

### GENERAL DESCRIPTION

The SGM856xQ is a high-precision voltage supervisor with  $\pm 1.2\%$  accuracy over the operating temperature range. It only consumes 750nA (TYP) quiescent current and provides a timeout watchdog with fixed timeout period.

The SGM856xQ gives four available watchdog timeout period options, which are preset as a default value and can be configured by the users for setting different multiples of the default value by SET0/SET1. The watchdog function can be enabled or disabled by the WD\_EN pin.

The output asserted times for nRESET or nWDO are all preset. The SGM856xxD-xQ is a unique device that latches the output until an effective watchdog input is detected.

The device is AEC-Q100 qualified (Automotive Electronics Council (AEC) standard Q100 Grade 1) and it is suitable for automotive applications.

The SGM856xQ is available in a Green TSOT-23-8 package.

### TYPICAL APPLICATION

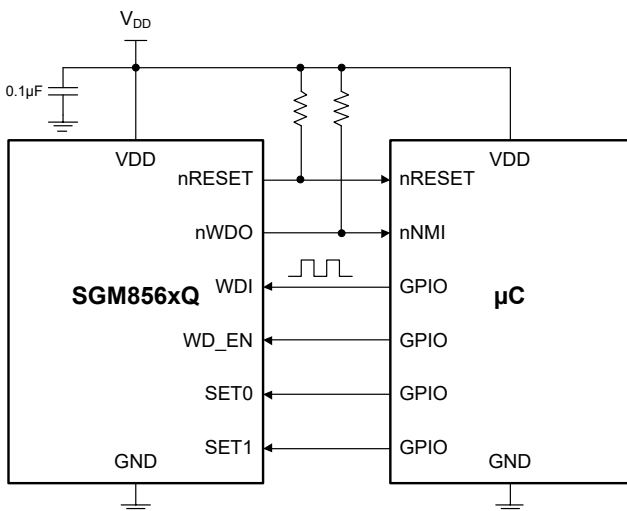


Figure 1. Typical Application Circuit

### FEATURES

- **AEC-Q100 Qualified for Automotive Applications**
  - ◆ Device Temperature Grade 1
  - ◆ T<sub>A</sub> = -40°C to +125°C
- **Factory-Programmed Watchdog Timeout**
  - ◆ Factory-Programmed Options: 70ms, 1.12s, 4.48s, 17.92s
- **Factory-Programmed Reset Delay with Scaling**
  - ◆ Factory-Programmed Options: 11.2ms, 44.8ms, 179.2ms, Latched (t<sub>D</sub> = 2.8ms)
- **Supply Voltage Range: 1.6V to 6.5V**
- **Fixed Threshold Voltage: 2.3V, 3.0V, 4.6V**
  - ◆  $\pm 1.2\%$  (MAX) Voltage Threshold Accuracy
  - ◆ Built-in Hysteresis: 2.1% (TYP)
- **Ultra-Low Supply Current: 750nA (TYP)**
- **Active-Low Open-Drain Outputs**
- **Various Programmability Options:**
  - ◆ Watchdog Enable
  - ◆ On-the-Fly Timer Extension: 1X to 128X
  - ◆ Latched Output Option
- **Available in a Green TSOT-23-8 Package**

### APPLICATIONS

- Driver Monitoring
- On-Board and Wireless Charger (OBC)
- Front Camera
- Battery Management System (BMS)
- Surround View System ECU

# Nano I<sub>Q</sub> Precision Voltage Supervisor with Precision SGM856xQ Timeout Watchdog Timer for Automotive Applications

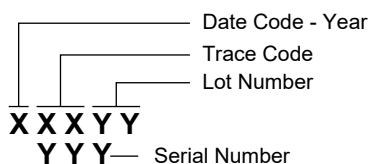
## PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE TOP MARKING	PACKING OPTION
SGM856AAB-2.3Q	TSOT-23-8	-40°C to +125°C	SGM856AAB-2.3QTN8G/TR	XXXYY 35Q	Tape and Reel, 3000
SGM856AAB-3.0Q	TSOT-23-8	-40°C to +125°C	SGM856AAB-3.0QTN8G/TR	XXXYY 2YO	Tape and Reel, 3000
SGM856AAB-4.6Q	TSOT-23-8	-40°C to +125°C	SGM856AAB-4.6QTN8G/TR	XXXYY 35R	Tape and Reel, 3000
SGM856AAD-2.3Q	TSOT-23-8	-40°C to +125°C	SGM856AAD-2.3QTN8G/TR	XXXYY 35S	Tape and Reel, 3000
SGM856AAD-3.0Q	TSOT-23-8	-40°C to +125°C	SGM856AAD-3.0QTN8G/TR	XXXYY 2YU	Tape and Reel, 3000
SGM856AAD-4.6Q	TSOT-23-8	-40°C to +125°C	SGM856AAD-4.6QTN8G/TR	XXXYY 35T	Tape and Reel, 3000
SGM856BAA-3.0Q	TSOT-23-8	-40°C to +125°C	SGM856BAA-3.0QTN8G/TR	XXXYY 300	Tape and Reel, 3000
SGM856BAB-2.3Q	TSOT-23-8	-40°C to +125°C	SGM856BAB-2.3QTN8G/TR	XXXYY 2YQ	Tape and Reel, 3000
SGM856BAB-3.0Q	TSOT-23-8	-40°C to +125°C	SGM856BAB-3.0QTN8G/TR	XXXYY 2YR	Tape and Reel, 3000
SGM856BAB-4.6Q	TSOT-23-8	-40°C to +125°C	SGM856BAB-4.6QTN8G/TR	XXXYY 2YS	Tape and Reel, 3000
SGM856BAD-2.3Q	TSOT-23-8	-40°C to +125°C	SGM856BAD-2.3QTN8G/TR	XXXYY 24H	Tape and Reel, 3000
SGM856BAD-3.0Q	TSOT-23-8	-40°C to +125°C	SGM856BAD-3.0QTN8G/TR	XXXYY 2YW	Tape and Reel, 3000
SGM856BAD-4.6Q	TSOT-23-8	-40°C to +125°C	SGM856BAD-4.6QTN8G/TR	XXXYY 2YX	Tape and Reel, 3000
SGM856CAA-3.0Q	TSOT-23-8	-40°C to +125°C	SGM856CAA-3.0TN8G/TR	XXXYY 301	Tape and Reel, 3000
SGM856CAB-3.0Q	TSOT-23-8	-40°C to +125°C	SGM856CAB-3.0QTN8G/TR	XXXYY 2YZ	Tape and Reel, 3000
SGM856CAD-3.0Q	TSOT-23-8	-40°C to +125°C	SGM856CAD-3.0QTN8G/TR	XXXYY 2Z1	Tape and Reel, 3000

NOTE: For more models not listed above, please contact your local SGMICRO sales representatives.

