SGM8701
Micro-Power, CMOS Input, RRIO, 1.4V, Push-Pull Output Comparator

GENERAL DESCRIPTION

The SGM8701 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 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 SGM8701 is ideal for use in a variety of battery-powered applications. With rail-to-rail common mode voltage range, the SGM8701 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 SGM8701 allows for operation with absolute minimum power consumption when driving any capacitive or resistive load.

SGM8701 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: 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 SOT-23-5 and SC70-5 Packages**

APPLICATIONS

RC Timers
Window Detectors
IR Receiver
Multivibrators
Alarm and Monitoring Circuits

PACKAGE/ORDERING INFORMATION

MODEL	PIN-PACKAGE	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SGM8701	SOT-23-5	-40℃ to +85℃	SGM8701YN5G/TR	S59XX	Tape and Reel, 3000
	SC70-5	-40℃ to +85℃	SGM8701YC5G/TR	S5AXX	Tape and Reel, 3000

NOTE: Order number and package marking are defined as the follow:

ORDER NUMBER

SGM8701 X X G / TR

- **Tape and Reel**
- **Green Product**
- **Package Type**
  - N5 SOT-23-5
  - C5 SC70-5
- **Operating Temperature Range**
  - Y -40℃ to +85℃

MARKING INFORMATION

SYY X X

- Date code - month ("A" = Jan. "B" = Feb. ⋯ "L" = Dec.)
- Date code - year ("A" = 2010, "B" = 2011 ⋯)
- Chip I.D.

For example: S59BA (2011, January)

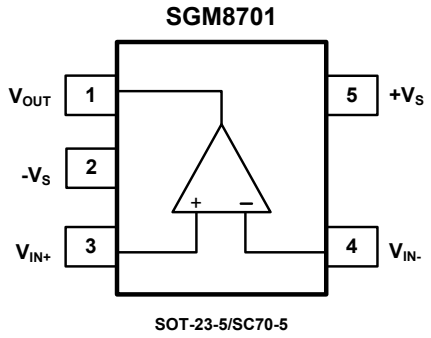
ABSOLUTE MAXIMUM RATINGS

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
Operating Temperature Range.....-40℃ to +85℃
Junction Temperature..... 150℃
Storage Temperature.....-65℃ to +150℃
Lead Temperature (soldering, 10s) .....260℃

ESD Susceptibility
HBM.....2000V
MM.....400V

NOTE:
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 in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

PIN CONFIGURATIONS (TOP VIEW)



SOT-23-5/SC70-5

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.

SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the latest datasheet.

ELECTRICAL CHARACTERISTICS: V_S = 1.4V

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

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	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_O = 500μA	1.598	1.669		V
		-40℃ ≤ T_A ≤ +85℃	1.581			
		V_S = 1.8V, I_O = 1mA	1.324	1.508		
		-40℃ ≤ T_A ≤ +85℃	1.288			
Output Swing Low	V_{OL}	V_S = 1.8V, I_O = -500μA		82	112	mV
		-40℃ ≤ T_A ≤ +85℃			127	
		V_S = 1.8V, I_O = -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: V_S = 2.5V

