



**SGM8711**

# **1.8V, Micro-Power, Rail-to-Rail I/O, Small Package, Push-Pull Output Comparator with Integrated Voltage Reference**

## **GENERAL DESCRIPTION**

The SGM8711 is a low power comparator with an uncommitted on-chip voltage reference, which consumes only  $2.2\mu\text{A}$  (TYP) supply current at 1.8V. The device can operate from 1.8V to 5.5V single supply, and is guaranteed to operate at 1.8V and 5V. The input common mode voltage range of comparator is 200mV beyond the supply rails. The above features make the SGM8711 a good choice for battery-powered applications.

The SGM8711 integrates a 1.2V series voltage reference. The voltage reference features a  $42\mu\text{V}/^\circ\text{C}$  low drift. It is designed for driving the  $10\text{nF}$  capacitive load with stable, and sourcing an output current up to  $2\text{mA}$  (TYP).

The SGM8711 has a push-pull output structure. It is capable of sinking and sourcing current when driving loads.

In addition, the SGM8711 fits in a small package, so it is also suitable for mobile phone and handheld electronic devices.

The SGM8711 is available in a Green UTDFN- $1.6\times1.6$ -6L package. It is rated over the  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$  temperature range.

## **FEATURES**

- Low Supply Current:  $2.2\mu\text{A}$  (TYP) at  $V_s = 1.8\text{V}$
- Supply Voltage Range: 1.8V to 5.5V
- Push-Pull Output
- Output Drive Capability:  $18\text{mA}$  (TYP) at  $V_s = 5\text{V}$
- Rail-to-Rail Input and Output
- Internal Voltage Reference: 1.2V
- $-40^\circ\text{C}$  to  $+85^\circ\text{C}$  Operating Temperature Range
- Available in a Green UTDFN- $1.6\times1.6$ -6L Package

## **APPLICATIONS**

Infrared Receivers  
Window Detectors  
RC Timers  
Monitoring and Alarm Systems

# 1.8V, Micro-Power, RRIO, Small Package, Push-Pull Output Comparator with Integrated Voltage Reference

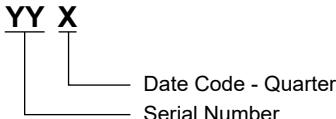
## SGM8711

## PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8711	UTDFN-1.6x1.6-6L	-40°C to +85°C	SGM8711YUDN6G/TR	TFX	Tape and Reel, 3000

## MARKING INFORMATION

NOTE: X = Date Code.



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, +Vs to -Vs	.....	6V
V <sub>IN</sub> Differential	.....	±(+Vs - (-Vs))
Voltage at Input/Output Pins	.....	(-Vs) - 0.3V to (+Vs) + 0.3V
Junction Temperature	.....	+150°C
Storage Temperature Range	.....	-65°C to +150°C
Lead Temperature (Soldering, 10s)	.....	+260°C
ESD Susceptibility		
HBM	.....	4000V
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

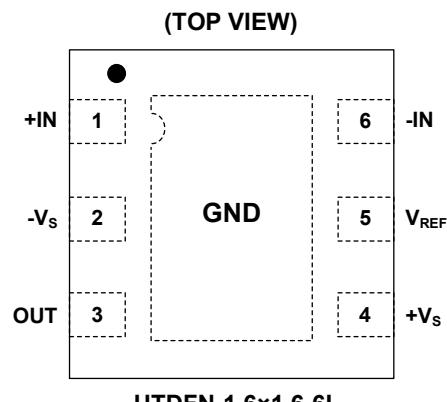
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures

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



**1.8V, Micro-Power, RRIO, Small Package, Push-Pull Output  
Comparator with Integrated Voltage Reference**  
**SGM8711**

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## ELECTRICAL CHARACTERISTICS