### MARKING INFORMATION

NOTE: XXX = Date Code and Trace Code.

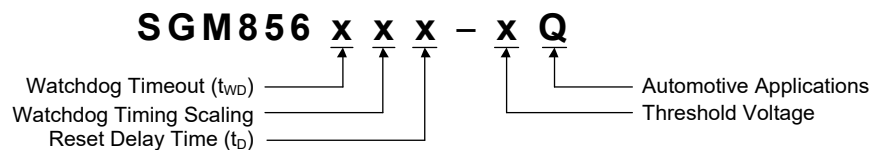


Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

# Nano I<sub>Q</sub> Precision Voltage Supervisor with Precision SGM856xQ Timeout Watchdog Timer for Automotive Applications

## PACKAGE/ORDERING INFORMATION (continued)

### Device Naming Convention



**Table 1. Device Naming Convention**

DESCRIPTION	NOMENCLATURE	VALUE
Watchdog Timeout ( $t_{WD}$ )	A	70ms
	B	1.12s
	C	4.48s
	D	17.92s
Watchdog Timing Scaling	A	1, 2, 4
	B	1, 8, 16
	C	1, 32, 64
	D	1, 64, 128
Reset Delay Time ( $t_D$ )	A	11.2ms
	B	44.8ms
	C	179.2ms
	D	Latched Output
Threshold Voltage	2.3	2.3V
	3.0	3.0V
	4.6	4.6V

# SGM856xQ Nano I<sub>Q</sub> Precision Voltage Supervisor with Precision Timeout Watchdog Timer for Automotive Applications

## ABSOLUTE MAXIMUM RATINGS

VDD Voltage	-0.3V to 7V
WD_EN, SETx, WDI	-0.3V to 7V
nRESET, nWDO Voltage	-0.3V to 7V
nRESET, nWDO Current	-20mA to 20mA
Package Thermal Resistance	
TSOT-23-8, $\theta_{JA}$	135.4°C/W
TSOT-23-8, $\theta_{JB}$	54.3°C/W
TSOT-23-8, $\theta_{JC}$	95.6°C/W
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility <sup>(1)(2)</sup>	
HBM	±4000V
CDM	±1000V

### NOTES:

1. For human body model (HBM), all pins comply with AEC-Q100-002 specification.
2. For charged device model (CDM), all pins comply with AEC-Q100-011 specification.

## RECOMMENDED OPERATING CONDITIONS

VDD Voltage	1.6V to 6.5V
WD_EN, SETx, WDI	0V to V <sub>DD</sub>
nRESET, nWDO Voltage	0V to 6.5V
nRESET, nWDO Current	-5mA to 5mA
Operating Ambient Temperature Range	-40°C to +125°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

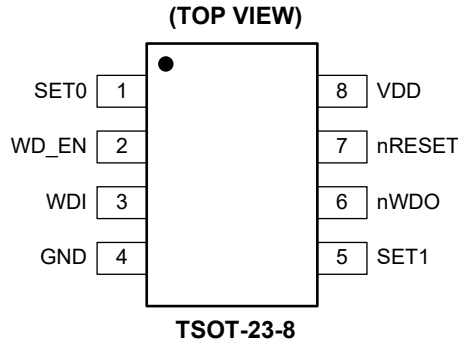
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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

# Nano I<sub>Q</sub> Precision Voltage Supervisor with Precision SGM856xQ Timeout Watchdog Timer for Automotive Applications

## PIN CONFIGURATION



## PIN DESCRIPTION

PIN	NAME	TYPE	FUNCTION
TSOT-23-8			
1	SET0	I	Logic Input. SET0, along with SET1, determines the watchdog timeout ratio. Do not leave it floating. The device has two SET pins, only the WD_EN can be used to disable the watchdog, while SET[1:0] = 00 or 01 means watchdog timing scaling coefficient is 1.
2	WD_EN	I	Watchdog Enable Input. Logic high input enables the watchdog and logic low disables the watchdog. Do not leave it floating.
3	WDI	I	Watchdog Input. The watchdog timer is cleared every time a falling edge is detected at this pin. Do not leave it floating.
4	GND	G	Ground Pin.
5	SET1	I	Logic Input. SET1, along with SET0, determines the watchdog timeout ratio. Do not leave it floating. The device has two SET pins, only the WD_EN can be used to disable the watchdog, while SET[1:0] = 00 or 01 means watchdog timing scaling coefficient is 1.
6	nWDO	O	Watchdog Output. It is recommended to place a 100kΩ resistor to pull up this pin. The nWDO pin is asserted low for a duration of nRESET timeout delay (t <sub>0</sub> ) under watchdog timeout errors. The watchdog functionality is disabled when the nRESET pin is logic low.
7	nRESET	O	Reset Output. It is recommended to place a 100kΩ resistor to pull up this pin. This pin is asserted low once VDD is below under-voltage threshold (V <sub>IT</sub> ).
8	VDD	I	Supply Voltage Pin. For noisy systems, it is advised to place a 0.1μF ceramic capacitor between the VDD pin and GND.

NOTE: I = input, O = output, G = ground.

# Nano I<sub>Q</sub> Precision Voltage Supervisor with Precision SGM856xQ Timeout Watchdog Timer for Automotive Applications

## ELECTRICAL CHARACTERISTICS

(V<sub>DD</sub> = 1.6V to 6.5V, R<sub>nRESET</sub> = 100kΩ to V<sub>DD</sub>, R<sub>nWDO</sub> = 100kΩ to V<sub>DD</sub>, nRESET/nWDO load C<sub>LOAD</sub> = 10pF, V<sub>DD</sub> ramp rate ≤ 1V/μs, T<sub>A</sub> = -40°C to +125°C, typical values are measured at T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>Common Parameters</b>						
Input Supply Voltage	V <sub>DD</sub>		1.6		6.5	V
Negative-Going Input Threshold Accuracy	V <sub>IT-</sub>	V <sub>IT-</sub> = 2.3V, 3.0V, 4.6V	-1.2	±0.5	1.2	%
Hysteresis	V <sub>HYS</sub>		1	2.1	4	%
Supply Current into VDD Pin	I <sub>DD</sub>	V <sub>DD</sub> = 2.5V	0.3	0.75	1.7	μA
		V <sub>DD</sub> = 6.5V	0.5	1.11	4	μA
Power-On Reset Voltage <sup>(1)</sup>	V <sub>POR</sub>	V <sub>OL_MAX</sub> = 300mV, I <sub>OUT_SINK</sub> = 15μA			900	mV
Low-Level Input Voltage WD_EN, WDI, SETx	V <sub>IL</sub>				0.25 × V <sub>DD</sub>	V
High Level Input Voltage WD_EN, WDI, SETx	V <sub>IH</sub>		0.8 × V <sub>DD</sub>			V
<b>nRESET/nWDO</b>						
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>DD</sub> = 1.6V, I <sub>OUT_SINK</sub> = 500μA			300	mV
		V <sub>DD</sub> = 3.3V, I <sub>OUT_SINK</sub> = 2mA			300	mV
Open-Drain Output Leakage Current	I <sub>LKG</sub>	V <sub>DD</sub> = V <sub>PULL-UP</sub> = 6.5V			300	nA

NOTE: 1. V<sub>POR</sub> is the minimum V<sub>DD</sub> voltage level for a controlled output state.