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

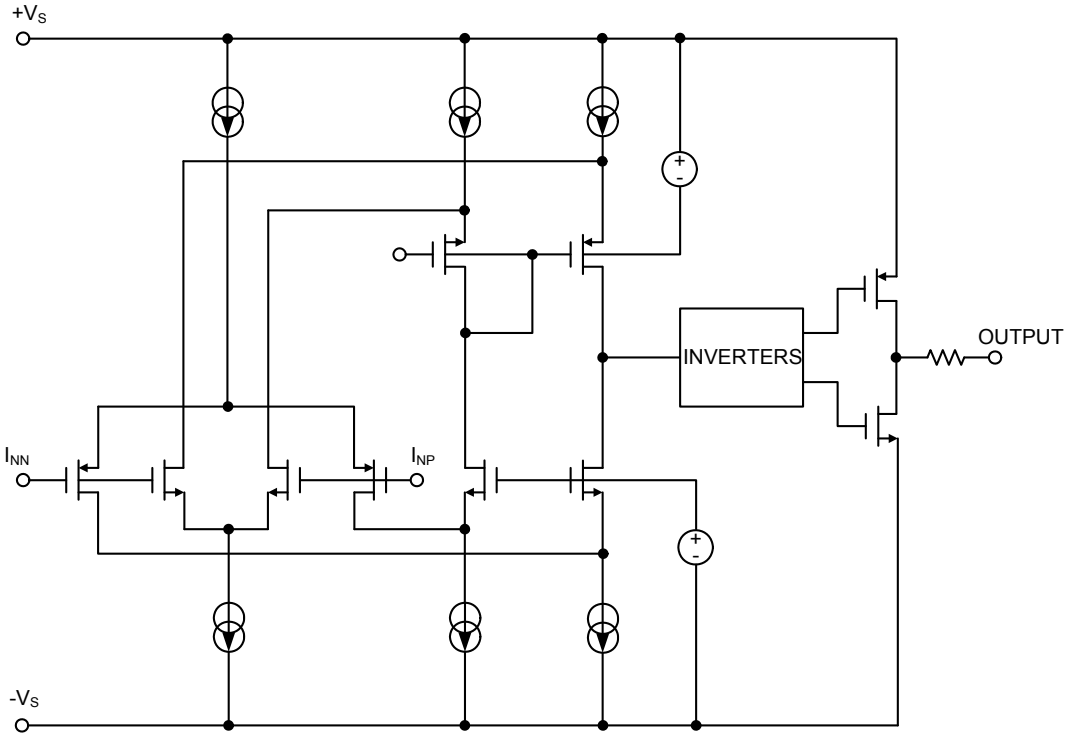
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	I_S	V_{CM} = 0.3V		310		nA
		V_{CM} = 2.2V		260		
Input Offset Voltage	V_{OS}	V_{CM} = 0V		0.5		mV
		V_{CM} = 2.5V		0.5		
Input Offset Average Drift				2		μV/℃
Common Mode Rejection Ratio	CMRR	V_{CM} Stepped from 0V to 1.4V		75		dB
		V_{CM} 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_O = 500μA		2.419		V
		I_O = 1mA		2.333		
Output Swing Low	V_{OL}	I_O = -500μA		66		mV
		I_O = -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: V_S = 5.0V

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

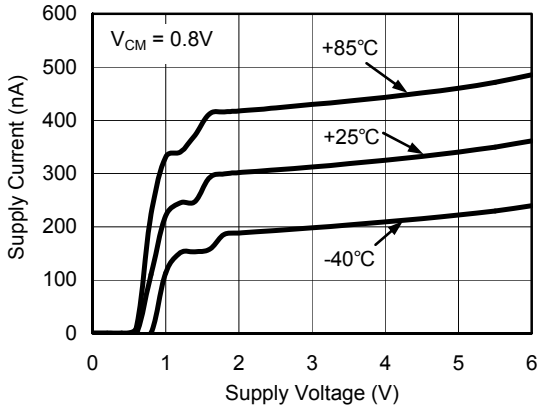
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	I_S	V_{CM} = 0.3V		350	2000	nA
		V_{CM} = 4.7V		300	2000	
Input Offset Voltage	V_{OS}	V_{CM} = 0V	-3	0.5	3	mV
		V_{CM} = 5V	-3	0.5	3	
Input Offset Average Drift				2		μV/℃
Common Mode Rejection Ratio	CMRR	V_{CM} Stepped from 0V to 3.9V		85		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_O = 500μA	4.923	4.952		V
		-40℃ ≤ T_A ≤ +85℃	4.916			
		I_O = 1mA	4.864	4.904		
		-40℃ ≤ T_A ≤ +85℃	4.848			
Output Swing Low	V_{OL}	I_O = -500μA		52	80	mV
		-40℃ ≤ T_A ≤ +85℃			90	
		I_O = -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

