



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 μ 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.

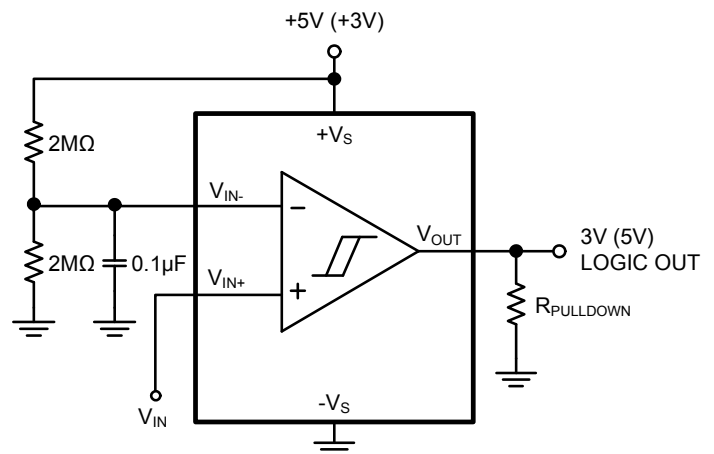
APPLICATIONS

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

FEATURES

- **Ultra Low Power Consumption:**
300nA (TYP) at $V_S = 1.4V$
- **Wide Supply Voltage Range: 1.4V to 5.5V**
- **Propagation Delay: 6 μ 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**

TYPICAL APPLICATION



SGM8702

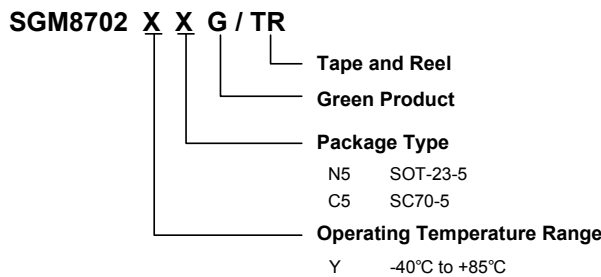
Micro-Power, CMOS Input, RRIO, 1.4V, Open Drain Output Comparator

PACKAGE/ORDERING INFORMATION

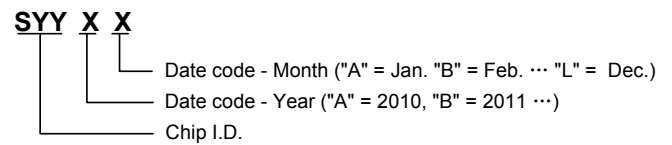
| MODEL | PIN-PACKAGE | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING | PACKAGE OPTION |
|---------|-------------|-----------------------------|-----------------|-----------------|---------------------|
| SGM8702 | SOT-23-5 | -40°C to +85°C | SGM8702YN5G/TR | S5BXX | Tape and Reel, 3000 |
| | SC70-5 | -40°C to +85°C | SGM8702YC5G/TR | S5CXX | Tape and Reel, 3000 |

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

ORDER NUMBER



MARKING INFORMATION



For example: S5BBA (2011, January)

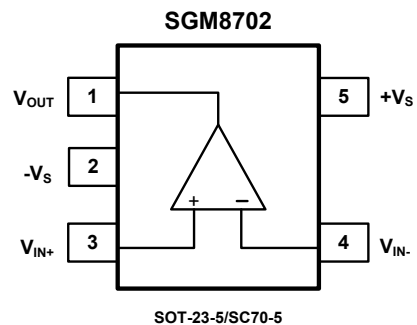
ABSOLUTE MAXIMUM RATINGS

| | |
|---|-----------------|
| 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°C to +85°C |
| Junction Temperature..... | 150°C |
| Storage Temperature..... | -65°C to +150°C |
| Lead Temperature (Soldering, 10s) | 260°C |
| 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)



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 $T_A = 25^\circ C$, $+V_S = 1.4V$, $-V_S = 0V$, $V_{CM} = +V_S/2$, $V_O = +V_S$ and $R_L = 1k\Omega$, 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 | | $\mu V/^\circ C$ |
| 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 | $V_S = 1.8V$ to 5.5V, $V_{CM} = 0V$ | 66 | 95 | | dB |
| Large Signal Voltage Gain | A_{VO} | | | 100 | | dB |
| Output Swing High | V_{OH} | $V_S = 1.8V$, $I_O = 500\mu A$ | 1.606 | 1.666 | | V |
| | | $-40^\circ C \leq T_A \leq +85^\circ C$ | 1.589 | | | |
| | | $V_S = 1.8V$, $I_O = 1mA$ | 1.348 | 1.498 | | |
| | | $-40^\circ C \leq T_A \leq +85^\circ C$ | 1.312 | | | |
| Output Current | I_{OUT} | Source | | 0.7 | | mA |
| Leakage Current | $I_{Leakage}$ | $V_O = 0V$ | | 1 | | nA |
| 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, $C_L = 30pF$, $R_L = 1M\Omega$ | | 220 | | ns |
| | | Overdrive = 100mV, $C_L = 30pF$, $R_L = 1M\Omega$ | | 220 | | |

