SGM8709
Micro-Power, CMOS Input, RRIO, 1.4V, Open-Drain Output Comparator

GENERAL DESCRIPTION

The SGM8709 is a single, rail-to-rail input CMOS comparator with typical 318nA ultra-low power supply current. The comparator operates from a wide range of 1.4V to 5.5V supply voltage, and is guaranteed to operate at 1.4V, 2.5V and 5.0V. This feature is suitable for battery-powered applications.

The SGM8709 is optimized for micro-power, single-supply operation. The open-drain output stage allows for operation with absolute minimum power consumption when driving any capacitive or resistive load.

The SGM8709 is available in Green SOT-23-5 and SC70-5 space-saving packages. The small packages make this device ideal for use in hand-held electronics and mobile phone applications. It is rated over the -40°C to +85°C temperature range.

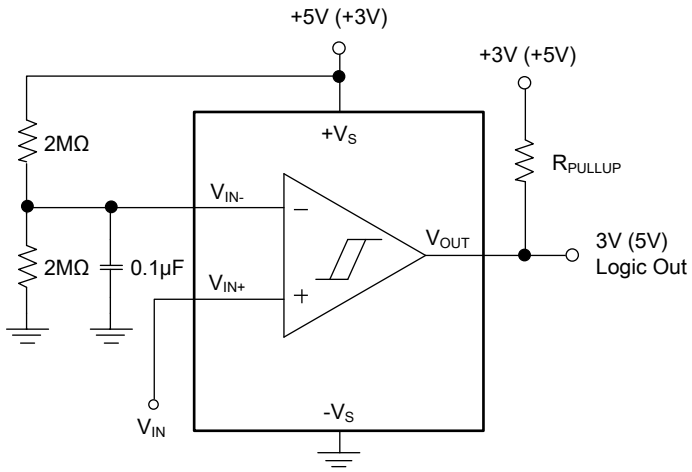
FEATURES

- **Ultra-Low Quiescent Current:**
  318nA (TYP) at V_S = 1.4V
- **Wide Single-Supply Voltage Range: 1.4V to 5.5V**
- **Typical 6μs Propagation Delay at V_S = 1.4V**
- **Rail-to-Rail Input and Output**
- **N-MOSFET Open Drain Output Structure**
- **Open Drain Output Current Drive:**
  18.7mA (TYP) at V_S = 5V
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in Green SOT-23-5 and SC70-5 Packages**

APPLICATIONS

Portable and Battery-Powered Applications
Alarm and Surveillance Circuits
Mobile Phones
RC Timers
Hand-Held Electronics
Window Detectors
IR Receiver

TYPICAL APPLICATION



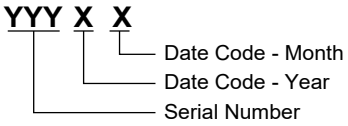
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8709	SOT-23-5	-40℃ to +85℃	SGM8709YN5G/TR	SBBXX	Tape and Reel, 3000
	SC70-5	-40℃ to +85℃	SGM8709YC5G/TR	SA5XX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code.

SOT-23-5/SC70-5



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 Pins ..... $(-V_S)$ - 0.3V to $(+V_S)$ + 0.3V
Voltage at Output Pin 6V
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 2000V
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

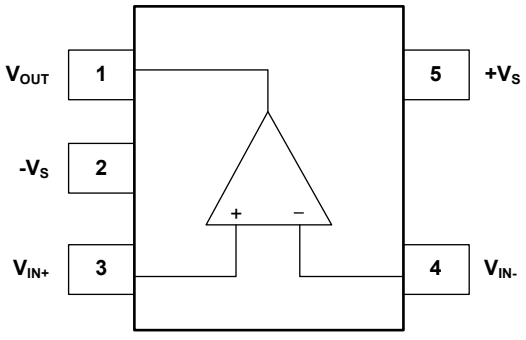
This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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)