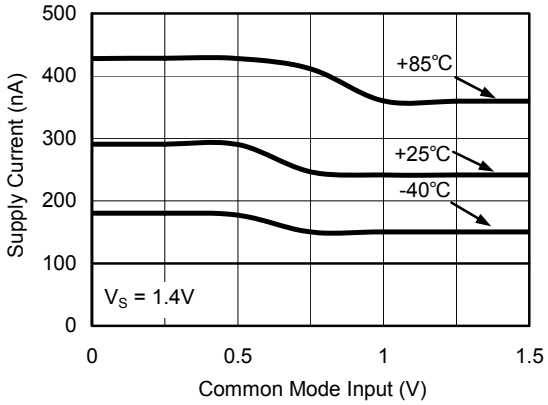


TYPICAL PERFORMANCE CHARACTERISTICS

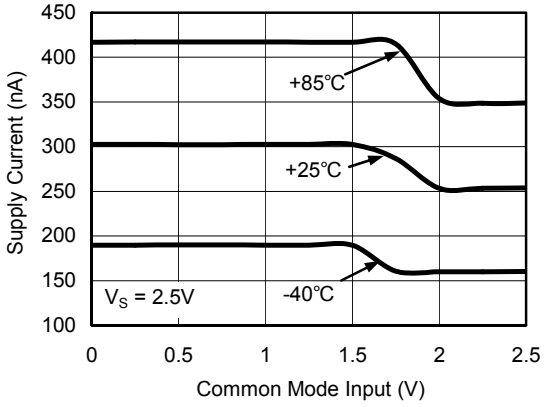
Supply Current vs. Supply Voltage



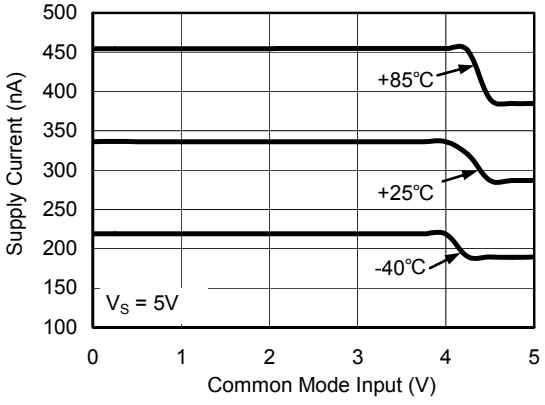
Supply Current vs.Common Mode Input



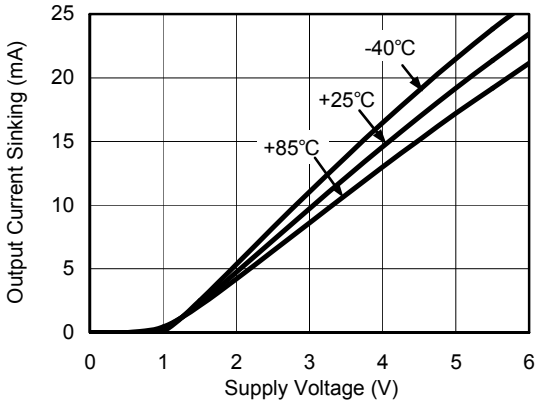
Supply Current vs. Common Mode Input



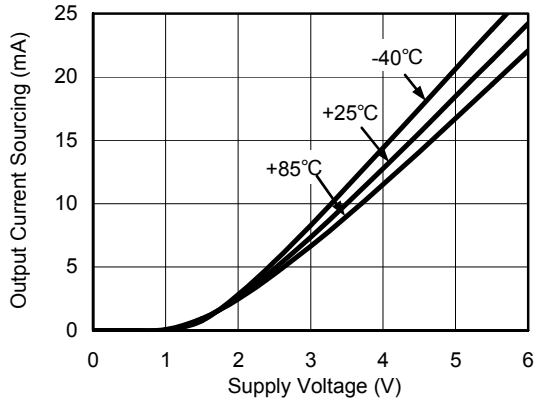
Supply Current vs. Common Mode Input



Short Circuit Sinking Current vs. Supply Voltage