(At  $T_A = +25^\circ\text{C}$ ,  $+V_S = 1.8\text{V}$ ,  $-V_S = 0\text{V}$ ,  $V_{CM} = +V_S/2$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	$I_S$	$I_{OUT} = 0\text{A}$		2.2	4.1	$\mu\text{A}$
Input Offset Voltage	$V_{OS}$	$V_{CM} = 0\text{V}$		0.5	3.3	$\text{mV}$
		$V_{CM} = 1.8\text{V}$		0.5	3.3	
Input Offset Average Drift				2		$\mu\text{V}/^\circ\text{C}$
Common Mode Rejection Ratio	$CMRR$	$V_{CM} = 0\text{V}$ to $1.8\text{V}$	55	68		$\text{dB}$
Power Supply Rejection Ratio	$PSRR$	$V_S = 1.8\text{V}$ to $5.5\text{V}$ , $V_{CM} = 0\text{V}$	74	102		$\text{dB}$
Power Supply Ramp-Up Rate <sup>(1)</sup>			5			$\text{V/s}$
Large-Signal Voltage Gain	$A_{VO}$			100		$\text{dB}$
Output Swing High	$V_{OH}$	$I_{OUT} = 500\mu\text{A}$	1.617	1.675		$\text{V}$
		$I_{OUT} = 500\mu\text{A}$ , $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	1.572			
		$I_{OUT} = 1\text{mA}$	1.412	1.525		
		$I_{OUT} = 1\text{mA}$ , $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	1.330			
Output Swing Low	$V_{OL}$	$I_{OUT} = -500\mu\text{A}$		84	124	$\text{mV}$
		$I_{OUT} = -500\mu\text{A}$ , $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$			163	
		$I_{OUT} = -1\text{mA}$		173	249	
		$I_{OUT} = -1\text{mA}$ , $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$			347	
Output Current	$I_{OUT}$	Source	1.15	2		$\text{mA}$
		Source, $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	1.0			
		Sink		-3.5	-2.0	
		Sink, $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$			-1.4	
Propagation Delay (High to Low)		Overdrive = 10mV		11.7		$\mu\text{s}$
		Overdrive = 100mV		5.6		
Propagation Delay (Low to High)		Overdrive = 10mV		24.2		$\mu\text{s}$
		Overdrive = 100mV		14.7		
Rise Time	$t_{RISE}$	Overdrive = 10mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		168		$\text{ns}$
		Overdrive = 100mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		174		
Fall Time	$t_{FALL}$	Overdrive = 10mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		75		$\text{ns}$
		Overdrive = 100mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		50		
Noise of $V_{REF}$		$f = 0.1\text{Hz}$ to $10\text{Hz}$		0.3		$\text{mV}_{\text{P-P}}$
<b>Voltage Reference</b>						
Reference Voltage	$V_{REF}$	$I_{REF} = 0\text{mA}$	1.182	1.200	1.218	$\text{V}$
Reference Voltage Drift				42		$\mu\text{V}/^\circ\text{C}$
Reference Output Current (Source)				2		$\text{mA}$

**1.8V, Micro-Power, RRIO, Small Package, Push-Pull Output  
Comparator with Integrated Voltage Reference**  
**SGM8711**