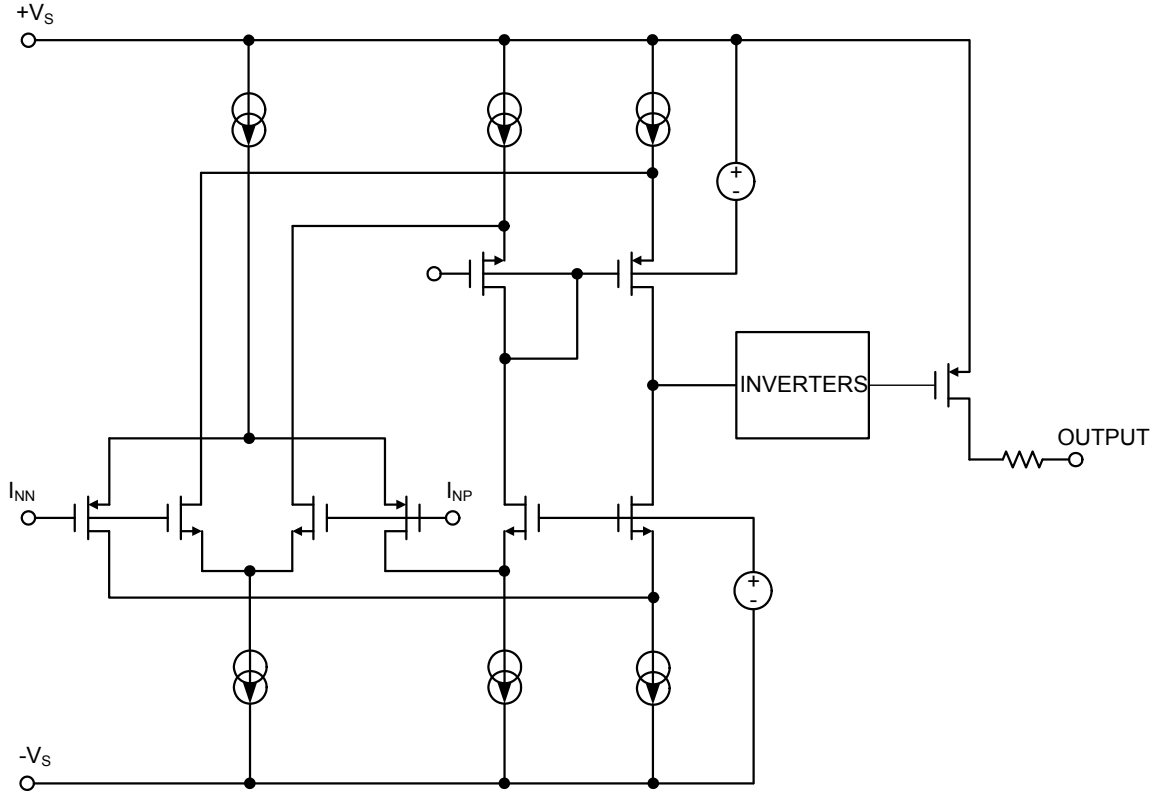
ELECTRICAL CHARACTERISTICS: $V_S = 2.5V$ (At $T_A = 25^\circ C$, $+V_S = 2.5V$, $-V_S = 0V$, $V_{CM} = +V_S/2$, $V_O = +V_S$ and $R_L = 1k\Omega$, unless otherwise noted.)

| 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 | | $\mu V/^\circ C$ |
| 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 | $V_S = 1.8V$ to $5.5V$, $V_{CM} = 0V$ | | 95 | | dB |
| Large Signal Voltage Gain | A_{VO} | | | 100 | | dB |
| Output Swing High | V_{OH} | $I_O = 500\mu A$ | | 2.417 | | V |
| | | $I_O = 1mA$ | | 2.329 | | |
| Output Current | I_{OUT} | Source | | 5.3 | | mA |
| Leakage Current | $I_{Leakage}$ | $V_O = 0V$ | | 2 | | nA |
| 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, $C_L = 30pF$, $R_L = 1M\Omega$ | | 120 | | ns |
| | | Overdrive = 100mV, $C_L = 30pF$, $R_L = 1M\Omega$ | | 120 | | |

