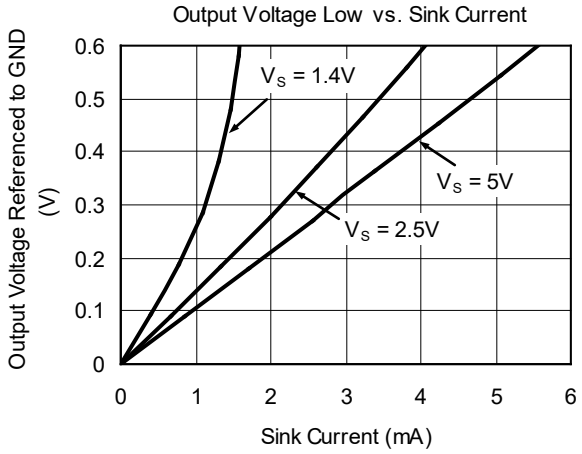
Short Circuit Sinking Current vs. Supply Voltage

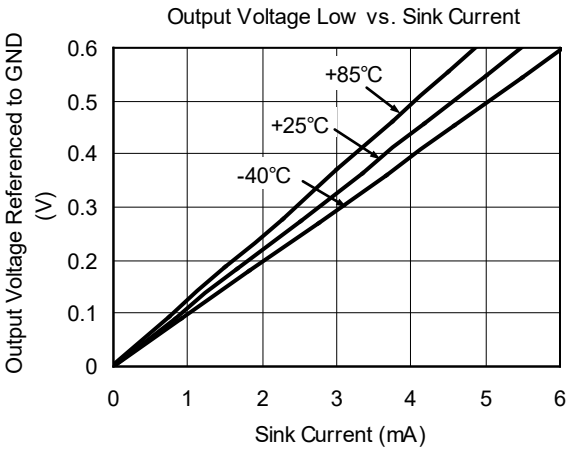


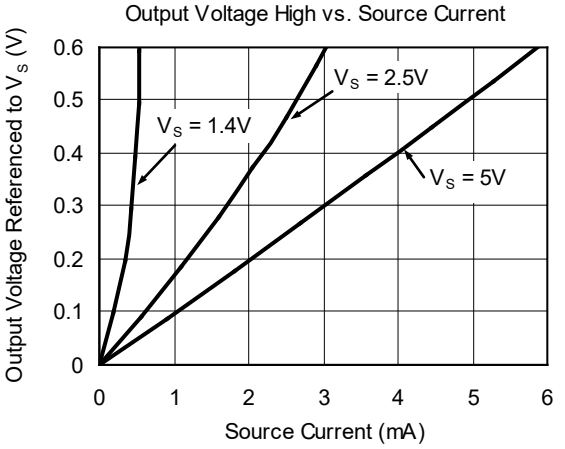
Short Circuit Sourcing Current vs. Supply Voltage

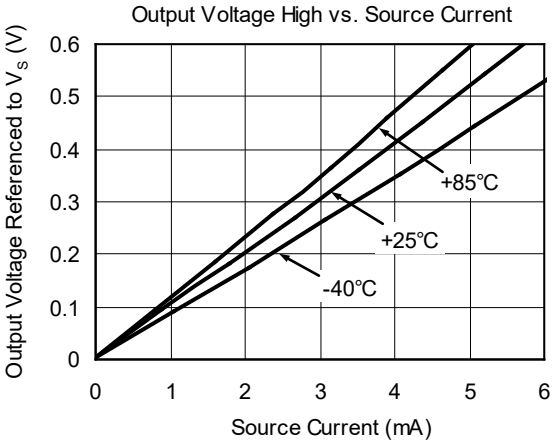


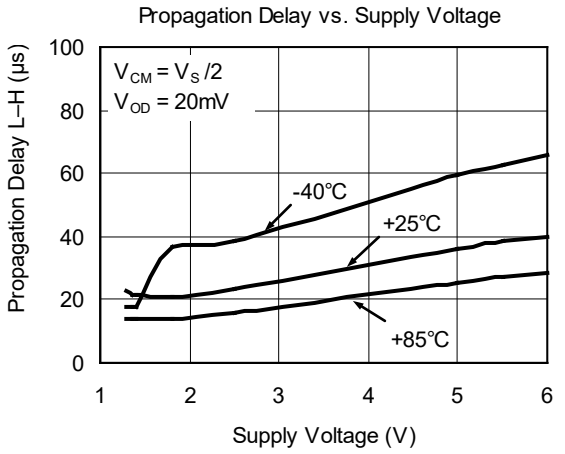
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