## TIMING REQUIREMENTS

(V<sub>DD</sub> = 1.6V to 6.5V, R<sub>nRESET</sub> = 100kΩ to V<sub>DD</sub>, R<sub>nWDO</sub> = 100kΩ to V<sub>DD</sub>, nRESET/nWDO load C<sub>LOAD</sub> = 10pF, V<sub>DD</sub> ramp rate ≤ 1V/μs, T<sub>A</sub> = -40°C to +125°C, typical values are measured at T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Glitch Immunity V <sub>IT-</sub>	t <sub>GL_VIT-</sub>	5% V <sub>IT-</sub> overdrive <sup>(1)</sup>		21		μs
WDI Pulse Duration to Start Next Frame <sup>(2)</sup>	t <sub>P-WD</sub>	V <sub>DD</sub> > V <sub>IT-</sub>	1			μs
WD_EN Hold Time to Enable WD Operation <sup>(2)</sup>	t <sub>HD-WDEN</sub>	V <sub>DD</sub> > V <sub>IT-</sub>	200			μs
SETx Hold Time to Change WD Timer Setting <sup>(2)</sup>	t <sub>HD-SETx</sub>	V <sub>DD</sub> > V <sub>IT-</sub>	150			μs
Watchdog Timeout Period	t <sub>WD</sub>	SGM856Axx-xQ	56.4	70	82	ms
		SGM856Bxx-xQ	0.9	1.12	1.32	s
		SGM856Cxx-xQ	3.6	4.48	5.28	s
		SGM856Dxx-xQ	14.4	17.92	21.12	s
Startup Delay <sup>(3)</sup>	t <sub>STRT</sub>			275		μs
nRESET Detect Delay for VDD Falling below V <sub>IT-</sub>	t <sub>P_HL</sub>	V <sub>DD</sub> = (V <sub>IT+</sub> + 10%) to (V <sub>IT-</sub> - 10%) <sup>(4)</sup>		17	35	μs
Reset Time Delay <sup>(5)</sup>	t <sub>D</sub>	SGM856xxA-xQ	9	11	13.2	ms
		SGM856xxB-xQ	36	45	52.8	
		SGM856xxC-xQ	144	179	211.2	
Watchdog Timeout Delay	t <sub>nWDO</sub>			t <sub>D</sub>		s

NOTES:

1. Overdrive% = [(V<sub>DD</sub>/V<sub>IT-</sub>) - 1] × 100%

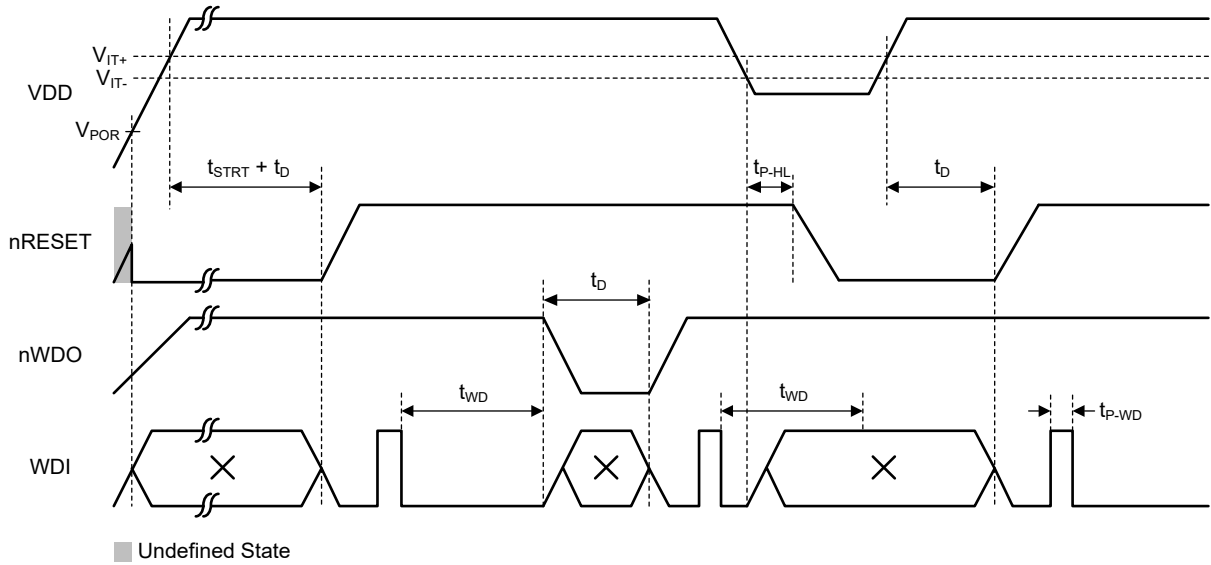
2. Not production tested.

3. Guaranteed by design. After rising above V<sub>IT+</sub> from an initial voltage lower than the specified minimum V<sub>DD</sub>, nRESET deassertion occurs after the cumulative duration of t<sub>STRT</sub> and t<sub>D</sub>.

4. t<sub>P\_HL</sub> is measured from threshold trip point (V<sub>IT-</sub>) to nRESET assertion. V<sub>IT+</sub> = V<sub>IT-</sub> + V<sub>HYS</sub>.