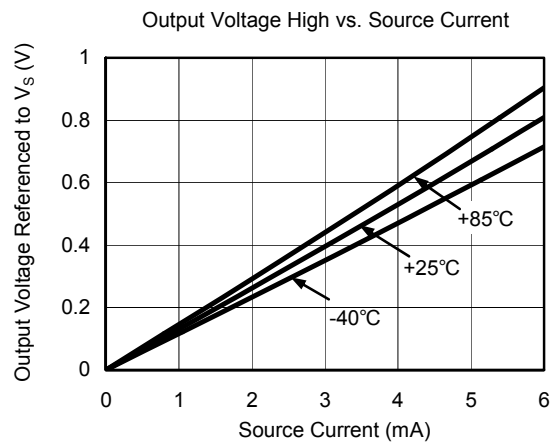
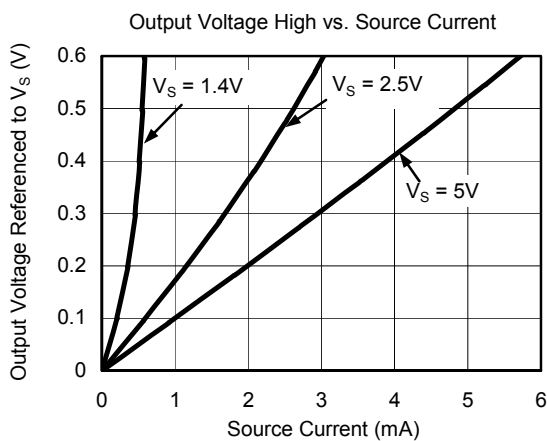
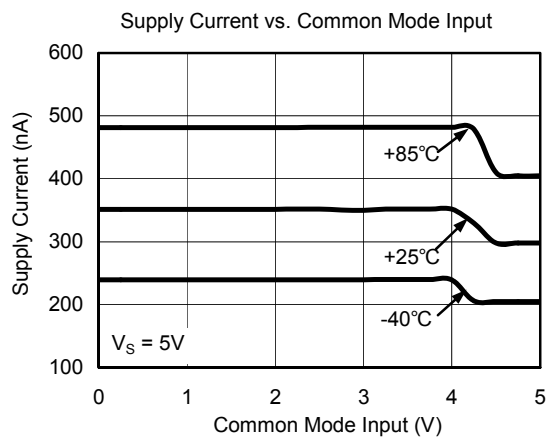
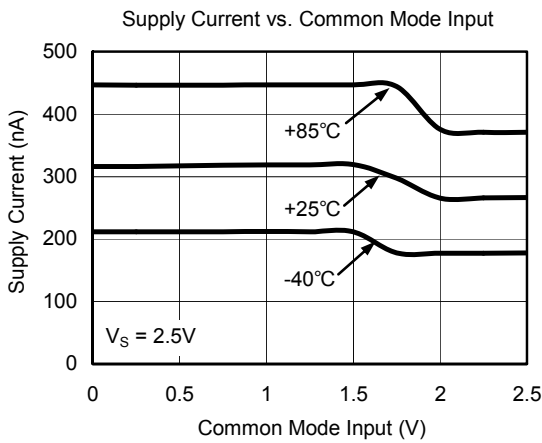
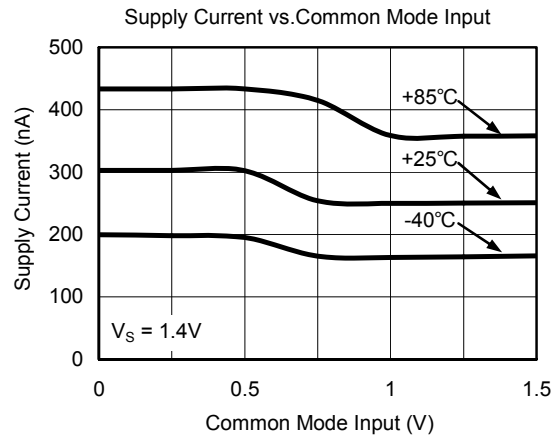
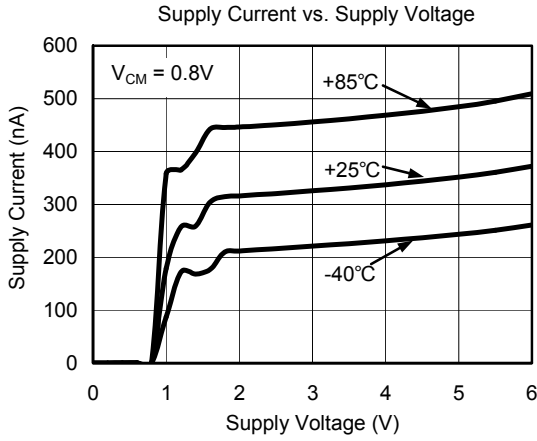
ELECTRICAL CHARACTERISTICS: $V_S = 5.0V$ (At $T_A = 25^\circ C$, $+V_S = 5.0V$, $-V_S = 0V$, $V_{CM} = +V_S/2$, $V_O = +V_S$ and $R_L = 1k\Omega$, unless otherwise noted.)