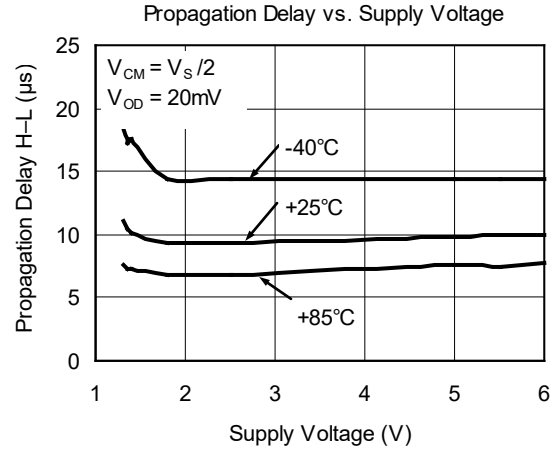






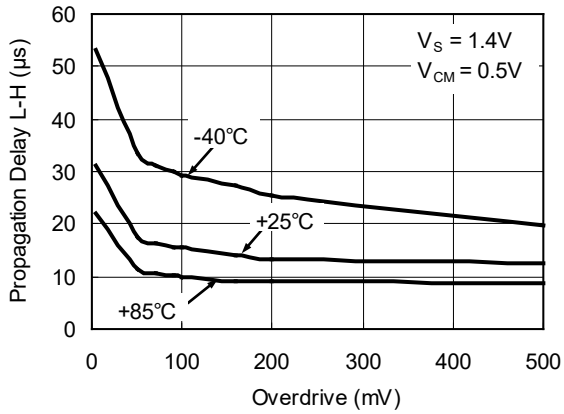






TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Propagation Delay vs. Overdrive



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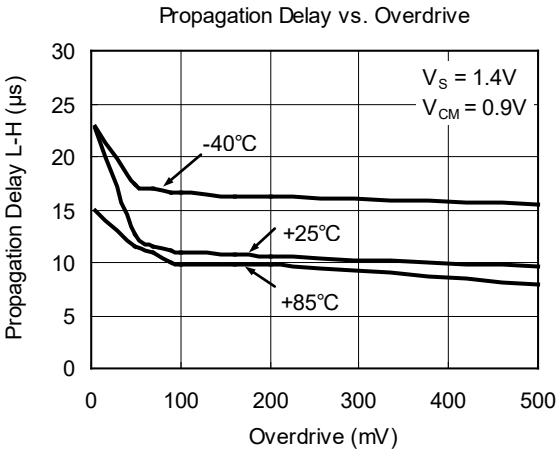

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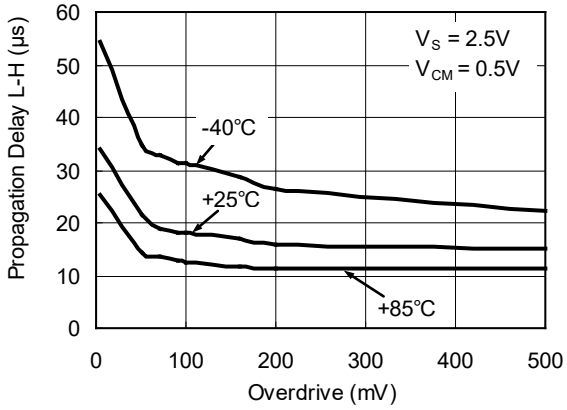

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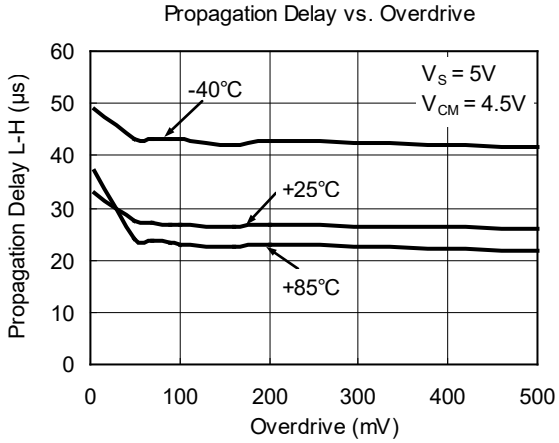