SOT-23-5/SC70-5

ELECTRICAL CHARACTERISTICS

(At T_A = +25℃, $+V_S$ = 1.4V, $-V_S$ = 0V, V_{CM} = $+V_S$/2, V_{OUT} = $-V_S$ and R_L = 20kΩ connected to $+V_S$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	I_S	V_{CM} = 0.3V		318	1000	nA
		V_{CM} = 1.1V		263	1000	
Input Offset Voltage	V_{OS}	V_{CM} = 0V		0.6	3	mV
		V_{CM} = 1.4V		0.4	3	
Input Offset Average Drift				2		μV/℃
Common Mode Rejection Ratio	CMRR	V_{CM} stepped from 0V to 0.3V		61		dB
		V_{CM} stepped from 0.8V to 1.4V		59		
		V_{CM} stepped from 0V to 1.4V		67		
Power Supply Rejection Ratio	PSRR	V_S = 1.8V to 5.5V, V_{CM} = 0V		87		dB
Open-Loop Voltage Gain	A_{OL}			81		dB
Output Voltage Swing from Rail	V_{OL}	V_S = 1.8V, I_{OUT} = 500μA		81	106	mV
		-40℃ ≤ T_A ≤ +85℃			137	
		V_S = 1.8V, I_{OUT} = 1mA		165	213	
		-40℃ ≤ T_A ≤ +85℃			290	
Output Current	I_{OUT}	Sink	0.7	1.8		mA
		-40℃ ≤ T_A ≤ +85℃	0.5			
Leakage Current	$I_{Leakage}$	V_{OUT} = $+V_S$		1		nA
Propagation Delay (High to Low)		Overdrive = 10mV		12		μs
		Overdrive = 100mV		6		
Fall Time	t_{Fall}	Overdrive = 10mV, C_L = 30pF, R_L = 1MΩ		156		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 V_{OUT} = $-V_S$ and R_L = 20kΩ connected to $+V_S$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	I_S	V_{CM} = 0.3V		330		nA
		V_{CM} = 2.2V		275		
Input Offset Voltage	V_{OS}	V_{CM} = 0V		0.6		mV
		V_{CM} = 2.5V		0.4		
Input Offset Average Drift				2		μV/℃
Common Mode Rejection Ratio	CMRR	V_{CM} stepped from 0V to 1.4V		69		dB
		V_{CM} stepped from 1.9V to 2.5V		68		
		V_{CM} stepped from 0V to 2.5V		72		
Power Supply Rejection Ratio	PSRR	V_S = 1.8V to 5.5V, V_{CM} = 0V		87		dB
Open-Loop Voltage Gain	A_{OL}			80		dB
Output Voltage Swing from Rail	V_{OL}	I_{OUT} = 500μA		66		mV
		I_{OUT} = 1mA		131		
Output Current	I_{OUT}	Sink		7.1		mA
Leakage Current	$I_{Leakage}$	V_{OUT} = $+V_S$		2		nA
Propagation Delay (High to Low)		Overdrive = 10mV		11		μs
		Overdrive = 100mV		5		
Fall Time	t_{Fall}	Overdrive = 10mV, C_L = 30pF, R_L = 1MΩ		64		ns
		Overdrive = 100mV, C_L = 30pF, R_L = 1MΩ		48		

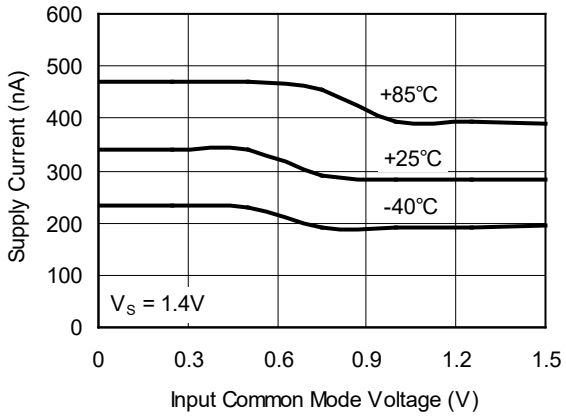
ELECTRICAL CHARACTERISTICS (continued)

(At T_A = +25℃, $+V_S$ = 5.0V, $-V_S$ = 0V, V_{CM} = $+V_S$/2 , V_{OUT} = $-V_S$ and R_L = 20kΩ connected to $+V_S$, unless otherwise noted.)