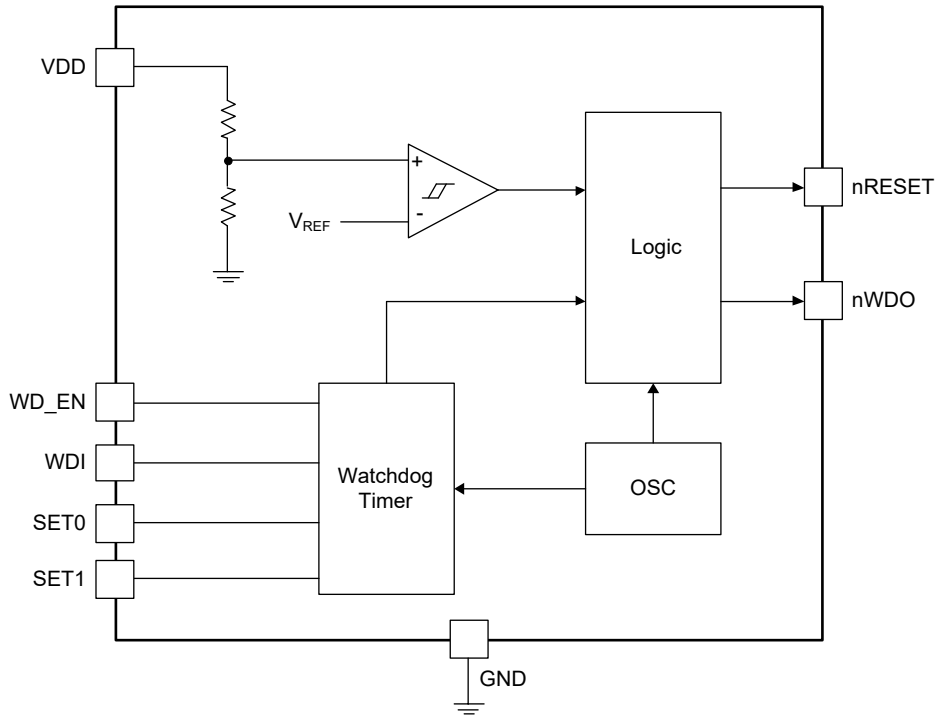
5. V<sub>DD</sub> voltage transitions from (V<sub>IT-</sub> - 10%) to (V<sub>IT-</sub> + 10%).

**TIMING DIAGRAM**



**Figure 2. Timing Diagram**

**FUNCTIONAL BLOCK DIAGRAM**



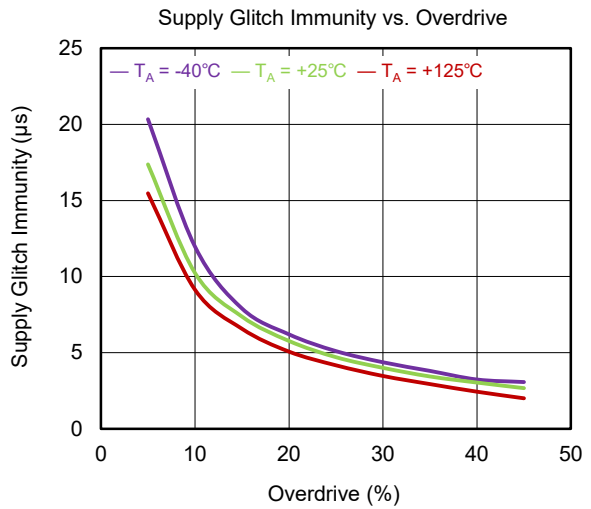
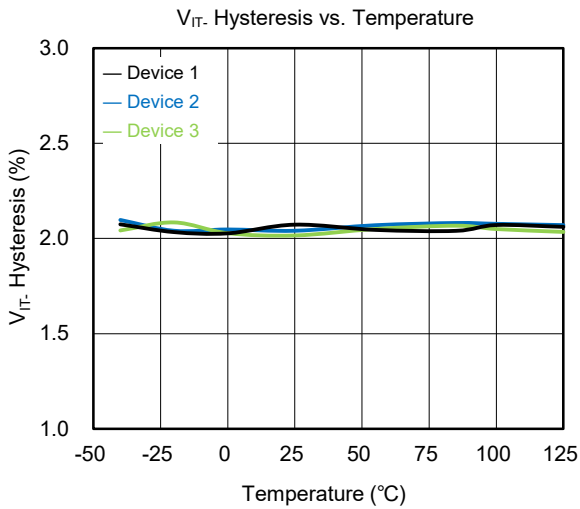
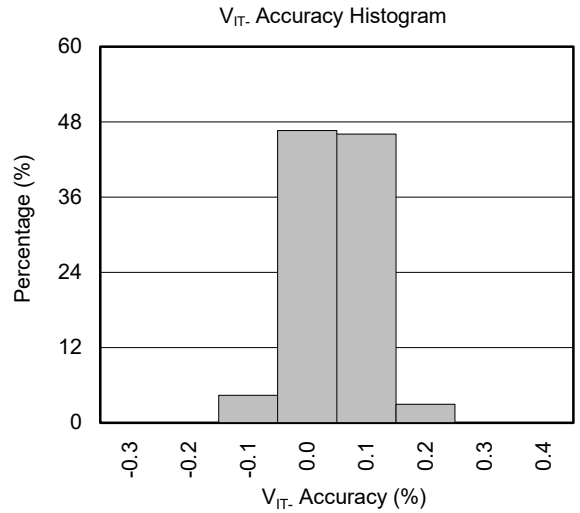
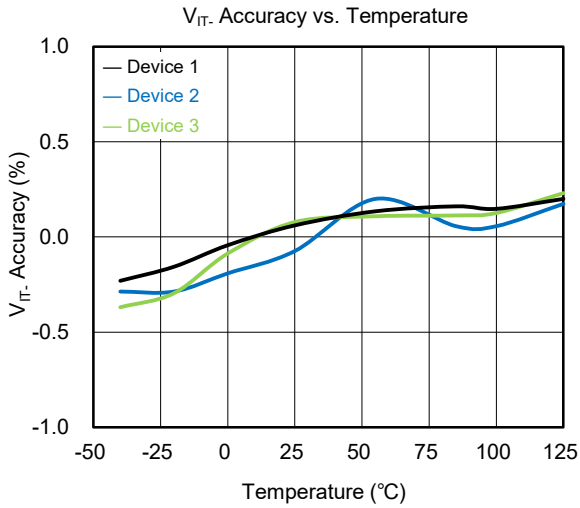
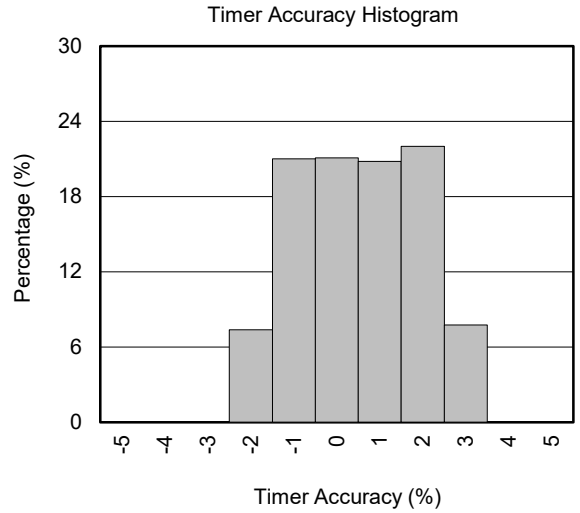
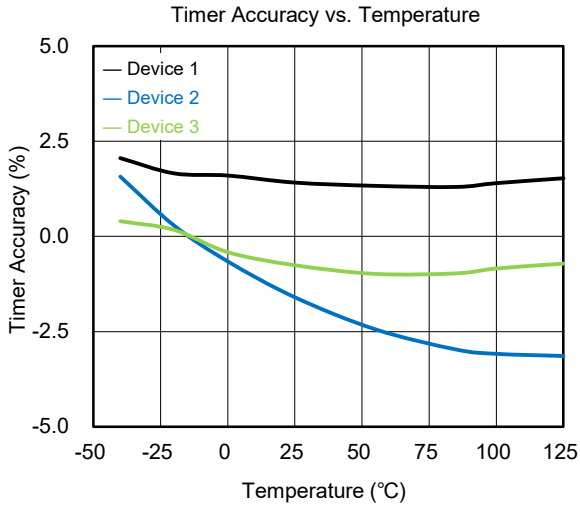
**Figure 3. Block Diagram**