| 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 | | $\mu V/^\circ C$ |
| 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 | $V_S = 1.8V$ to $5.5V$, $V_{CM} = 0V$ | 66 | 95 | | dB |
| Large Signal Voltage Gain | A_{VO} | | | 105 | | dB |
| Output Swing High | V_{OH} | $I_O = 500\mu A$ | 4.889 | 4.951 | | V |
| | | $-40^\circ C \leq T_A \leq +85^\circ C$ | 4.883 | | | |
| | | $I_O = 1mA$ | 4.861 | 4.902 | | |
| | | $-40^\circ C \leq T_A \leq +85^\circ C$ | 4.845 | | | |
| Output Current | I_{OUT} | Source | 14 | 18 | | mA |
| | | $-40^\circ C \leq T_A \leq +85^\circ C$ | 12.1 | | | |
| Leakage Current | $I_{Leakage}$ | $V_O = 0V$ | | 5 | | nA |
| 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, $C_L = 30pF$, $R_L = 1M\Omega$ | | 85 | | ns |
| | | Overdrive = 100mV, $C_L = 30pF$, $R_L = 1M\Omega$ | | 85 | | |

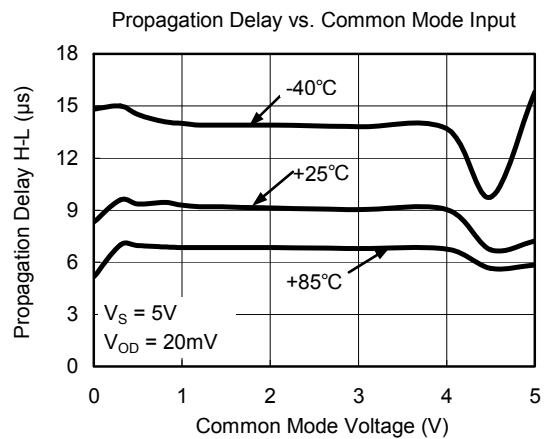
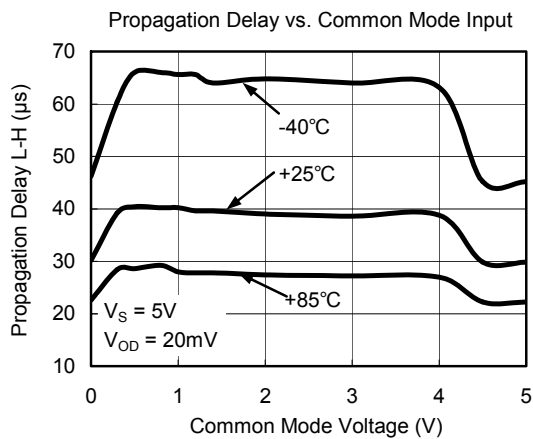
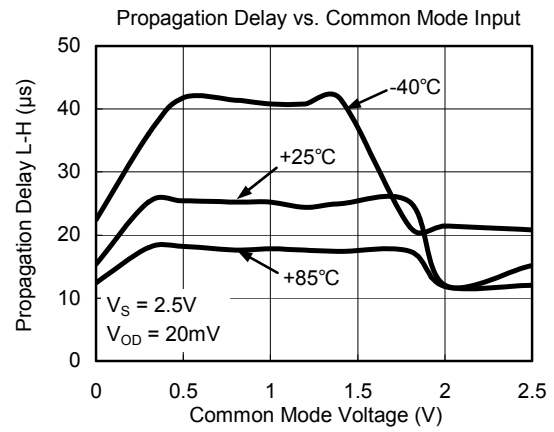
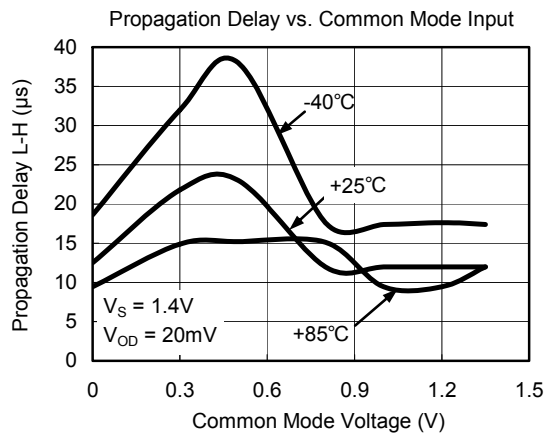
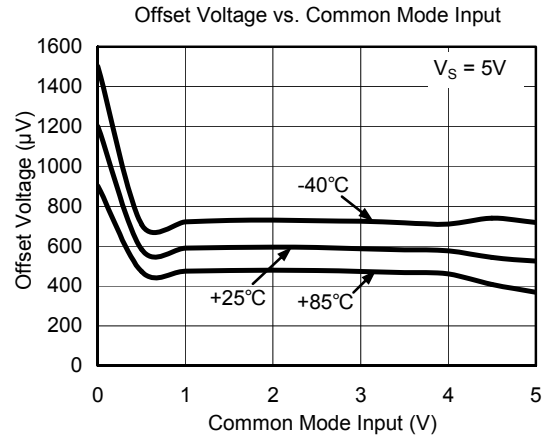
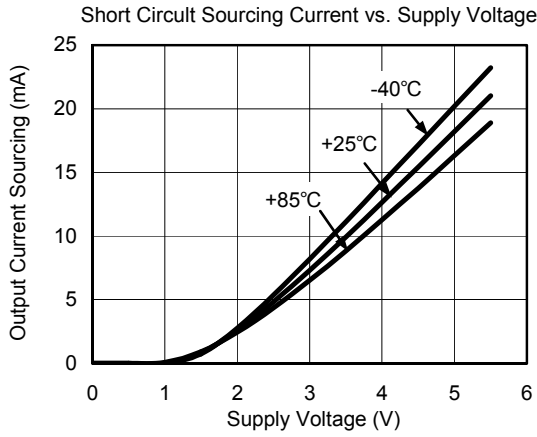
SIMPLIFIED SCHEMATIC DIAGRAM