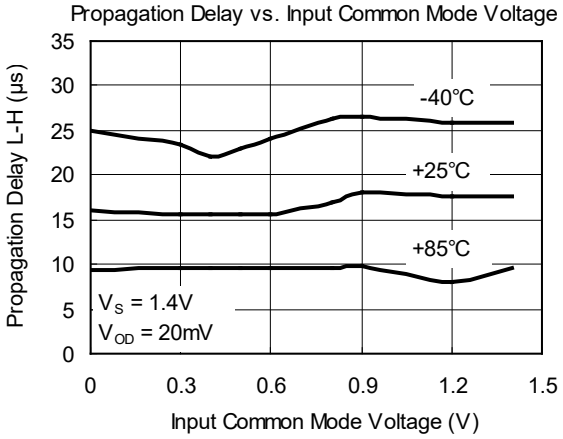
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	I_S	V_{CM} = 0.3V		366	2000	nA
		V_{CM} = 4.7V		311	2000	
Input Offset Voltage	V_{OS}	V_{CM} = 0V		0.6	3	mV
		V_{CM} = 5V		0.4	3	
Input Offset Average Drift				2		μV/℃
Common Mode Rejection Ratio	CMRR	V_{CM} stepped from 0V to 3.9V		69		dB
		V_{CM} stepped from 4.4V to 5.0V		75		
		V_{CM} stepped from 0V to 5.0V		77		
Power Supply Rejection Ratio	PSRR	V_S = 1.8V to 5.5V, V_{CM} = 0V		87		dB
Open-Loop Voltage Gain	A_{OL}			81		dB
Output Voltage Swing from Rail	V_{OL}	I_{OUT} = 500μA		53	72	mV
		-40℃ ≤ T_A ≤ +85℃			92	
		I_{OUT} = 1mA		104	124	
		-40℃ ≤ T_A ≤ +85℃			152	
Output Current	I_{OUT}	Sink	15.3	18.7		mA
		-40℃ ≤ T_A ≤ +85℃	12.1			
Leakage Current	$I_{Leakage}$	V_{OUT} = $+V_S$		5		nA
Propagation Delay (High to Low)		Overdrive = 10mV		13		μs
		Overdrive = 100mV		5		
Fall Time	t_{Fall}	Overdrive = 10mV, C_L = 30pF, R_L = 1MΩ		40		ns
		Overdrive = 100mV, C_L = 30pF, R_L = 1MΩ		36		

TYPICAL PERFORMANCE CHARACTERISTICS

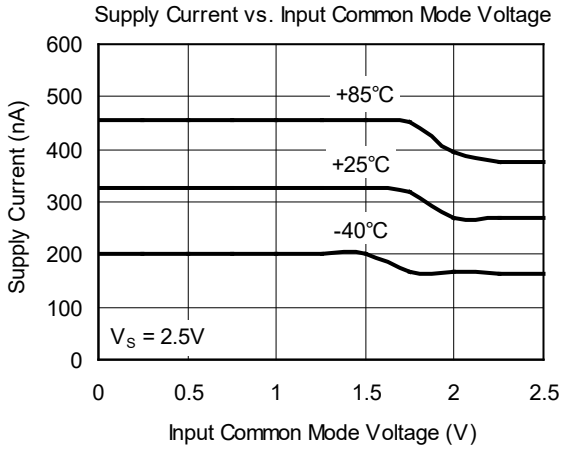
Supply Current vs. Input Common Mode Voltage



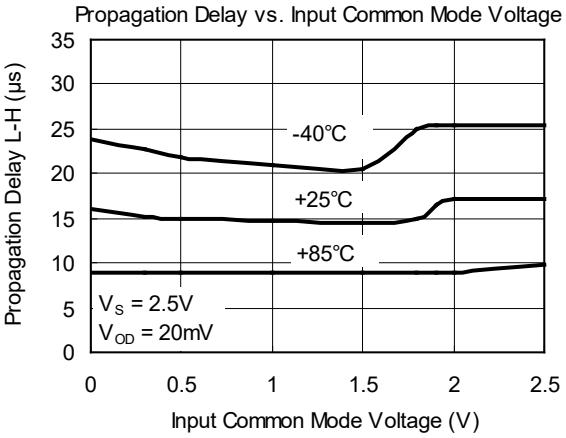
Propagation Delay vs. Input Common Mode Voltage