# Nano I<sub>Q</sub> Precision Voltage Supervisor with Precision Timeout Watchdog Timer for Automotive Applications

## SGM856xQ

### TYPICAL PERFORMANCE CHARACTERISTICS

T<sub>A</sub> = +25°C, unless otherwise noted.

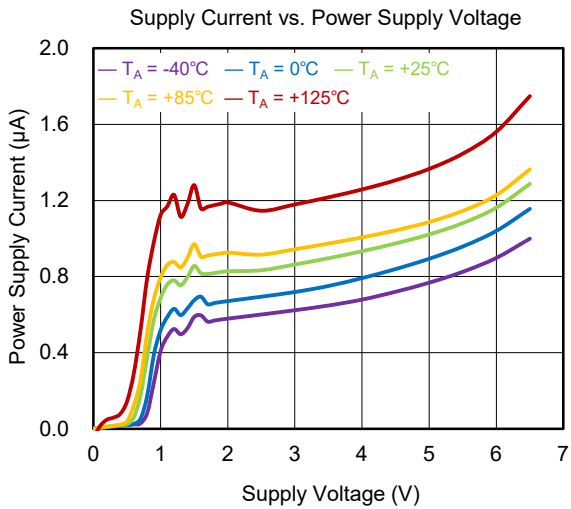
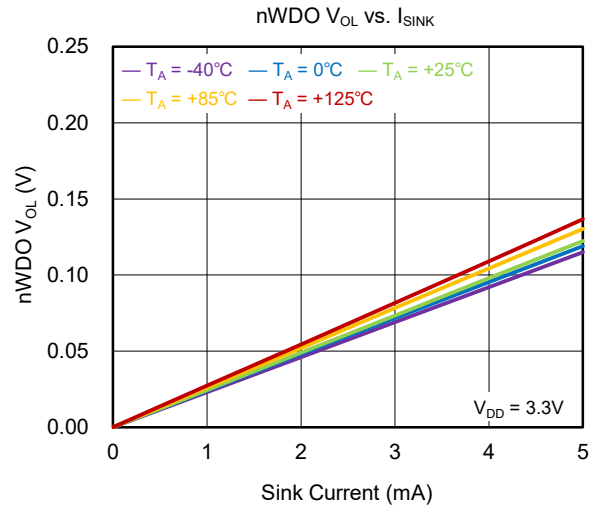
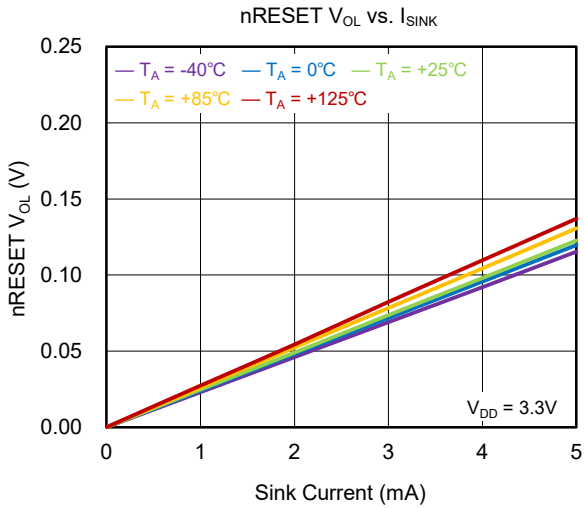
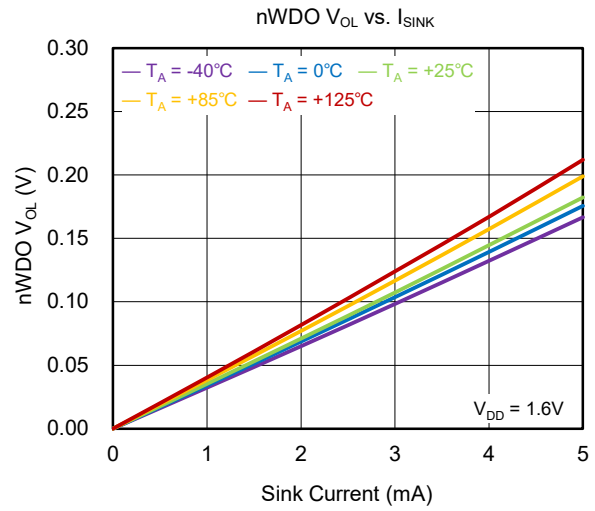
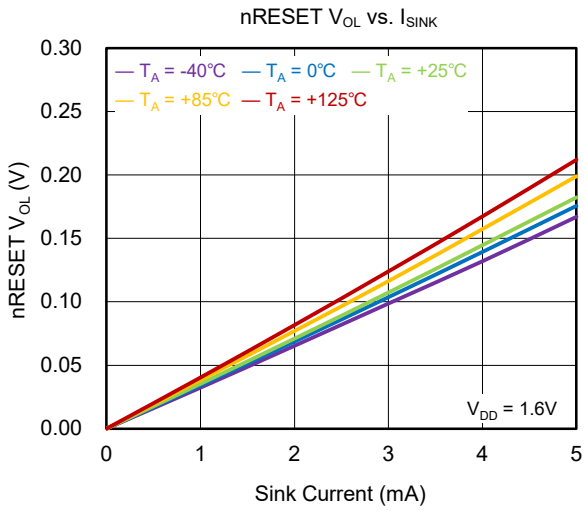


# Nano I<sub>Q</sub> Precision Voltage Supervisor with Precision Timeout Watchdog Timer for Automotive Applications

## SGM856xQ

### TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T<sub>A</sub> = +25°C, unless otherwise noted.



# Nano I<sub>Q</sub> Precision Voltage Supervisor with Precision SGM856xQ Timeout Watchdog Timer for Automotive Applications

## DETAILED DESCRIPTION

### Overview

The SGM856xQ is a high-precision voltage supervisor, integrated with an accurate watchdog timer in the specified temperature range of -40 °C to +125 °C. Besides, it ensures an accurate hysteresis of ±2.1% on the threshold, which makes it very suitable for systems that need small tolerance. It can also disable the watchdog function with the WD\_EN pin and extend the watchdog scaling with the SETx pins.