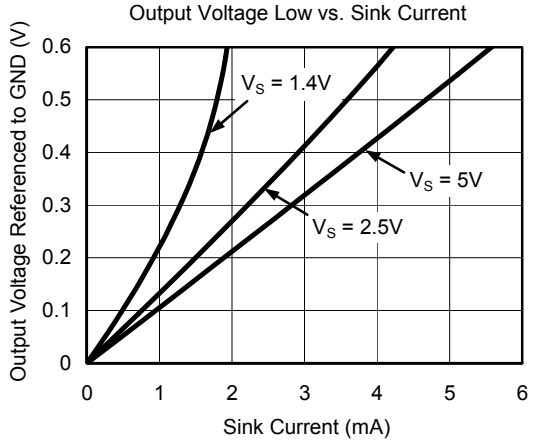


Short Circuit Sourcing Current vs. Supply Voltage

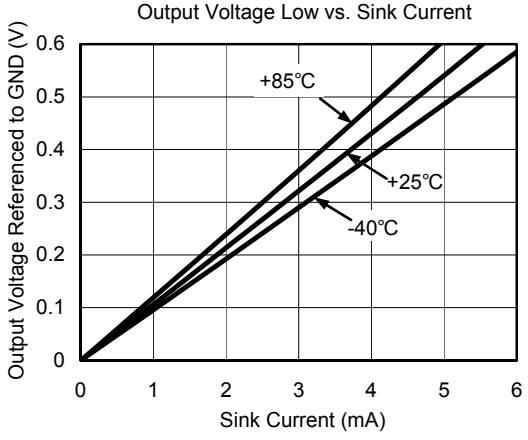


TYPICAL PERFORMANCE CHARACTERISTICS

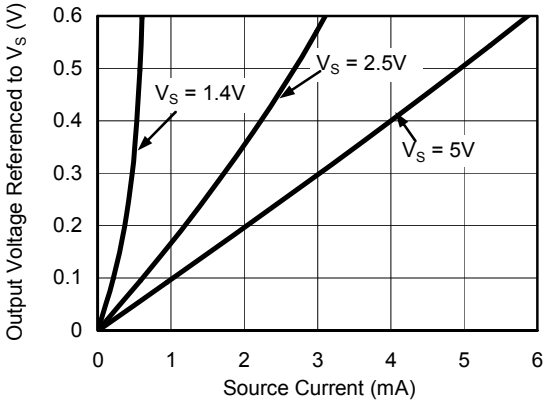
Output Voltage Low vs. Sink Current



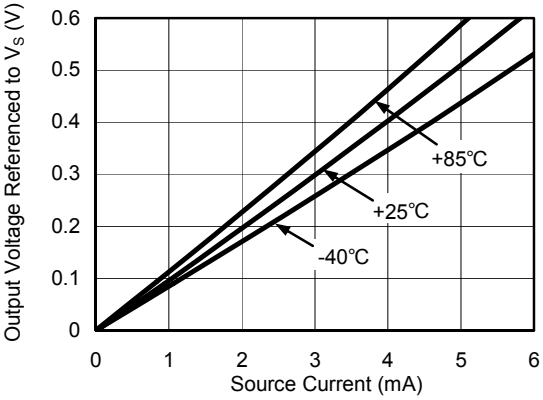
Output Voltage Low vs. Sink Current



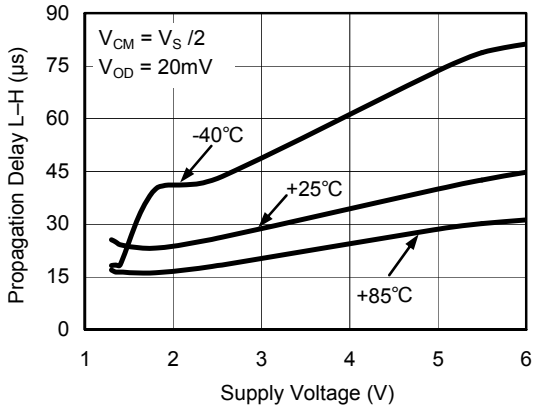
Output Voltage High vs. Source Current