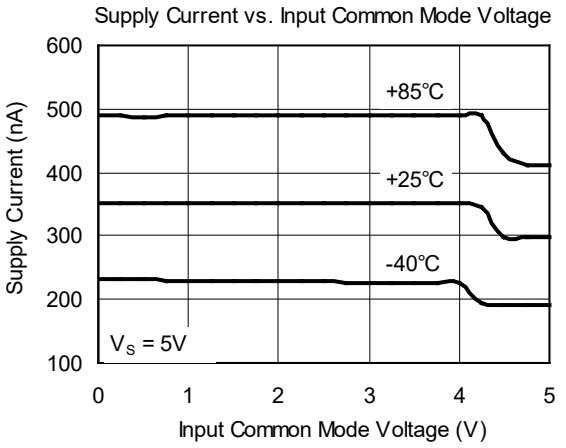
Supply Current vs. Input Common Mode Voltage



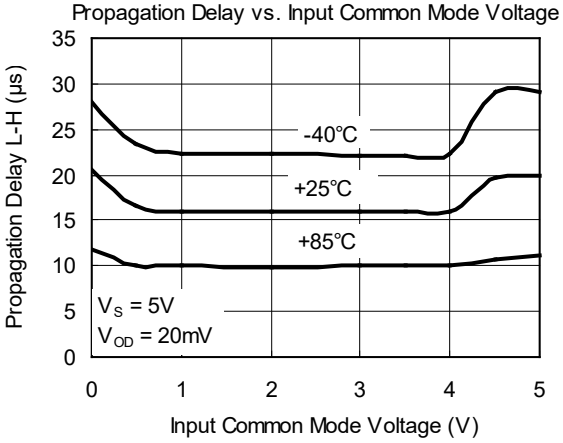
Propagation Delay vs. Input Common Mode Voltage