**ELECTRICAL CHARACTERISTICS (continued)**

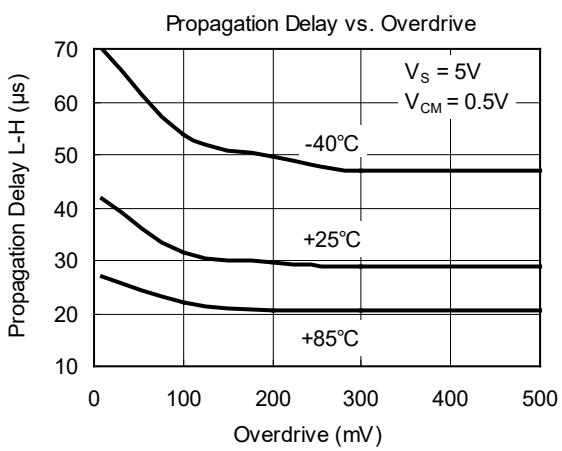
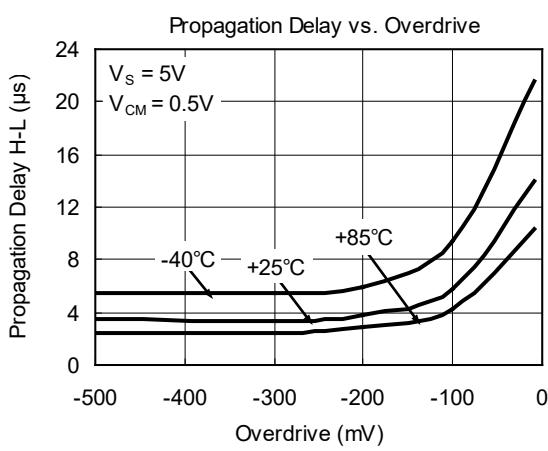
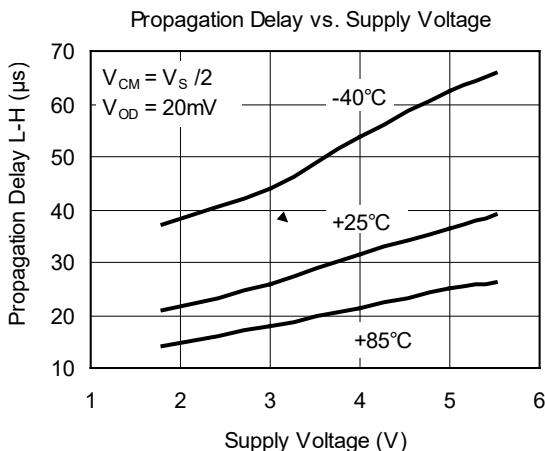
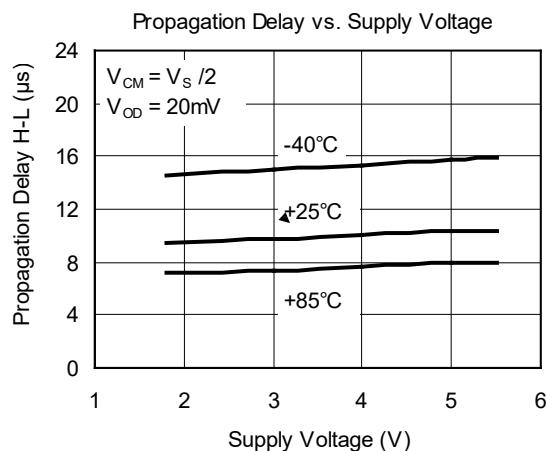
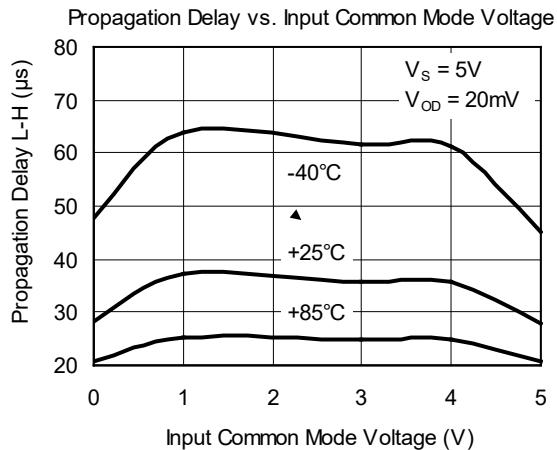
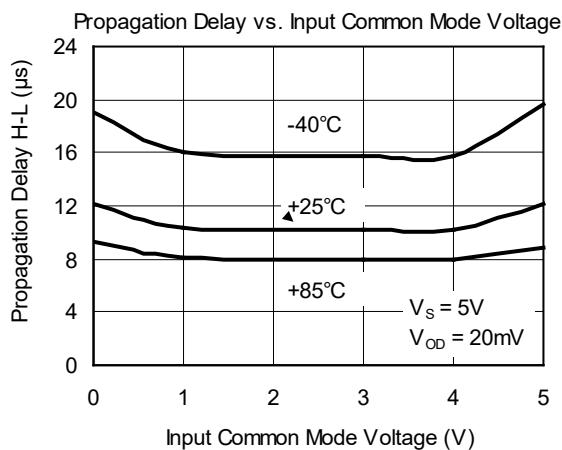
(At  $T_A = +25^\circ\text{C}$ ,  $+V_S = 5\text{V}$ ,  $-V_S = 0\text{V}$ ,  $V_{CM} = +V_S/2$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	$I_S$	$I_{OUT} = 0\text{A}$		2.3	4.4	$\mu\text{A}$
Input Offset Voltage	$V_{OS}$	$V_{CM} = 0\text{V}$		0.5	3.3	$\text{mV}$
		$V_{CM} = 5\text{V}$		0.5	3.3	
Input Offset Average Drift				2		$\mu\text{V}/^\circ\text{C}$
Common Mode Rejection Ratio	$CMRR$	$V_{CM} = 0\text{V}$ to $5\text{V}$	63	76		$\text{dB}$
Power Supply Rejection Ratio	$PSRR$	$V_S = 1.8\text{V}$ to $5.5\text{V}$ , $V_{CM} = 0\text{V}$	74	102		$\text{dB}$
Power Supply Ramp-Up Rate <sup>(1)</sup>			5			$\text{V/s}$
Large-Signal Voltage Gain	$A_{VO}$			110		$\text{dB}$
Output Swing High	$V_{OH}$	$I_{OUT} = 500\mu\text{A}$	4.935	4.952		$\text{V}$
		$I_{OUT} = 500\mu\text{A}$ , $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	4.926			
		$I_{OUT} = 1\text{mA}$	4.874	4.904		
		$I_{OUT} = 1\text{mA}$ , $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	4.855			
Output Swing Low	$V_{OL}$	$I_{OUT} = -500\mu\text{A}$		54	72	$\text{mV}$