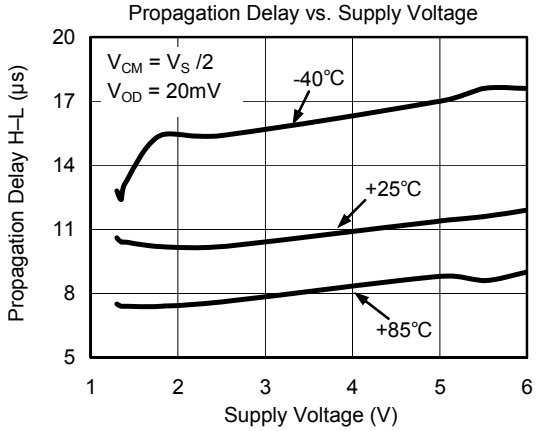
Output Voltage High vs. Source Current



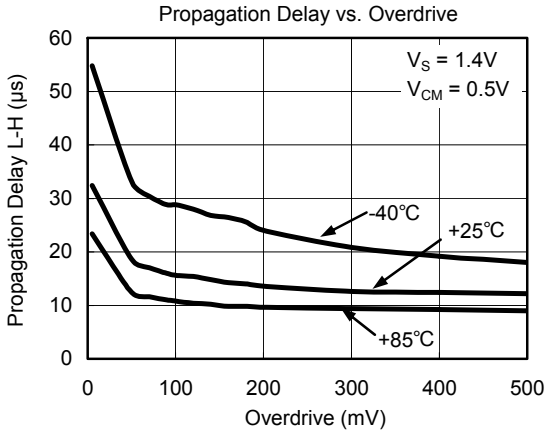
Propagation Delay vs. Supply Voltage

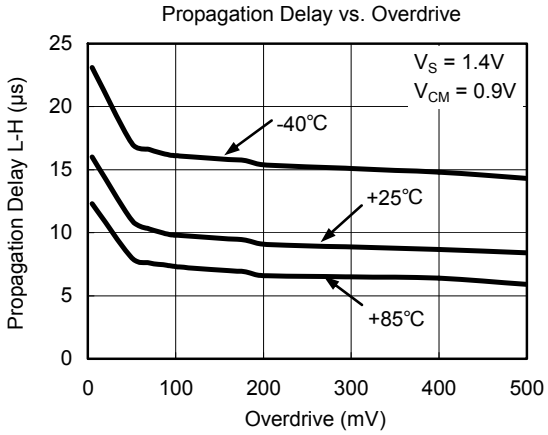


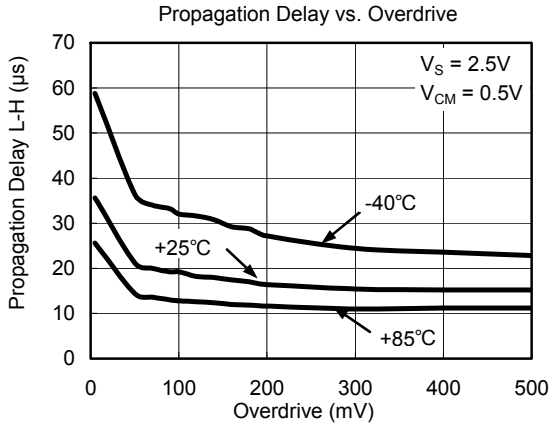
Propagation Delay vs. Supply Voltage

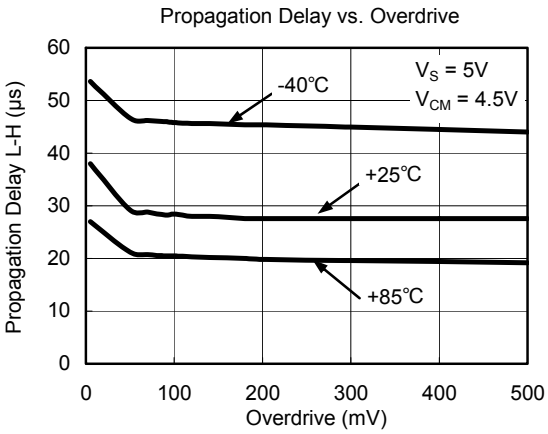


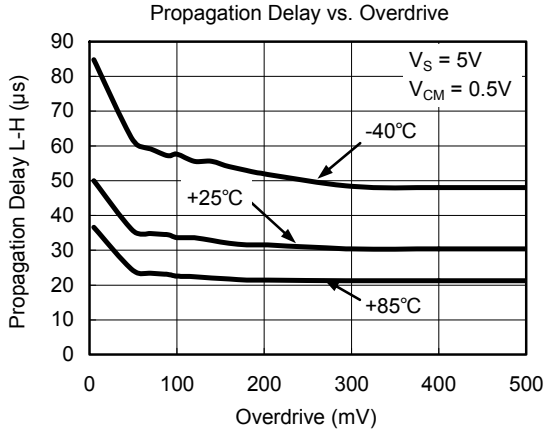
TYPICAL PERFORMANCE CHARACTERISTICS

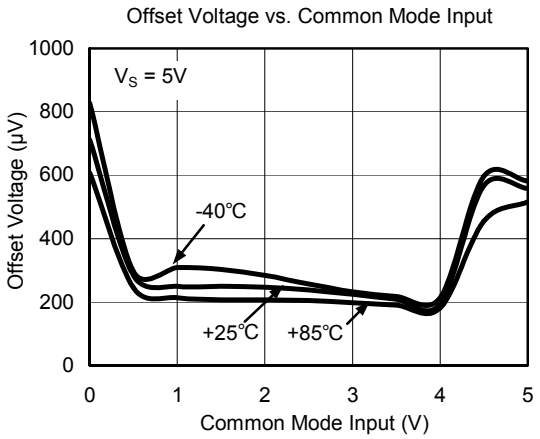