### Feature Description

#### Voltage Supervisor

The SGM856xQ provides three fixed monitored voltage thresholds: 2.3V, 3.0V and 4.6V. It can precisely monitor voltages with quiescent current down to only 750nA.

Figure 4 illustrates the timing diagram of the SGM856xQ. When V<sub>DD</sub> is lower than V<sub>POR</sub>, the nRESET pin is floating. After V<sub>DD</sub> rises above V<sub>POR</sub>, the nRESET output is asserted low. If the V<sub>DD</sub> continues to increase above the positive-going threshold (V<sub>IT+</sub>), the nRESET will keep low for the time duration of t<sub>STRT</sub> + t<sub>D</sub> and then goes high. Once the nRESET is deasserted, the watchdog timer begins to work. The nRESET will maintain the deasserted state until the V<sub>DD</sub> drops below the negative-going threshold V<sub>IT-</sub>. Note that the device takes t<sub>D</sub> to pull high the nRESET when V<sub>DD</sub> ramps up from a point higher than V<sub>DD\_MIN</sub>.

#### Timeout Watchdog Timer

When V<sub>DD</sub> > V<sub>IT-</sub> + V<sub>HYS</sub> and the nRESET is deasserted after the t<sub>D</sub> time, the watchdog function becomes active.

In other words, the nWDO is forced to be high if nRESET is logic low.

The SGM856xQ continuously checks whether a watchdog timeout event occurs once the nRESET is logic high. The watchdog timer will be refreshed under the following conditions:

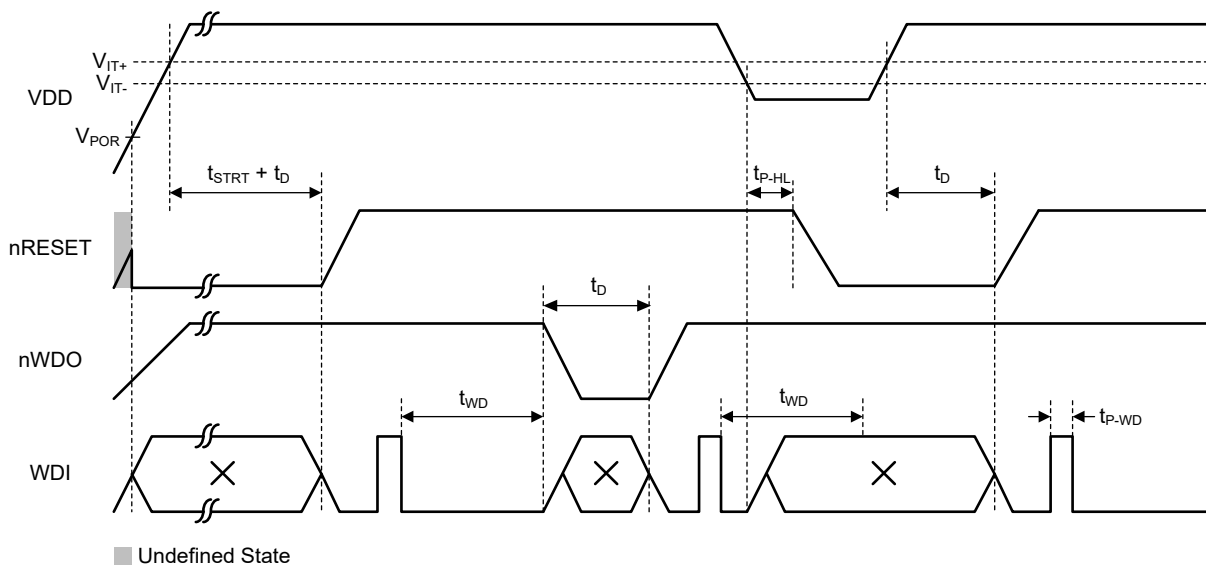
- ◆ A falling edge at the WDI pin;
- ◆ A falling/rising edge at the SETx pins;
- ◆ A rising edge at nRESET or nWDO or WD\_EN is detected.

Once the watchdog does not receive a valid refresh signal during t<sub>WD</sub>, the nWDO will be pulled low for t<sub>D</sub>. Figure 6 shows the basic operation for timeout watchdog timer operation.

The SGM856xQ provides four kinds of timeout delay options: 70ms, 1.12s, 4.48s and 17.92s with ±20% accuracy. It also provides the opportunity to set multiples of t<sub>WD</sub> through the SETx pin. Details can be seen in SET Pin Behavior section.

#### Watchdog Enable/Disable Operation

In some applications, such as firmware update and step-by-step debug, disabling the watchdog function momentarily is necessary and significant. The SGM856xQ performs this task through the WD\_EN pin. Pulling the WD\_EN pin high can enable the watchdog function, while pulling it down can disable the watchdog function. The state transition for the WD\_EN pin can be achieved at any time. nWDO will respond instantaneously to logic high once the WD\_EN pin is pulled low.



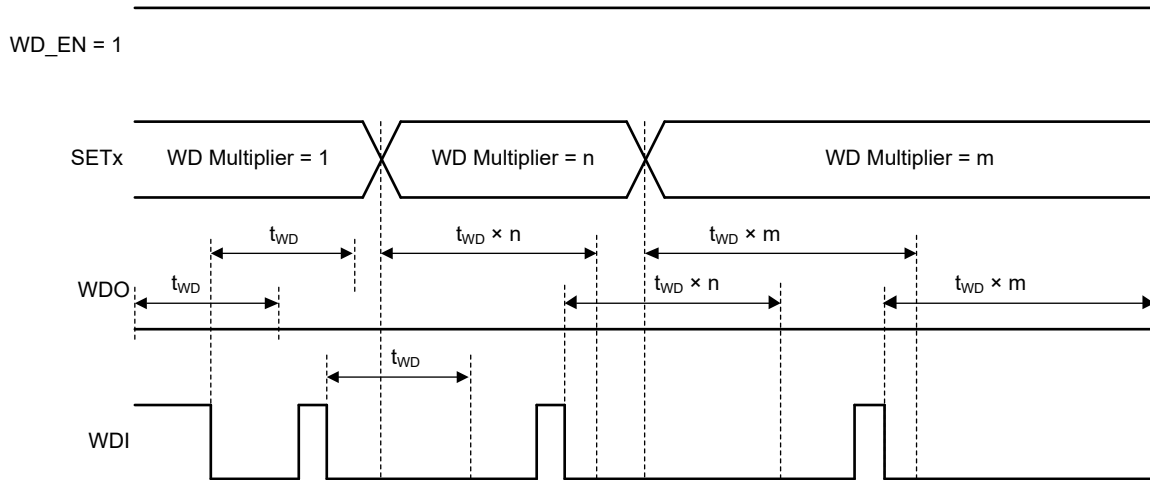
**Figure 4. Voltage Supervisor Timing Diagram**