		$I_{OUT} = -500\mu\text{A}$ , $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$			79	
		$I_{OUT} = -1\text{mA}$		106	140	
		$I_{OUT} = -1\text{mA}$ , $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$			154	
Output Current	$I_{OUT}$	Source	14.0	18		$\text{mA}$
		Source, $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	10.5			
		Sink		-18	-15.5	
		Sink, $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$			-12.5	
Propagation Delay (High to Low)		Overdrive = 10mV		12.7		$\mu\text{s}$
		Overdrive = 100mV		5.6		
Propagation Delay (Low to High)		Overdrive = 10mV		38.1		$\mu\text{s}$
		Overdrive = 100mV		29.5		
Rise Time	$t_{RISE}$	Overdrive = 10mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		39		$\text{ns}$
		Overdrive = 100mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		40		
Fall Time	$t_{FALL}$	Overdrive = 10mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		33		$\text{ns}$
		Overdrive = 100mV, $C_L = 30\text{pF}$ , $R_L = 1\text{M}\Omega$		30		
Noise of $V_{REF}$		$f = 0.1\text{Hz}$ to $10\text{Hz}$		0.32		$\text{mV}_{\text{P-P}}$
<b>Voltage Reference</b>						
Reference Voltage	$V_{REF}$	$I_{REF} = 0\text{mA}$	1.182	1.200	1.218	$\text{V}$
Reference Voltage Drift				41		$\mu\text{V}/^\circ\text{C}$
Reference Output Current (Source)				2		$\text{mA}$