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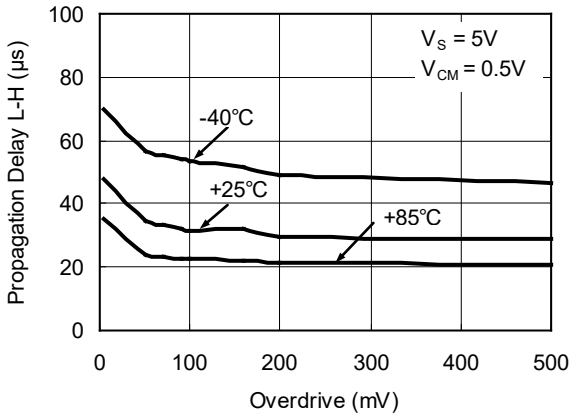
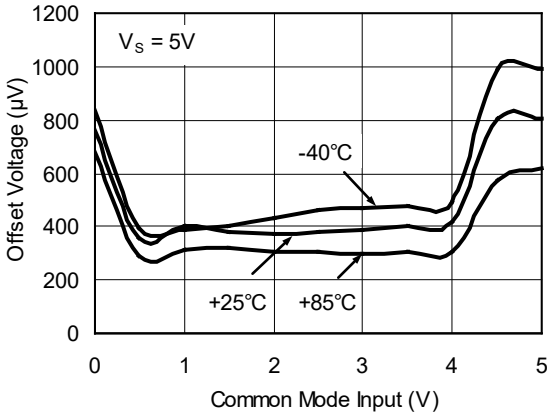
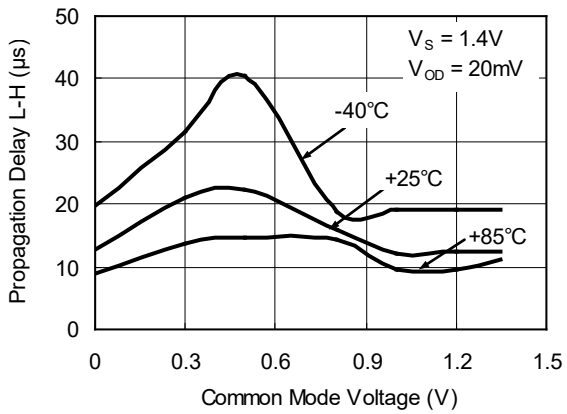


Offset Voltage vs. Common Mode Input



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Propagation Delay vs. Common Mode Input



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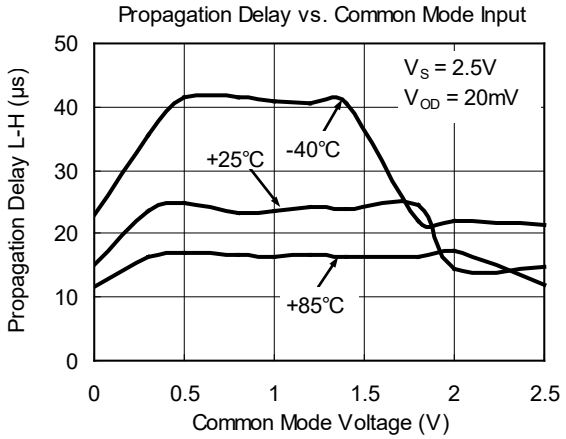

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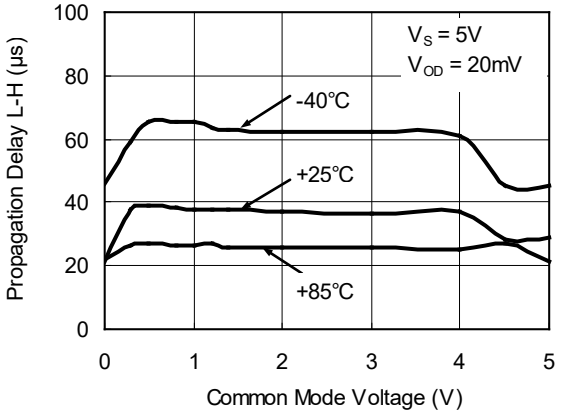