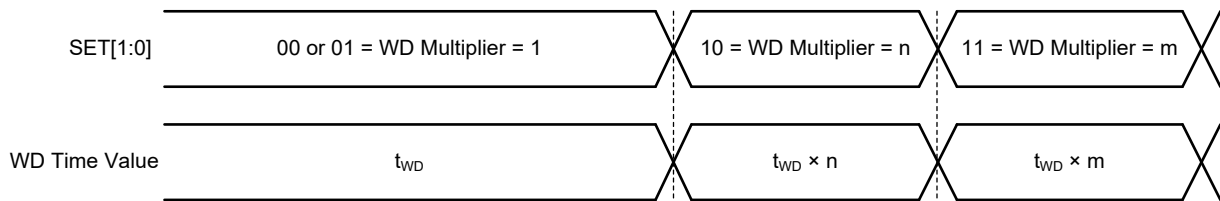
# Nano I<sub>Q</sub> Precision Voltage Supervisor with Precision SGM856xQ Timeout Watchdog Timer for Automotive Applications

## DETAILED DESCRIPTION (continued)

Figure 7 and Figure 8 show the timing behavior with respect to SETx status changes.



**Figure 7. Watchdog Behavior with with SETx Pin Status**



$t_{WD}$  = Fixed based on factory-set option.

n, m = Fixed based on time-set multiplier chosen.

**Figure 8. Watchdog Operation with 2 SETx Pins**

### Device Functional Modes

Table 4 summarizes the functional modes of the SGM856xQ.

**Table 3. Device Functional Modes**

VDD	Watchdog Status	WDI	nWDO	nRESET
$V_{DD} < V_{POR}$	Not Applicable	—	Undefined	Undefined
$V_{POR} \leq V_{DD} < V_{IT-}$	Not Applicable	Ignored	High	Low
$V_{DD} \geq V_{IT+}$	Disabled	Ignored	High	High
	Enabled	$t_{PULSE}^{(1)} < t_{WD\_MIN}$	High	High
	Enabled	$t_{PULSE}^{(1)} > t_{WD\_MAX}$	Low	High

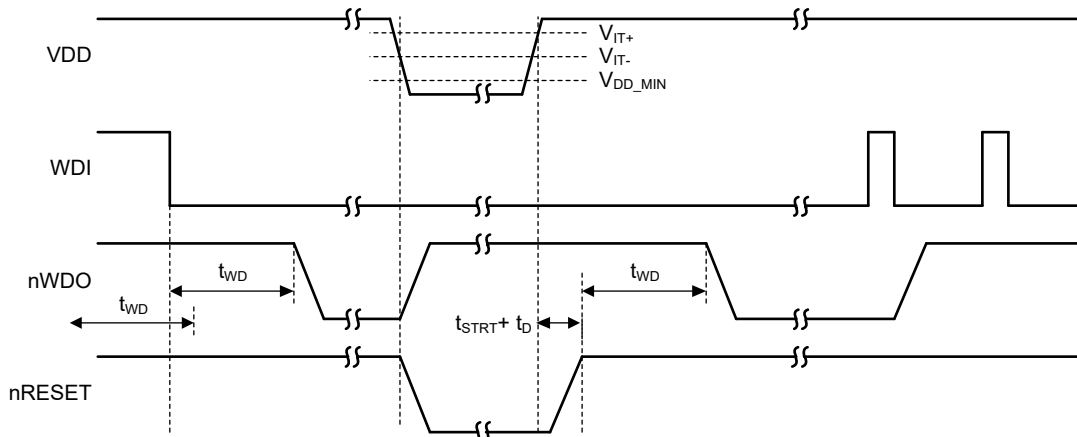
NOTE: 1. Where  $t_{PULSE}$  is the time between falling edges on WDI.

**DETAILED DESCRIPTION (continued)**

**nWDO Output Latch Function**

The nWDO will be latched low due to the timeout error for SGM856xD-xQ. To exit the latched state, the following actions can be taken:

- ◆ A new power cycle for the VDD pin;
- ◆ A valid WDI falling edge;
- ◆ Toggling WD\_EN from logic high to logic low.

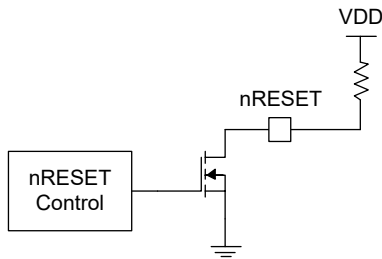


**Figure 9. Output Latch Timing Behavior**

**APPLICATION INFORMATION**

**Calculating the nRESET/nWDO Pull-up Resistor**

The nRESET and nWDO pin are both open-drain outputs, as shown in Figure 10. When selecting an appropriate pull-up resistor, the total system current consumption (including quiescent current flowing into VDD and currents flowing through the pull-up resistors), the low-level output voltage ( $V_{OL}$ ), the capacitor between the nRESET/nWDO and GND, and the leakage current of nRESET/nWDO pin should be taken into consideration.



**Figure 10. Open-Drain RESET Configuration**

A tradeoff is made between the low-level output voltage  $V_{OL}$  and the current flowing into the nRESET and nWDO pin ( $I_{nRST}$  and  $I_{nWDO}$ ). The constraint for  $V_{OL}$  is lower than 0.3V and for  $I_{nRST}$  and  $I_{nWDO}$  is lower than

10mA. To be more exact,  $I_{nRST}$  and  $I_{nWDO}$  should be kept below 2mA for  $V_{DD} \geq 3V$  and 500 $\mu$ A for  $V_{DD} = 1.6V$ . Note that every time only one of nRESET and nWDO will be pulled low. Thus, only the current flowing through one pull-up resistor should be considered.

For example, when the power rail is pulled up to 2.5V, the pull-up resistor should be larger than 4.4k $\Omega$  due to  $V_{OL}$ . Take the pull-up resistor as 100k $\Omega$ , the obtained total current consumption is 25.75 $\mu$ A.

**Power Supply Recommendations**

This device is configured to function normally with an input voltage ranging from 1.6V to 6.5V. Note that incorporating a capacitor ranging from 0.1 $\mu$ F to 1 $\mu$ F between the VDD and GND pins is advisable, depending on the noise characteristics of the input voltage supply.