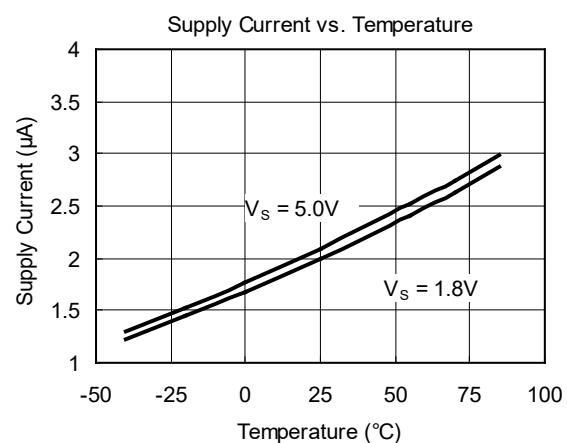
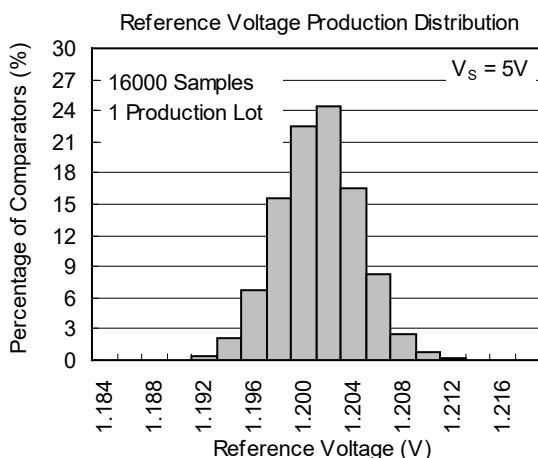
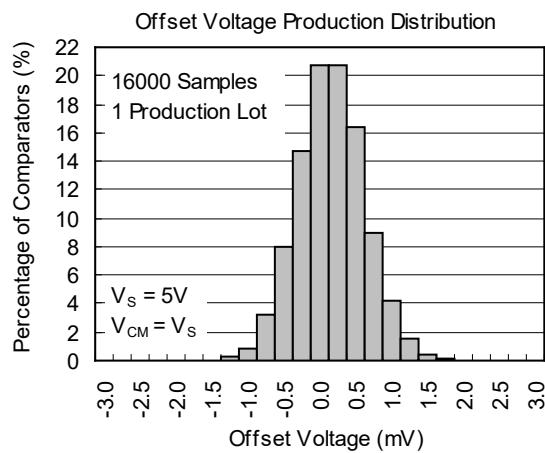
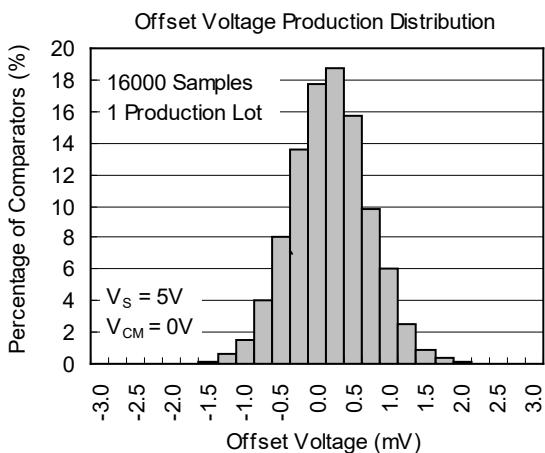
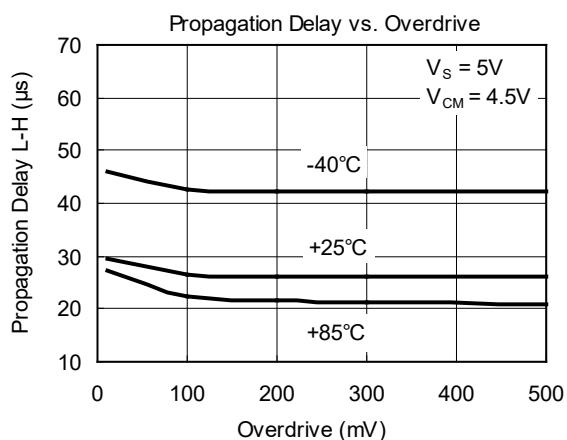
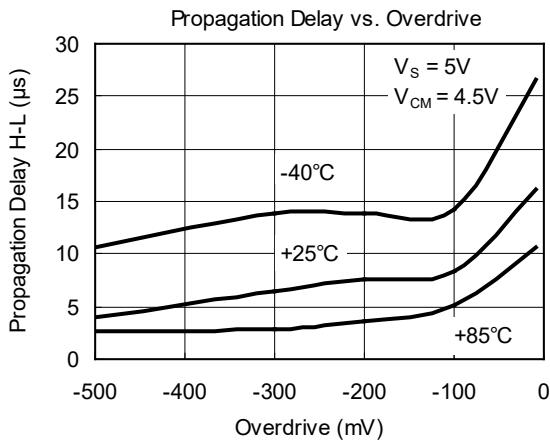
NOTE:

- If the ramp-up rate of the power supply is less than 5V/s, the start-up of the voltage reference output cannot be guaranteed.

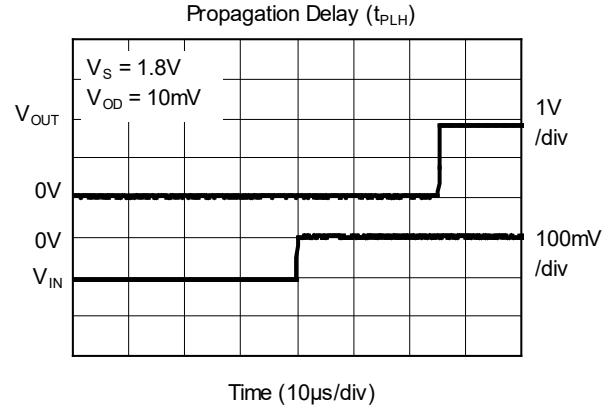
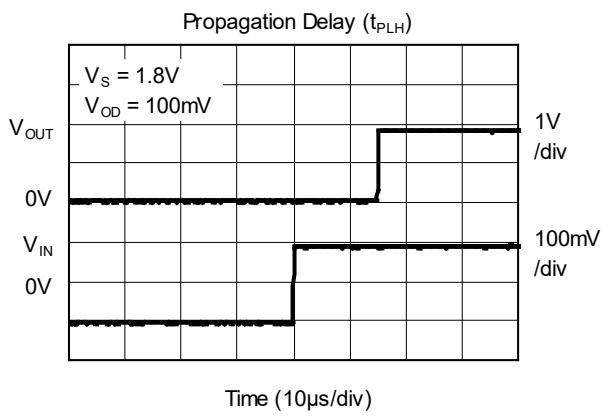
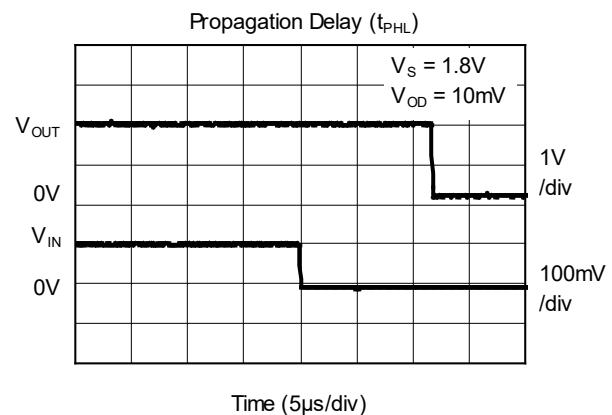
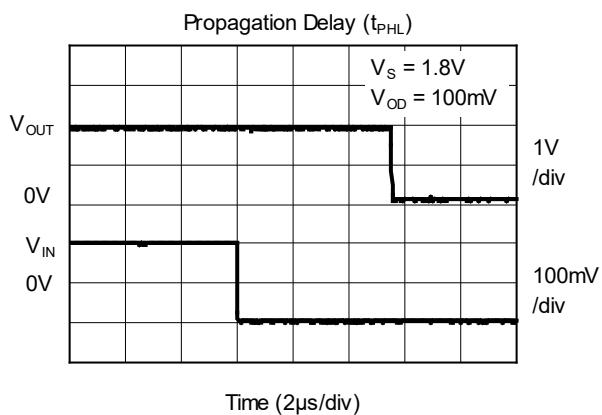
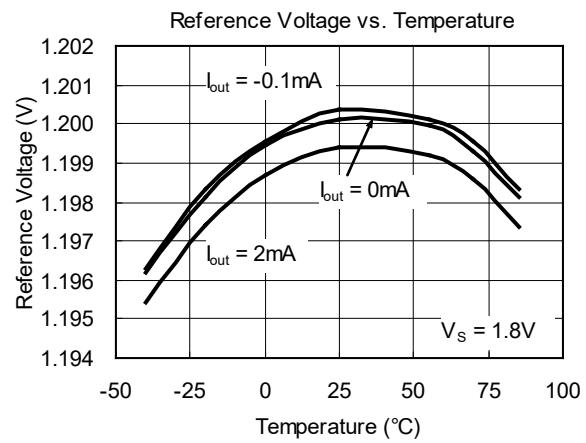
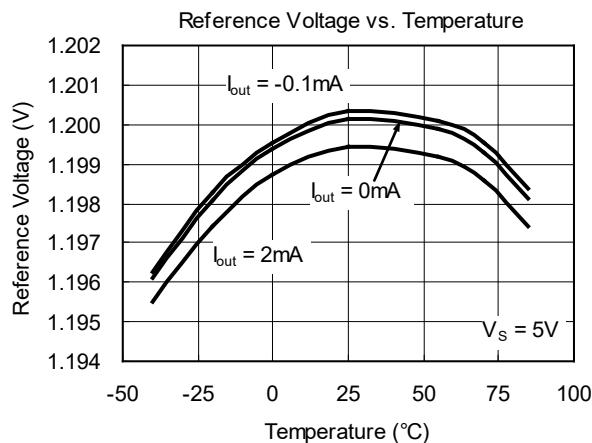
## TYPICAL PERFORMANCE CHARACTERISTICS