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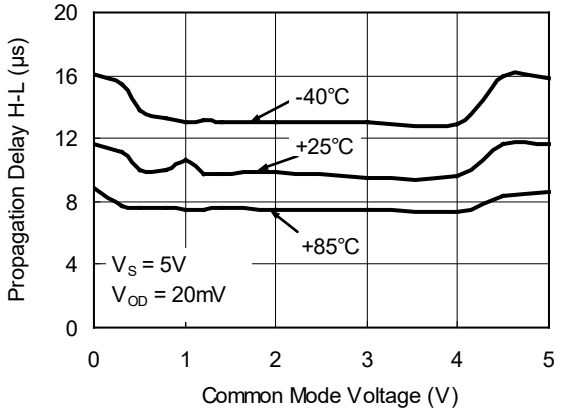

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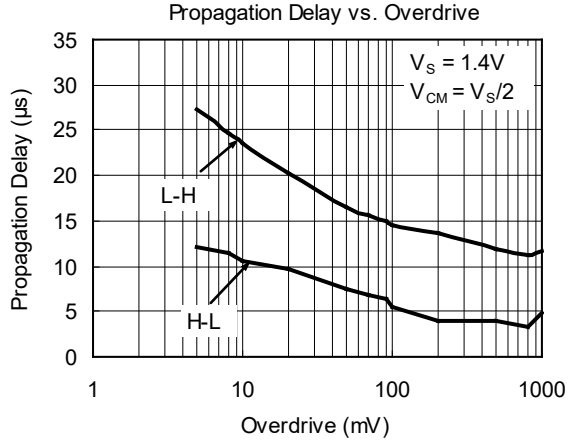

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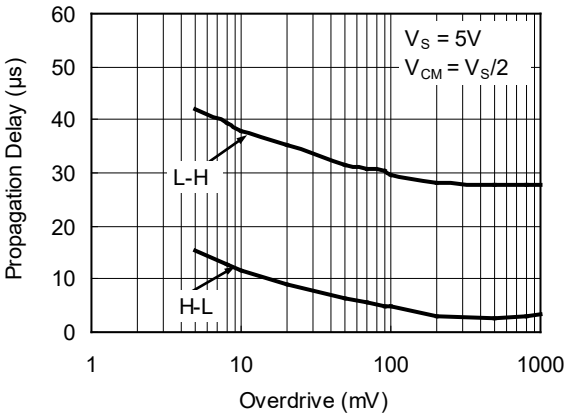
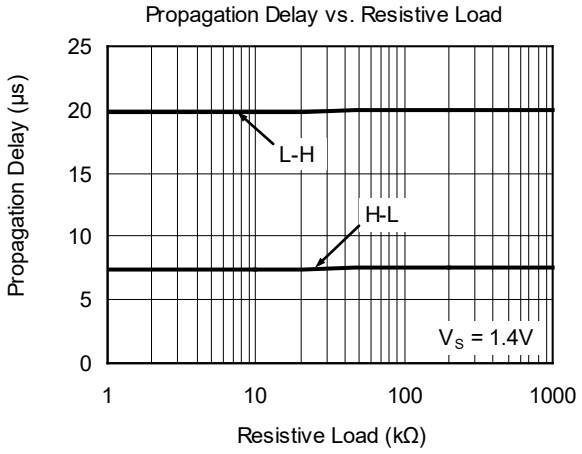
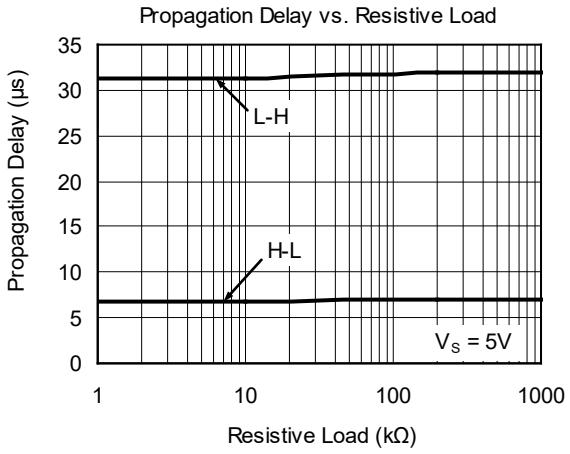