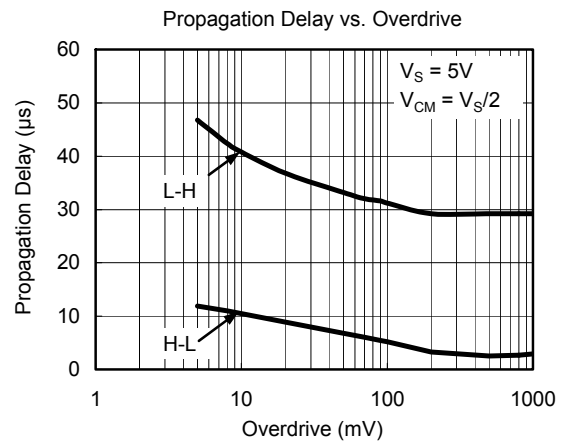
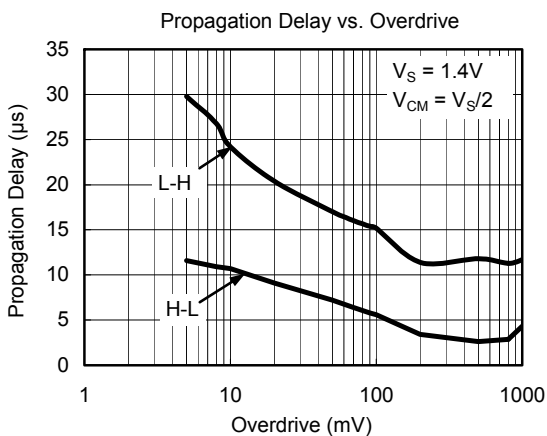
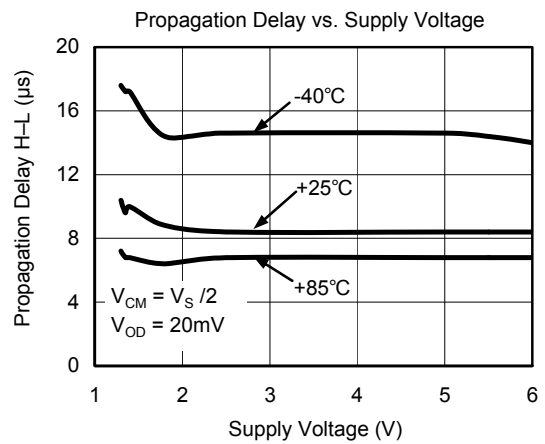
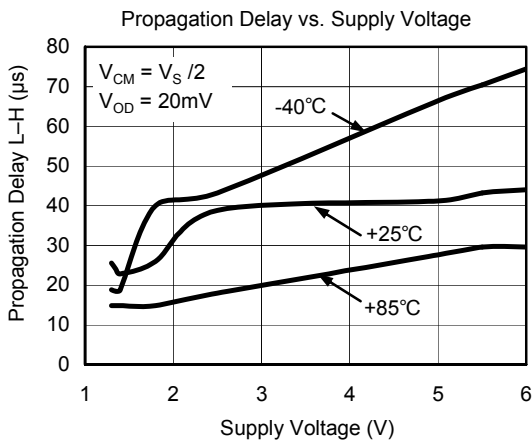
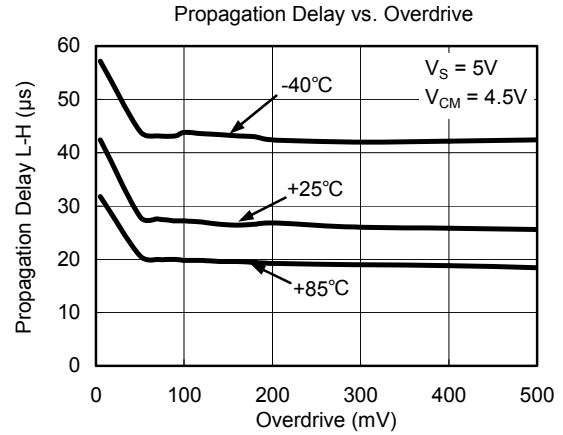
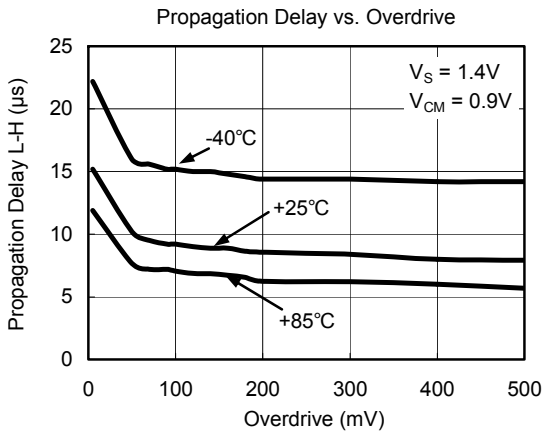
TYPICAL PERFORMANCE CHARACTERISTICS