**Layout Guidelines**

Though not mandatory, placing a 0.1 $\mu$ F ceramic capacitor close to the VDD pin is recommended to suppress the noise or transient spikes.

Place the pull-up resistors for nRESET and nWDO pins as close to the corresponding pin as possible.

**REVISION HISTORY**

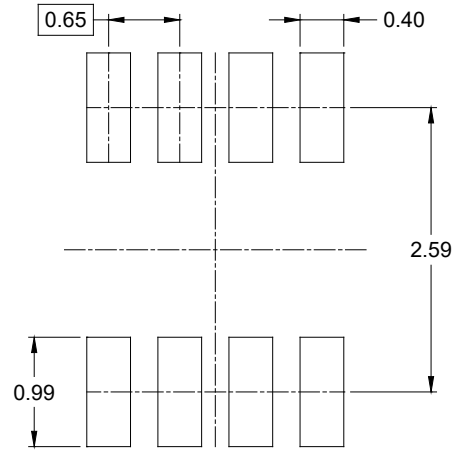
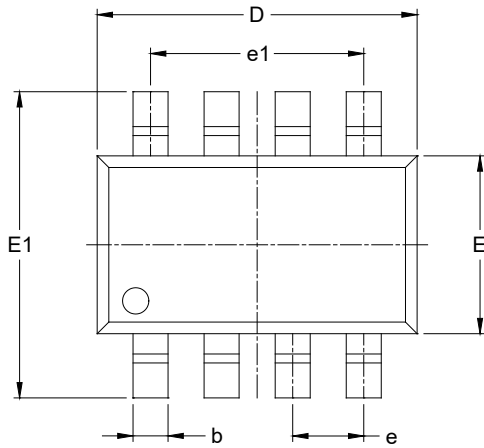
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original to REV.A (MAY 2026)	Page
Changed from product preview to production data.....	All

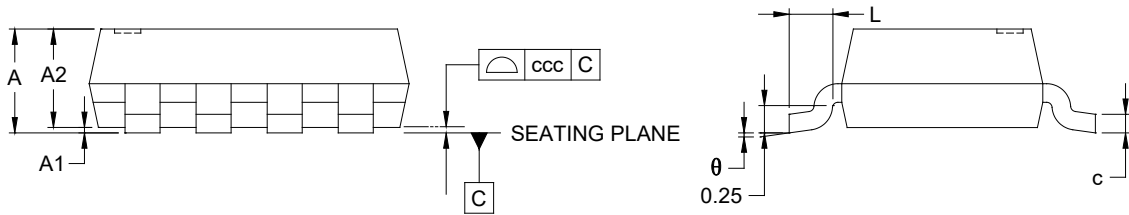
# PACKAGE INFORMATION

## PACKAGE OUTLINE DIMENSIONS

### TSOT-23-8



RECOMMENDED LAND PATTERN (Unit: mm)



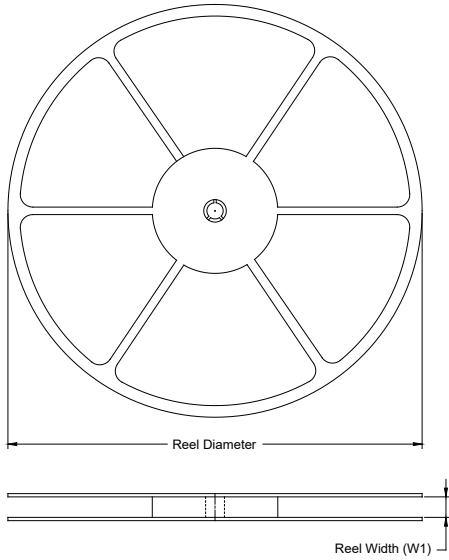
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.100
A1	0.000	-	0.100
A2	0.700	-	1.000
b	0.220	-	0.380
c	0.080	-	0.200
D	2.750	-	3.050
E	1.450	-	1.750
E1	2.550	-	3.050
e	0.650 BSC		
e1	1.950 BSC		
L	0.300	-	0.600
$\theta$	0°	-	8°
ccc	0.100		

NOTES:

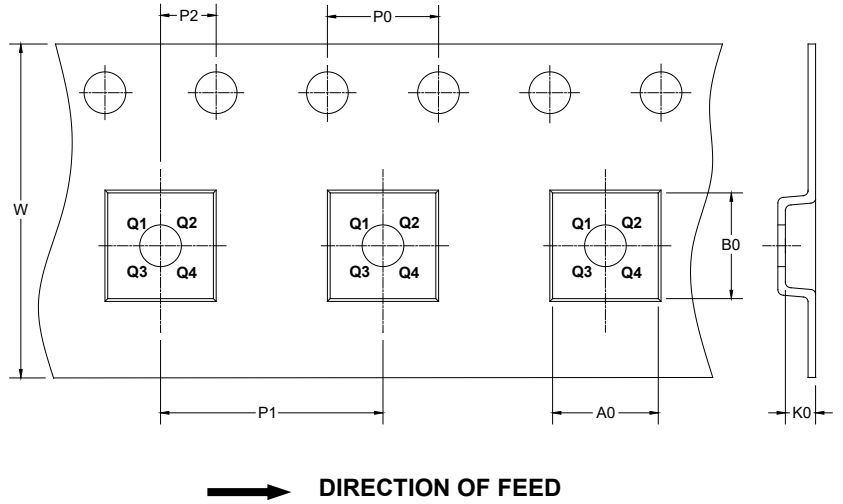
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-193.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

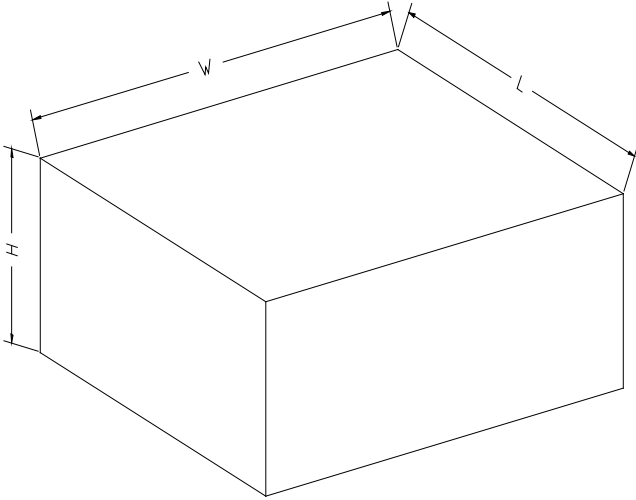
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TSOT-23-8	7"	9.5	3.20	3.20	1.10	4.0	4.0	2.0	8.0	Q3

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

D00002