TYPICAL PERFORMANCE CHARACTERISTICS (continued)





REVISION HISTORY

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

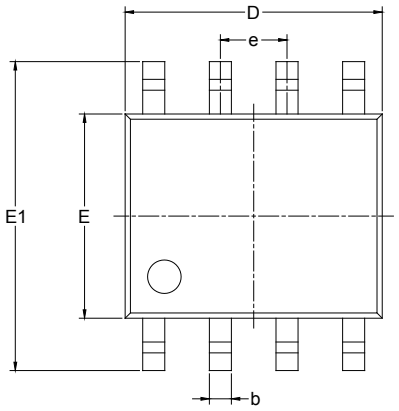
NOVEMBER 2013 – REV.A.1 to REV.A.2	**Page**
Changed Electrical Characteristics section	4

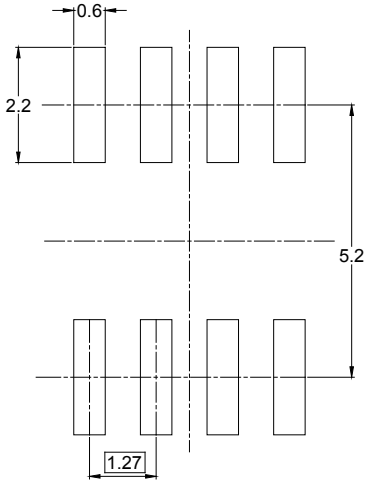
JANUARY 2013 – REV.A to REV.A.1	**Page**
Added Tape and Reel Information section	14, 15

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

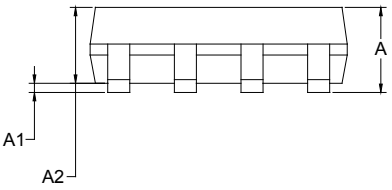
PACKAGE OUTLINE DIMENSIONS

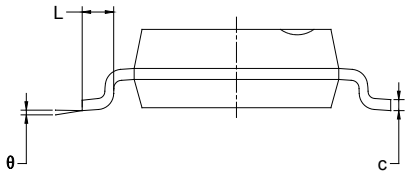
SOIC-8





RECOMMENDED LAND PATTERN (Unit: mm)

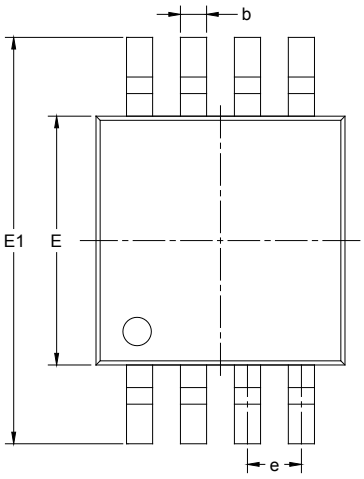


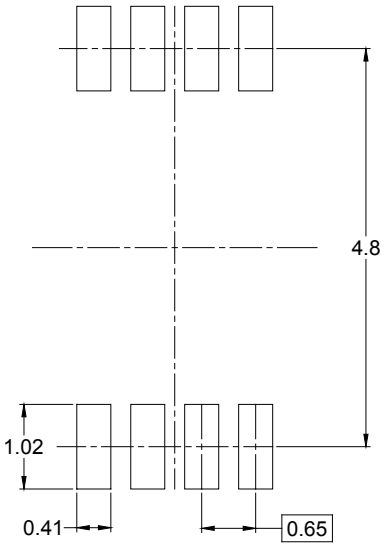


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

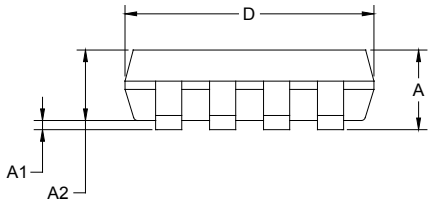
PACKAGE OUTLINE DIMENSIONS

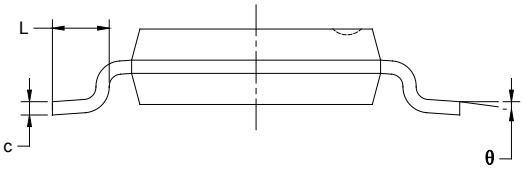
MSOP-8





RECOMMENDED LAND PATTERN (Unit: mm)