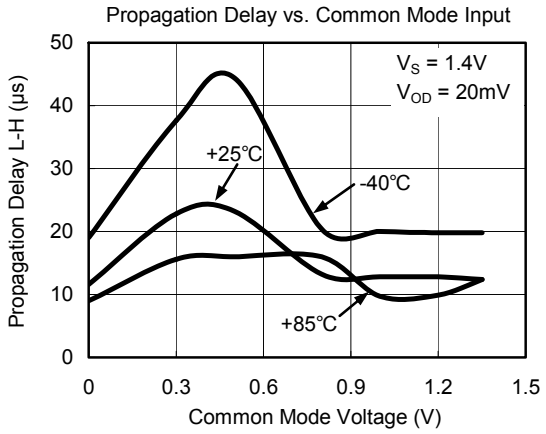


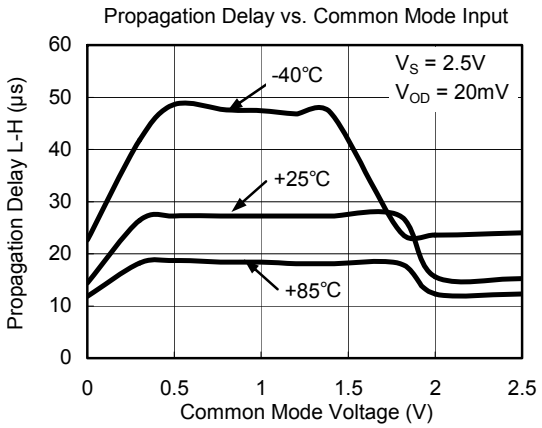


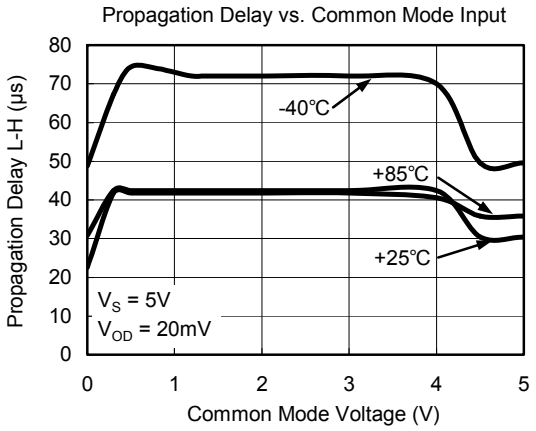


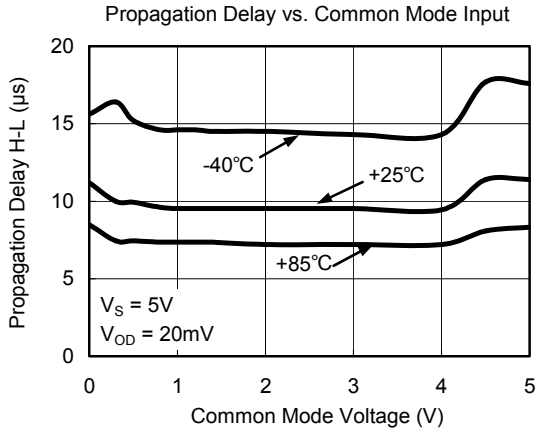


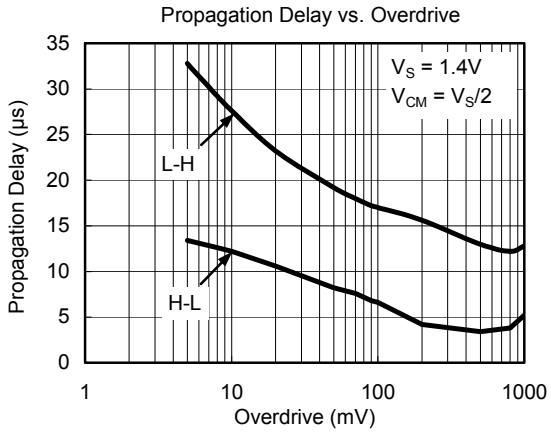
TYPICAL PERFORMANCE CHARACTERISTICS

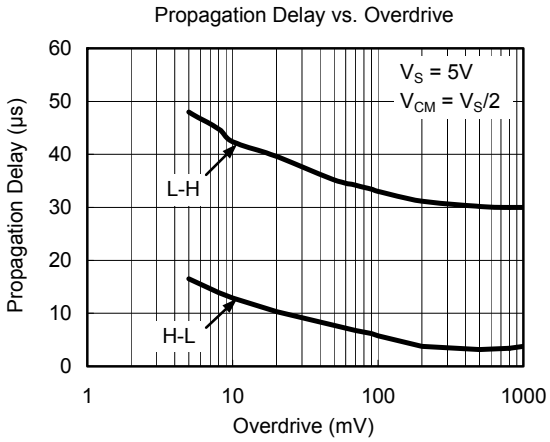




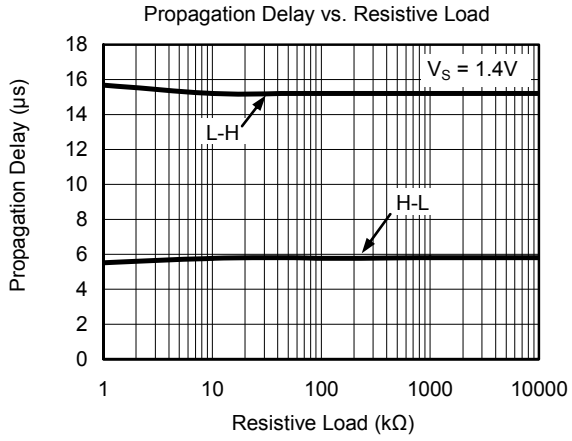


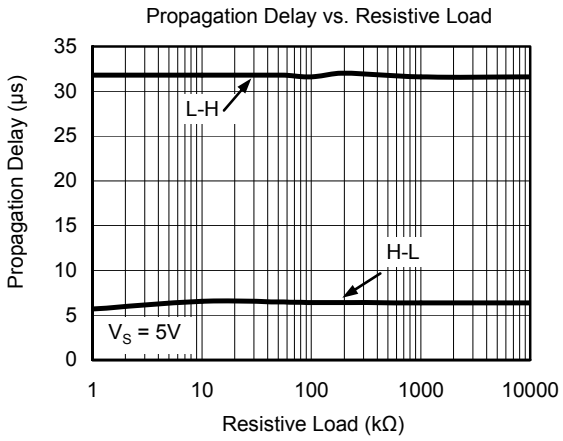






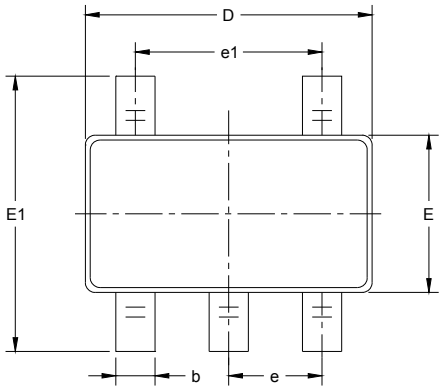