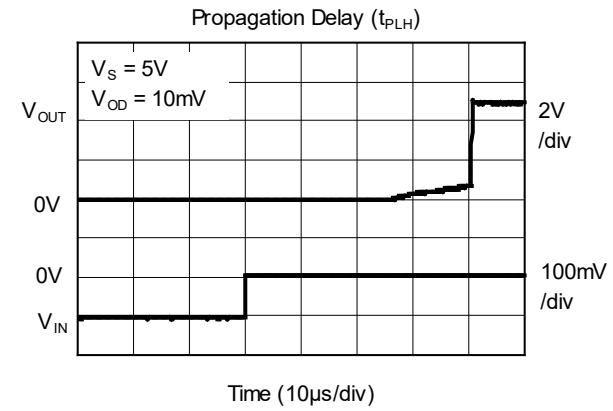
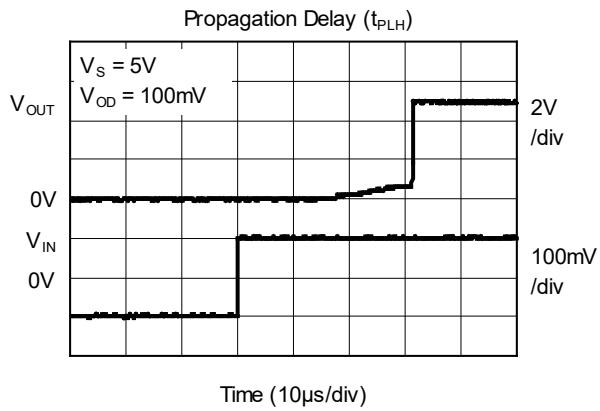
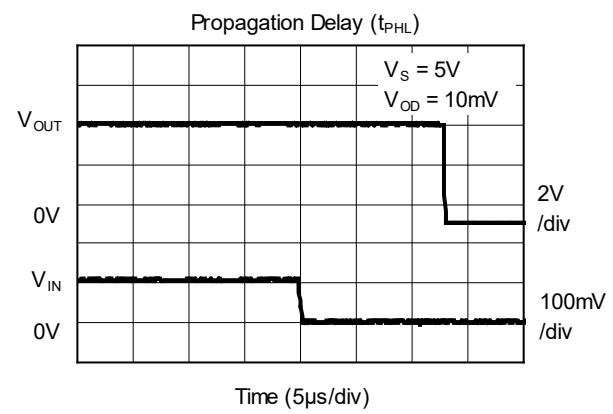
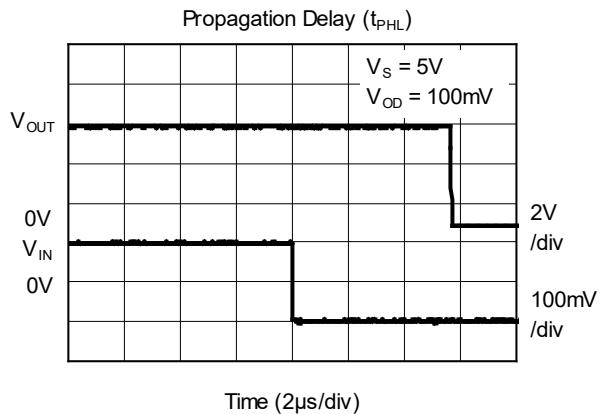


## TYPICAL PERFORMANCE CHARACTERISTICS (continued)



## TYPICAL PERFORMANCE CHARACTERISTICS (continued)



**TYPICAL PERFORMANCE CHARACTERISTICS (continued)**

**REVISION HISTORY**

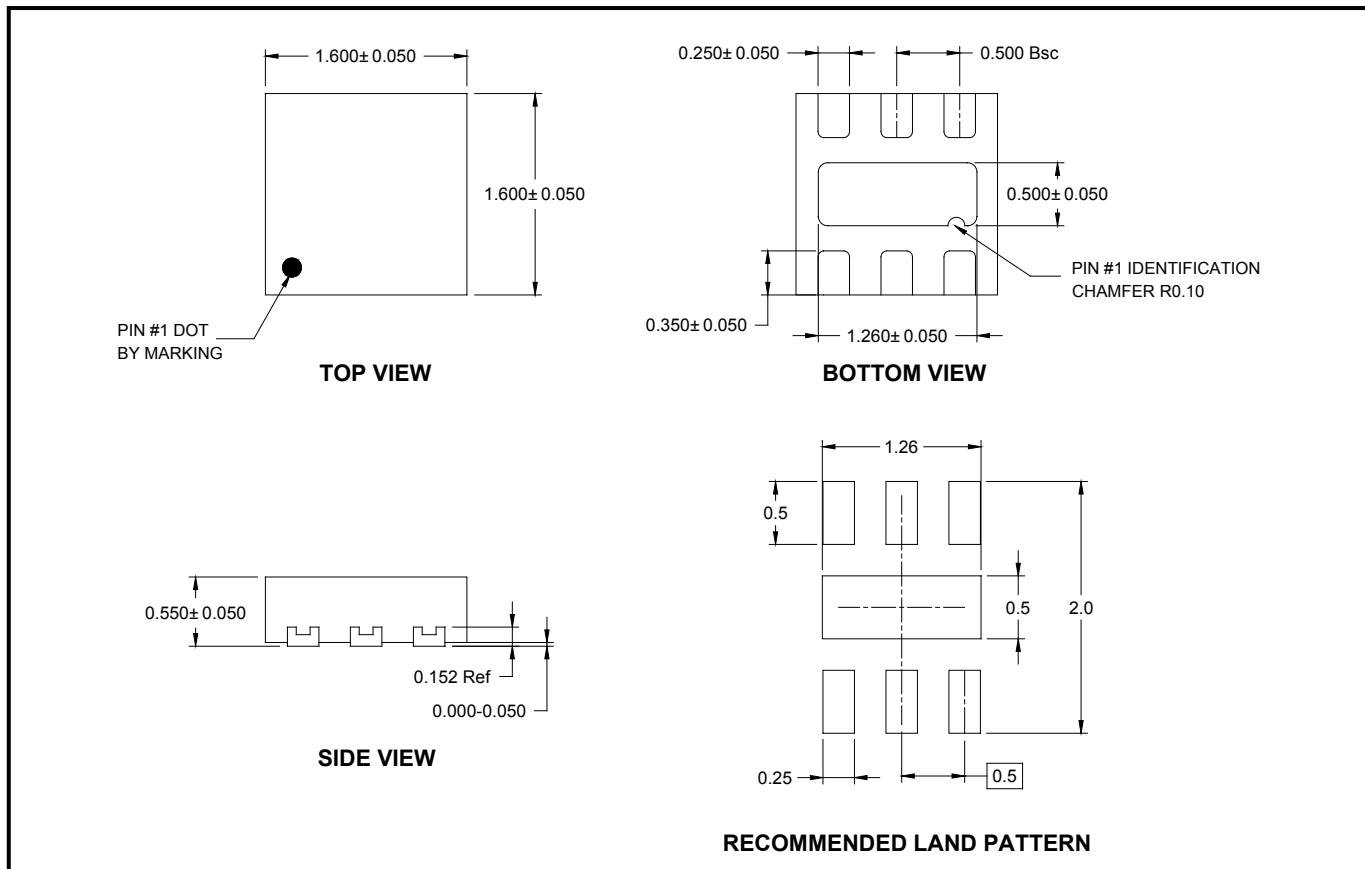
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