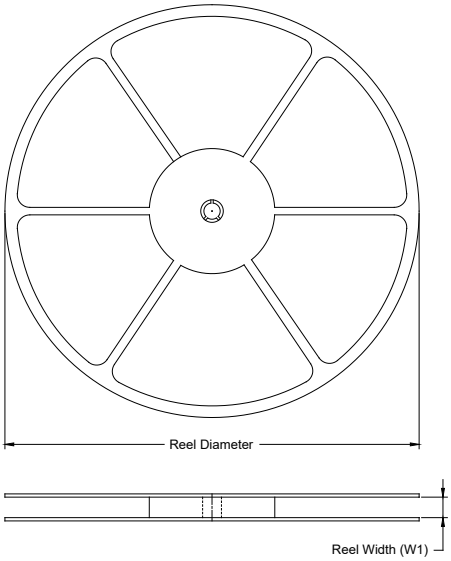




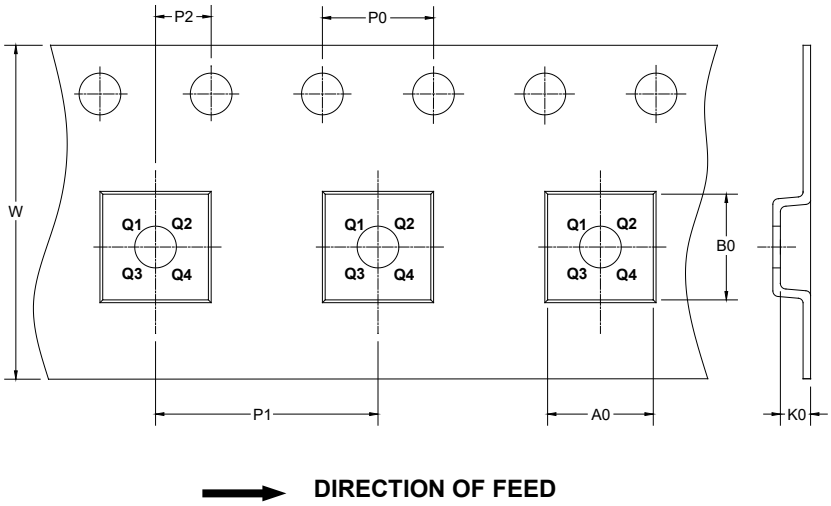
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650 BSC		0.026 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



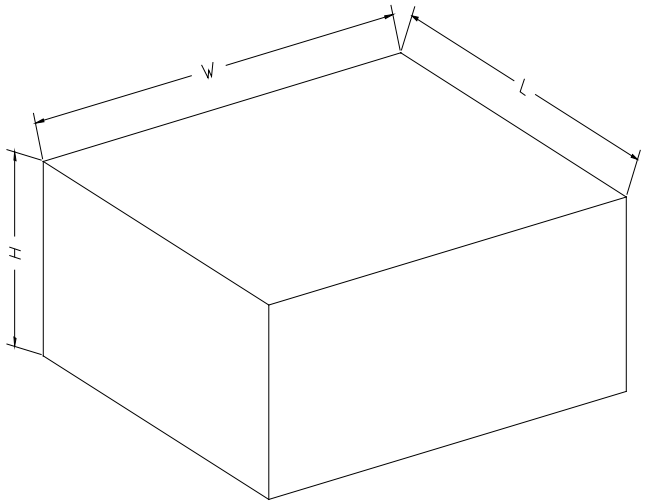
NOTE: The picture is only for reference. Please make the object as the standard.

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
SOIC-8	13″	12.4	6.40	5.40	2.10	4.0	8.0	2.0	12.0	Q1
MSOP-8	13″	12.4	5.20	3.30	1.50	4.0	8.0	2.0	12.0	Q1

DD0001

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
13″	386	280	370	5

DD0002