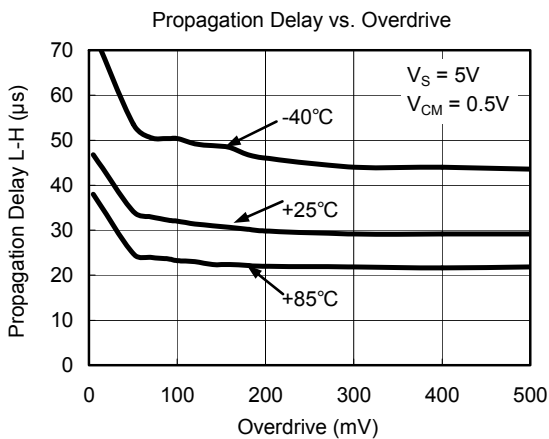
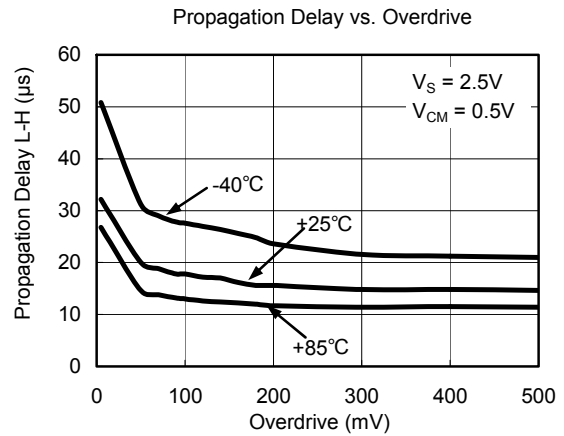
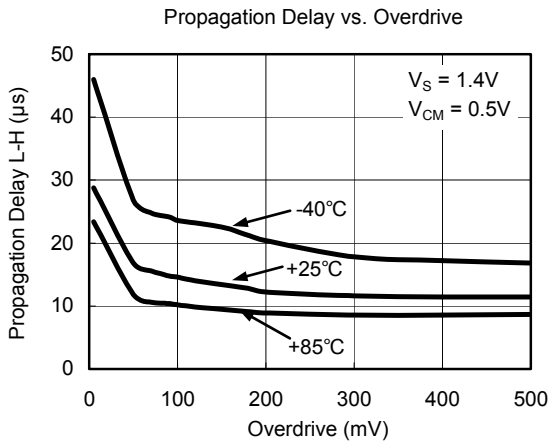
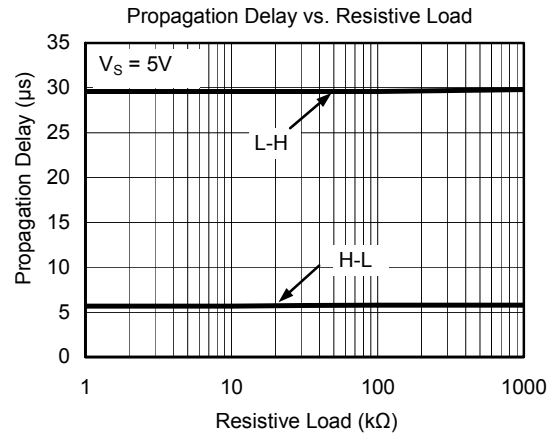
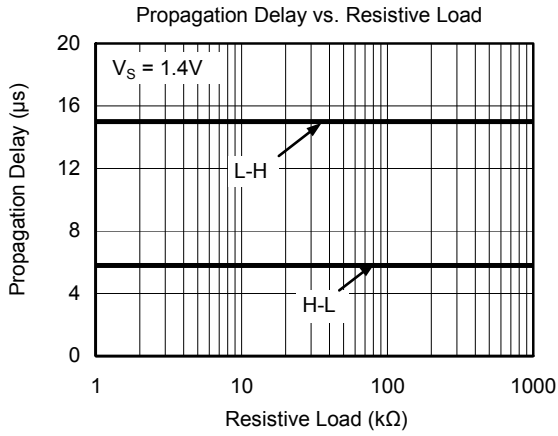
TYPICAL PERFORMANCE CHARACTERISTICS