<b>Changes from Original (AUGUST 2014) to REV.A</b>	<b>Page</b>
Changed from product preview to production data.....	All

## PACKAGE INFORMATION

### PACKAGE OUTLINE DIMENSIONS

#### UTDFN-1.6x1.6-6L

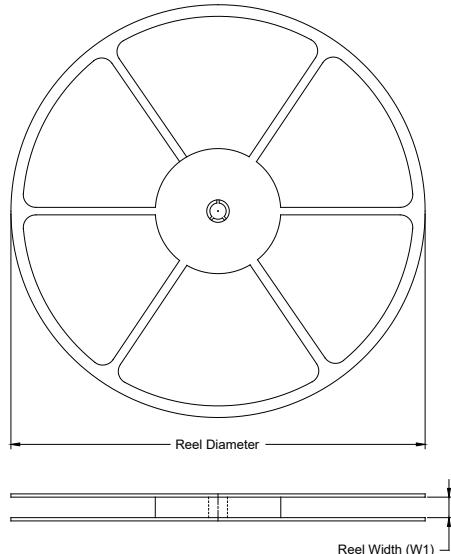


NOTE: All linear dimensions are in millimeters.

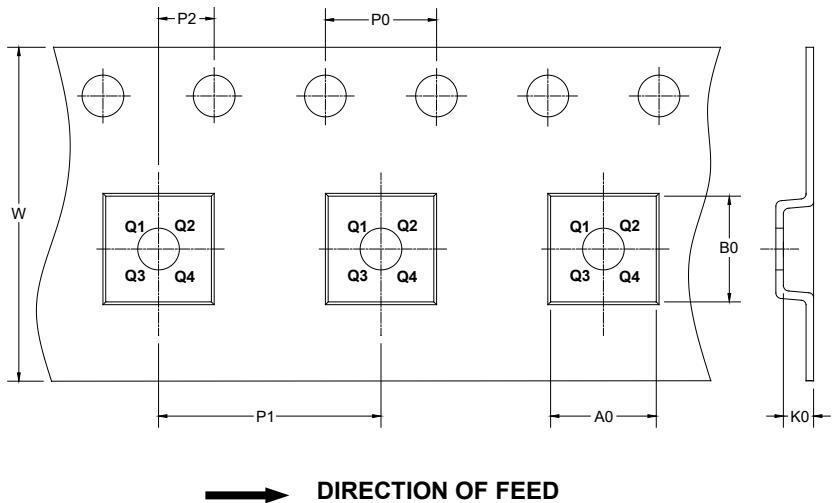
# PACKAGE INFORMATION

## 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
UTDFN-1.6×1.6-6L	7"	9.0	1.78	1.78	0.69	4.0	4.0	2.0	8.0	Q1

DD0001

## 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