TYPICAL PERFORMANCE CHARACTERISTICS

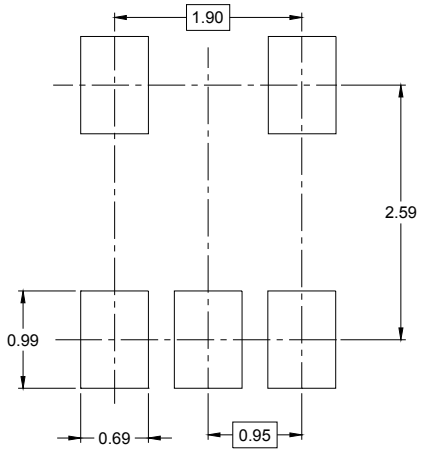




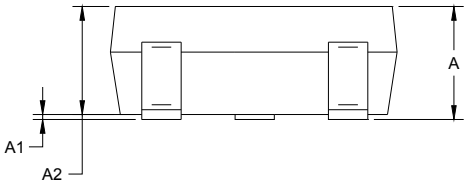
PACKAGE OUTLINE DIMENSIONS

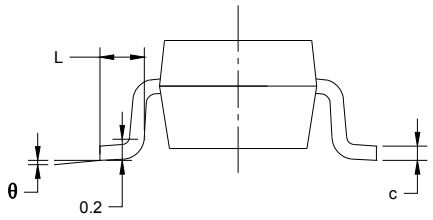
SOT-23-5





RECOMMENDED LAND PATTERN (Unit: mm)

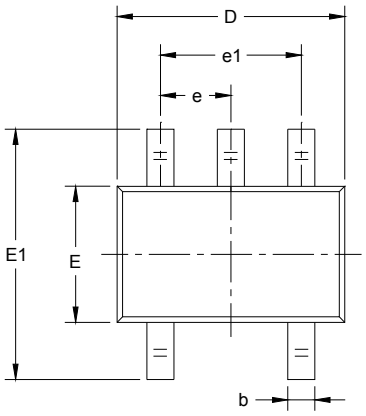


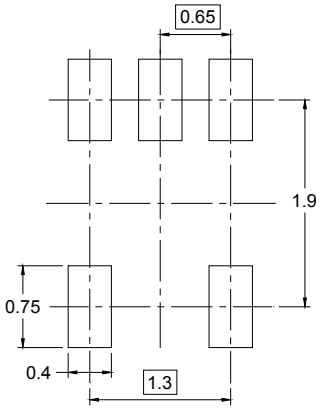


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037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