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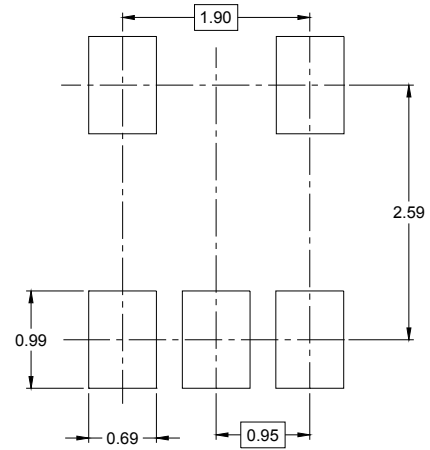
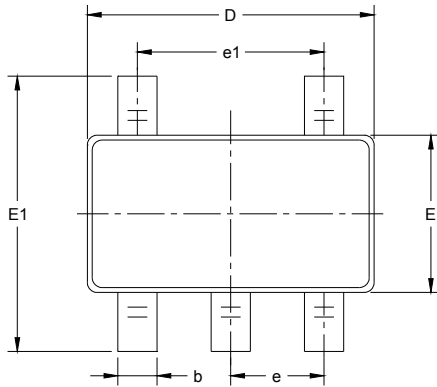


TYPICAL PERFORMANCE CHARACTERISTICS

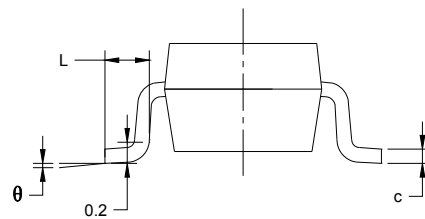
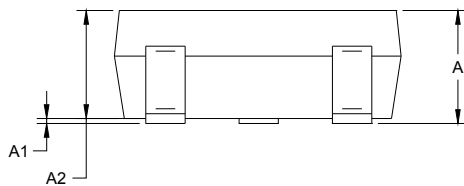


PACKAGE OUTLINE DIMENSIONS

SOT-23-5



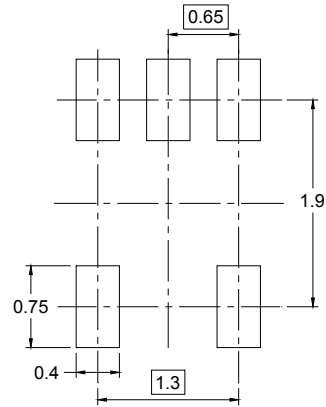
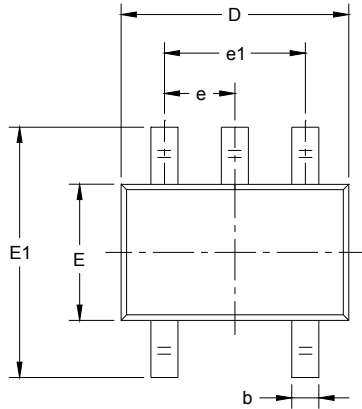
RECOMMENDED LAND PATTERN (Unit: mm)