Supply Current vs. Input Common Mode Voltage

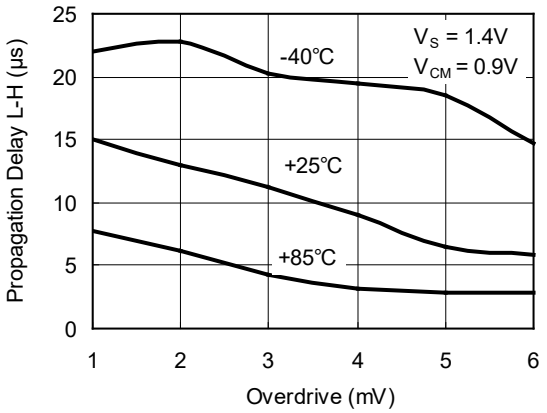


Propagation Delay vs. Input Common Mode Voltage

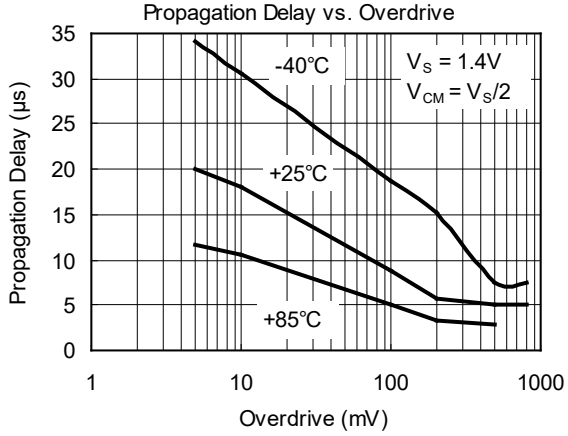


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

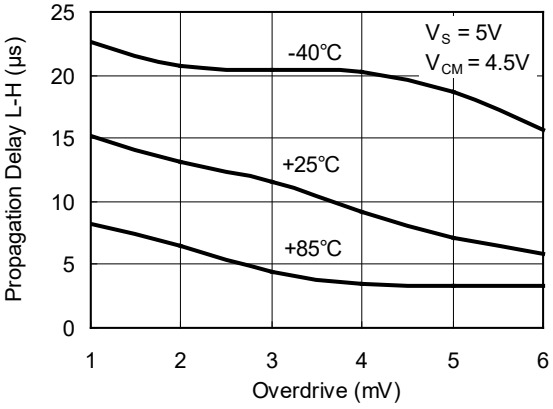
Propagation Delay vs. Overdrive



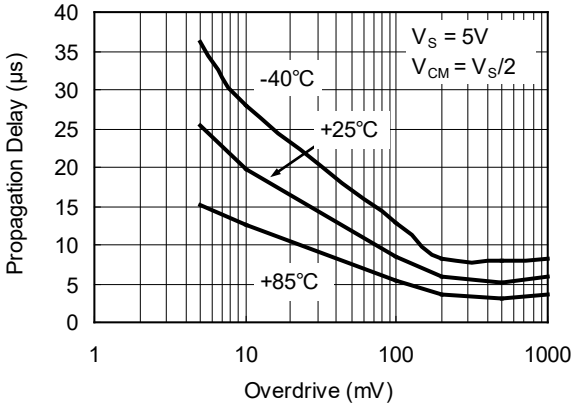
Propagation Delay vs. Overdrive



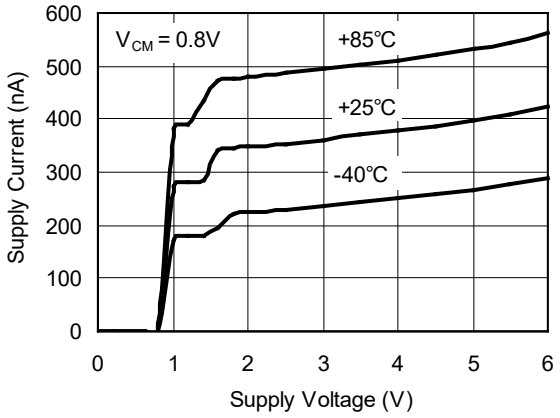
Propagation Delay vs. Overdrive



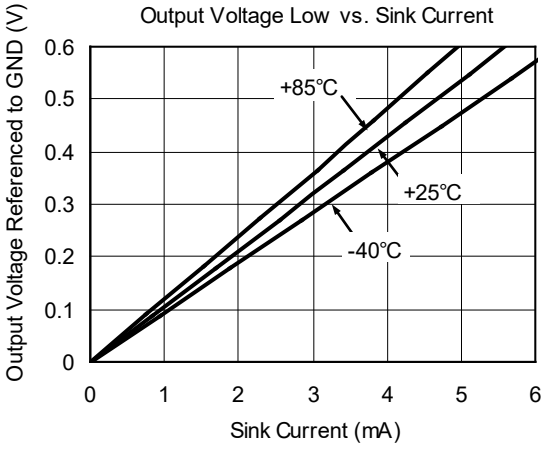
Propagation Delay vs. Overdrive