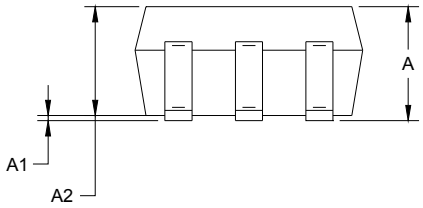
PACKAGE OUTLINE DIMENSIONS

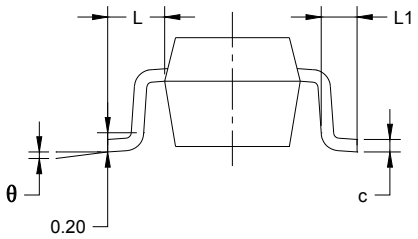
SC70-5





RECOMMENDED LAND PATTERN (Unit: mm)

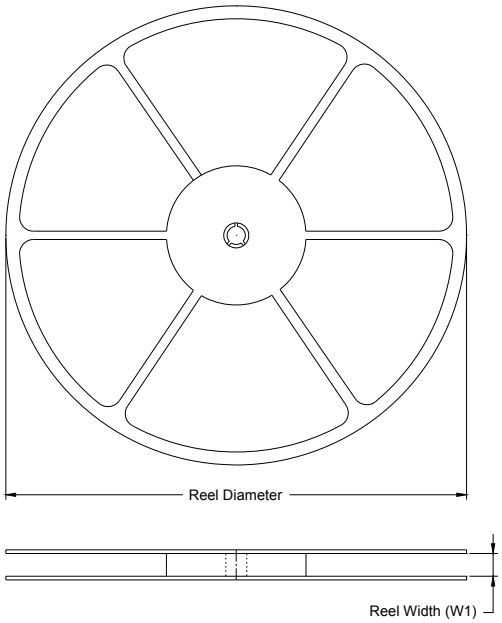




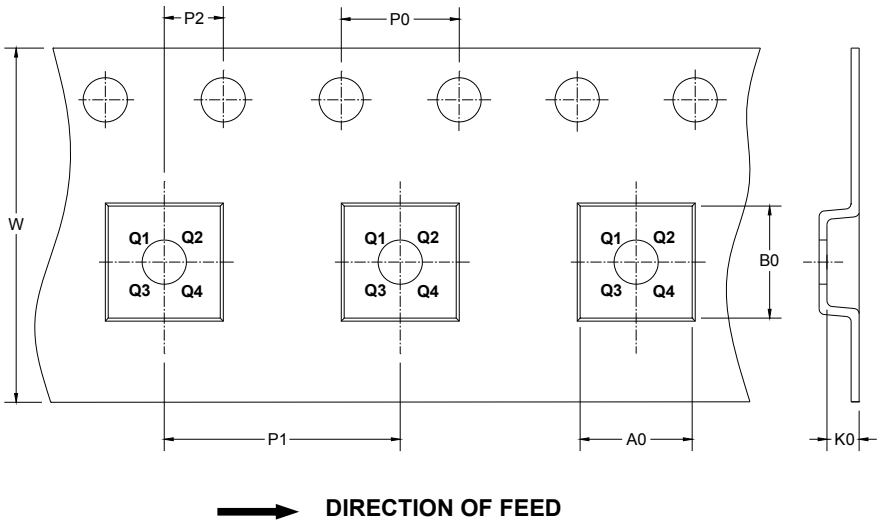
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 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

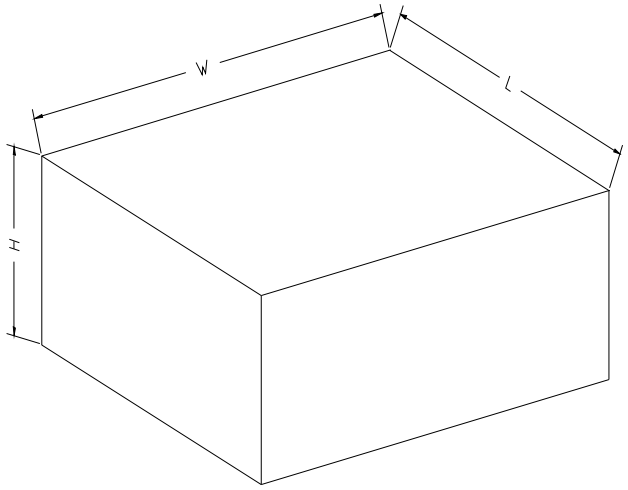


NOTE: The picture is only for reference. Please make the object as the standard.

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	3.2	3.2	1.4	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

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