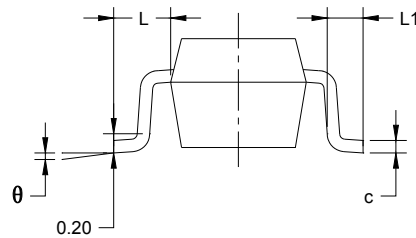
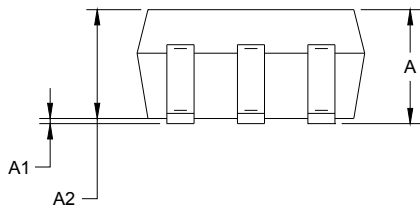
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 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 |
| theta | 0° | 8° | 0° | 8° |

PACKAGE OUTLINE DIMENSIONS

SC70-5



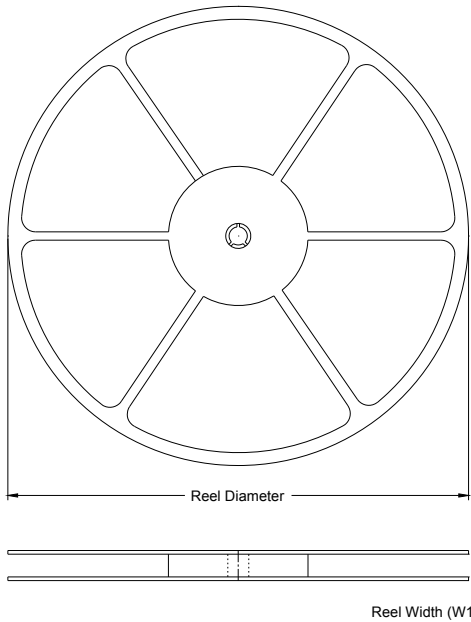
RECOMMENDED LAND PATTERN (Unit: mm)



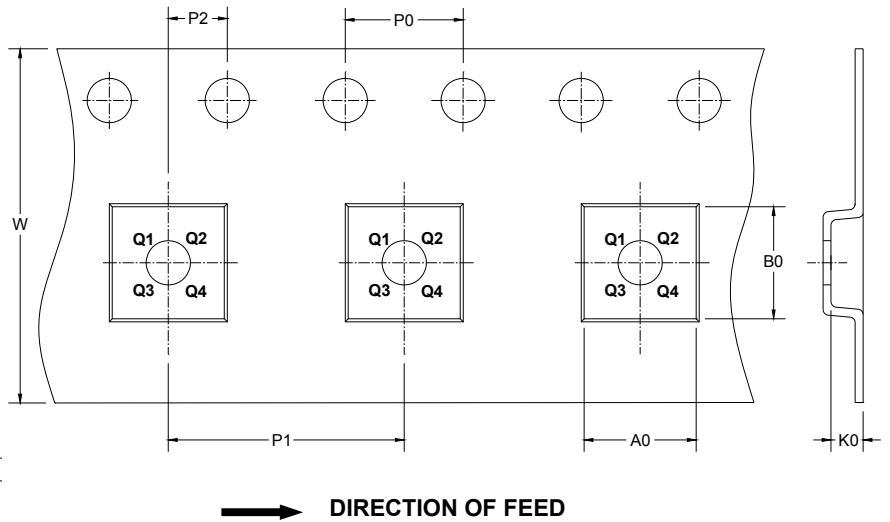
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.900 | 1.100 | 0.035 | 0.043 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.000 | 0.035 | 0.039 |
| b | 0.150 | 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 |
| 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.

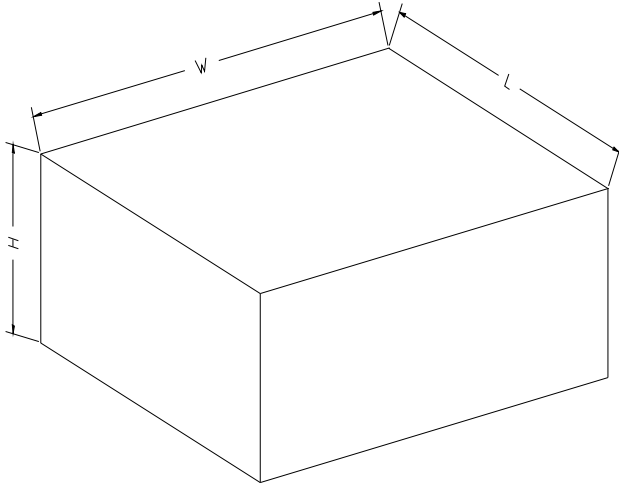
KEY PARAMETER LIST OF TAPE AND REEL

| 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 |

SGM8702

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

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 |