Supply Current vs. Supply Voltage

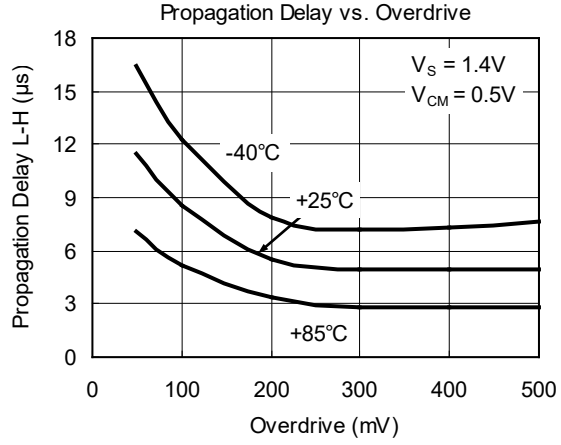


Output Voltage Low vs. Sink Current

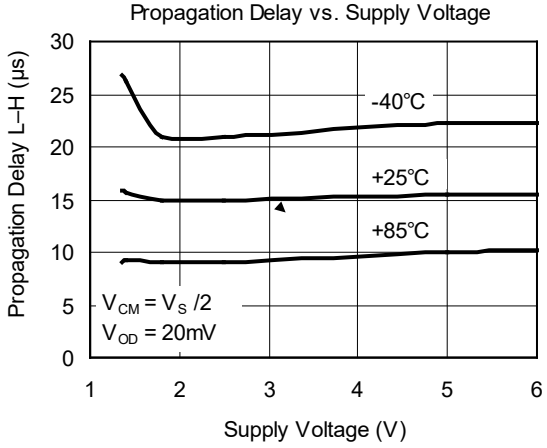


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

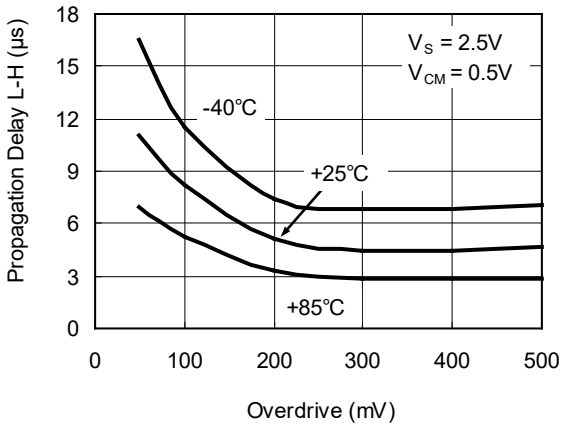
Propagation Delay vs. Overdrive



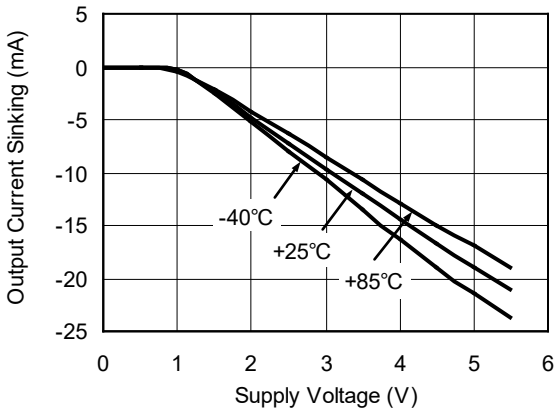
Propagation Delay vs. Supply Voltage



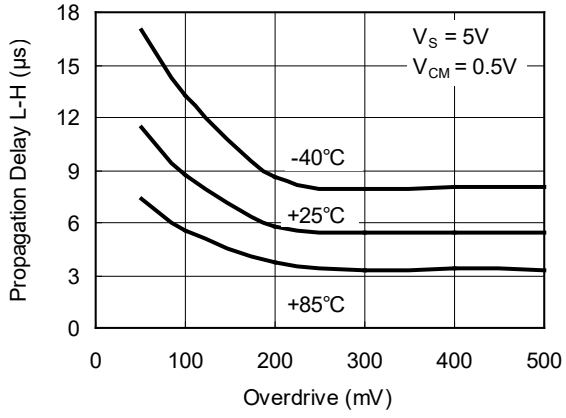
Propagation Delay vs. Overdrive



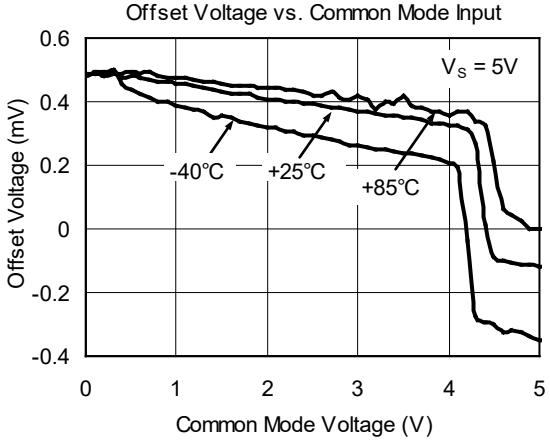
Short-Circuit Sinking Current vs. Supply Voltage



Propagation Delay vs. Overdrive



Offset Voltage vs. Common Mode Input



REVISION HISTORY

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

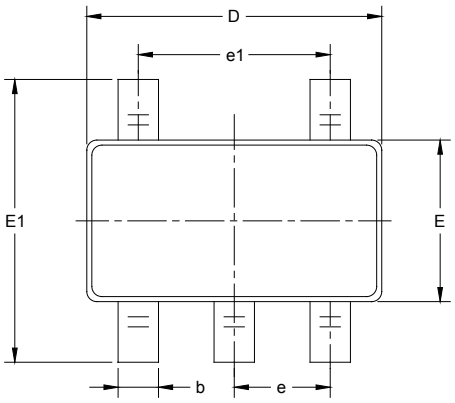
NOVEMBER 2013 – REV.A.1 to REV.A.2	Page
Changed Electrical Characteristics section	4

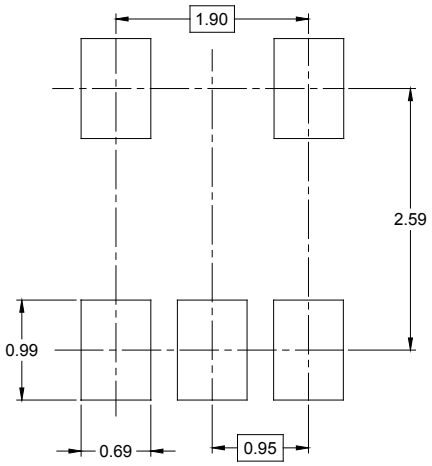
APRIL 2013 – REV.A to REV.A.1	Page
Added Absolute Maximum Ratings section	2

Changes from Original (SEPTEMBER 2012) to REV.A	Page
Changed from product preview to production data	All

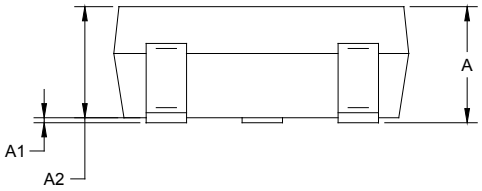
PACKAGE OUTLINE DIMENSIONS

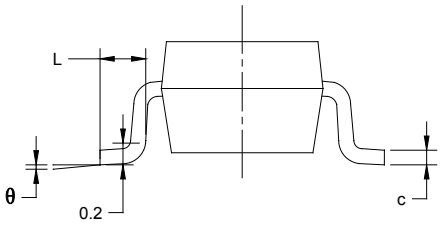
SOT-23-5





RECOMMENDED LAND PATTERN (Unit: mm)

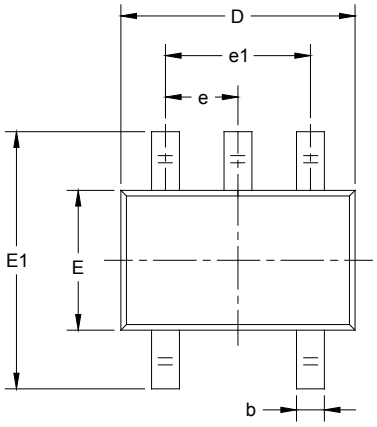


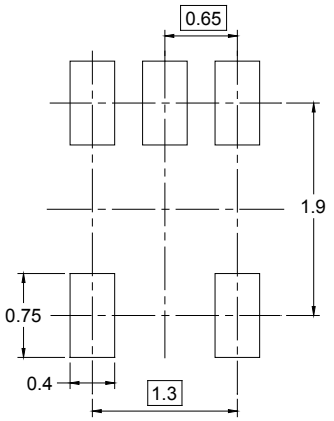


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037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

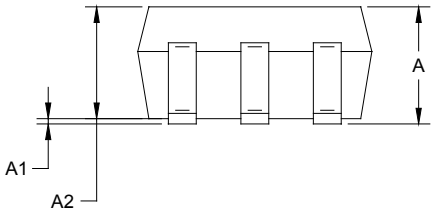
PACKAGE OUTLINE DIMENSIONS

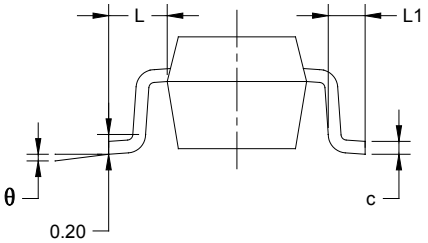
SC70-5





RECOMMENDED LAND PATTERN (Unit: mm)

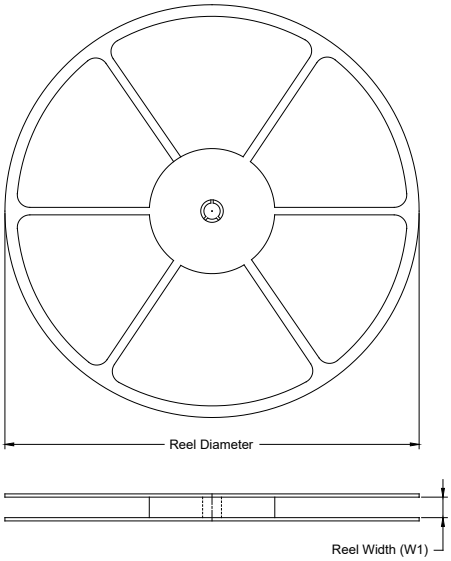




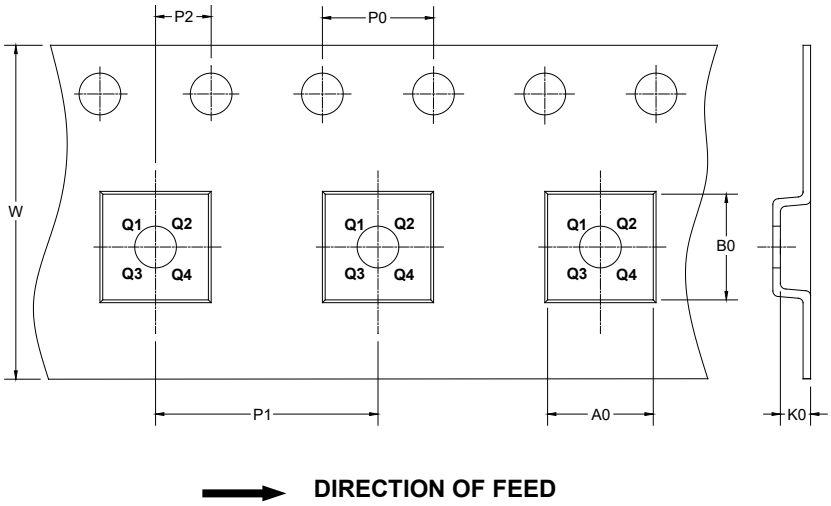
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

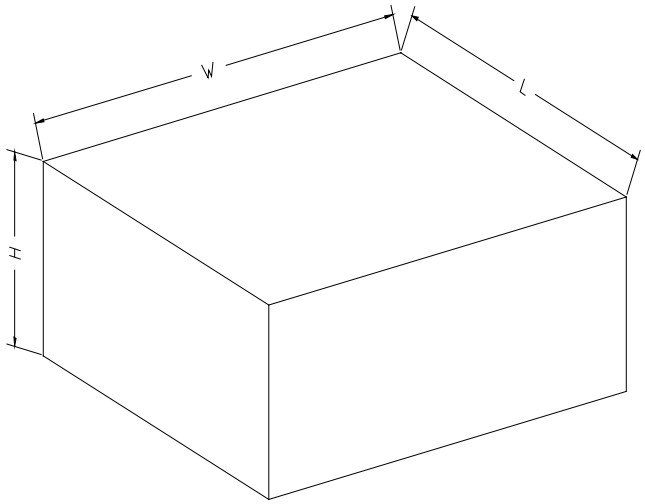
NOTE: The picture is only for reference. Please make the object as the standard.

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

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
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002

单击下面可查看定价，库存，交付和生命周期等信息

>>SGMICRO(圣邦微电子)