



## 89CXX/89NXX

CMOS IC

### LOW VOLTAGE FREE DELAY TIME SETTING VOLTAGE DETECTOR IC SERIES

#### DESCRIPTION

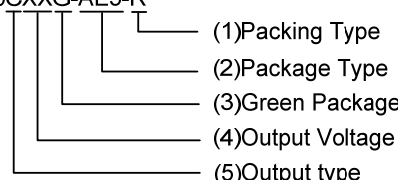
UTC **89CXX** and **89NXX** series are adjustable output delay Voltage Detector based on CMOS process. It is a high-accuracy, ultra-low current consumption Voltage Detector IC series with a built-in delay circuit. UTC **89CXX** and **89NXX** have two output types (Nch open drain and CMOS output) and detection voltages range from 0.9V to 4.8V in increments of 0.1V, so that the series may be selected according to application.

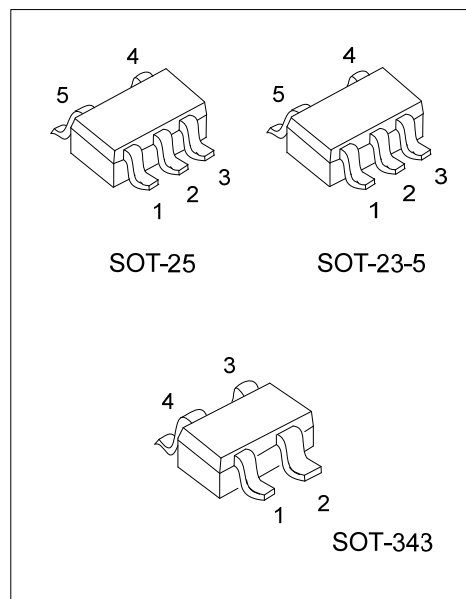
#### FEATURES

- \* Adjustable delay Time
- \* Ultra-low current consumption
- \* Wide operating temperature range
- \* **89CXX**: Push-Pull  $\overline{\text{RESET}}$  Active Low Output
- \* **89NXX**: Open-Drain  $\overline{\text{RESET}}$  Active Low Output

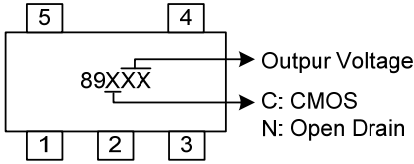
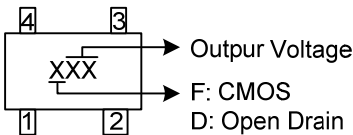
#### ORDERING INFORMATION

| Ordering Number |              | Package  | Packing   |
|-----------------|--------------|----------|-----------|
| Lead Free       | Halogen Free |          |           |
| 89CXXL-AE5-R    | 89CXXG-AE5-R | SOT-23-5 | Tape Reel |
| 89CXXL-AF5-R    | 89CXXG-AF5-R | SOT-25   | Tape Reel |
| 89CXXL-AL4-R    | 89CXXG-AL4-R | SOT-343  | Tape Reel |
| 89NXXL-AE5-R    | 89NXXG-AE5-R | SOT-23-5 | Tape Reel |
| 89NXXL-AF5-R    | 89NXXG-AF5-R | SOT-25   | Tape Reel |
| 89NXXL-AL4-R    | 89NXXG-AL4-R | SOT-343  | Tape Reel |

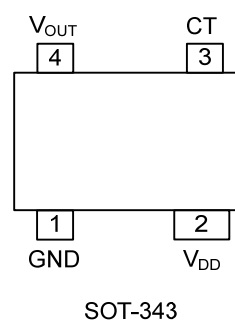
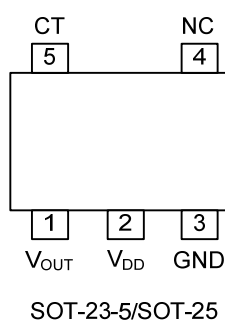
|                                                                                                         |                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>89CXXG-AE5-R</p>  | <p>(1) R: Tape Reel<br/>(2) AE5: SOT-23-5, AF5: SOT-25, AL4: SOT-343<br/>(3) G: Halogen Free and Lead Free, L: Lead Free<br/>(4) XX: refer to Marking Information<br/>(5) C: CMOS Output, N: Open Drain Output</p> |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## MARKING INFORMATION

| PACKAGE            | VOLTAGE CODE |          | MARKING                                                                            |
|--------------------|--------------|----------|------------------------------------------------------------------------------------|
| SOT-23-5<br>SOT-25 | 09: 0.9V     | 29: 2.9V |  |
|                    | 10: 1.0V     | 30: 3.0V |                                                                                    |
|                    | 11: 1.1V     | 31: 3.1V |                                                                                    |
|                    | 12: 1.2V     | 32: 3.2V |                                                                                    |
|                    | 13: 1.3V     | 33: 3.3V |                                                                                    |
|                    | 14: 1.4V     | 34: 3.4V |                                                                                    |
|                    | 15: 1.5V     | 35: 3.5V |                                                                                    |
|                    | 16: 1.6V     | 36: 3.6V |                                                                                    |
|                    | 17: 1.7V     | 37: 3.7V |                                                                                    |
|                    | 18: 1.8V     | 38: 3.8V |                                                                                    |
| SOT-343            | 19: 1.9V     | 39: 3.9V |  |
|                    | 20: 2.0V     | 40: 4.0V |                                                                                    |
|                    | 21: 2.1V     | 41: 4.1V |                                                                                    |
|                    | 22: 2.2V     | 42: 4.2V |                                                                                    |
|                    | 23: 2.3V     | 43: 4.3V |                                                                                    |
|                    | 24: 2.4V     | 44: 4.4V |                                                                                    |
|                    | 25: 2.5V     | 45: 4.5V |                                                                                    |
|                    | 26: 2.6V     | 46: 4.6V |                                                                                    |
|                    | 27: 2.7V     | 47: 4.7V |                                                                                    |
|                    | 28: 2.8V     | 48: 4.8V |                                                                                    |

## PIN CONFIGURATION

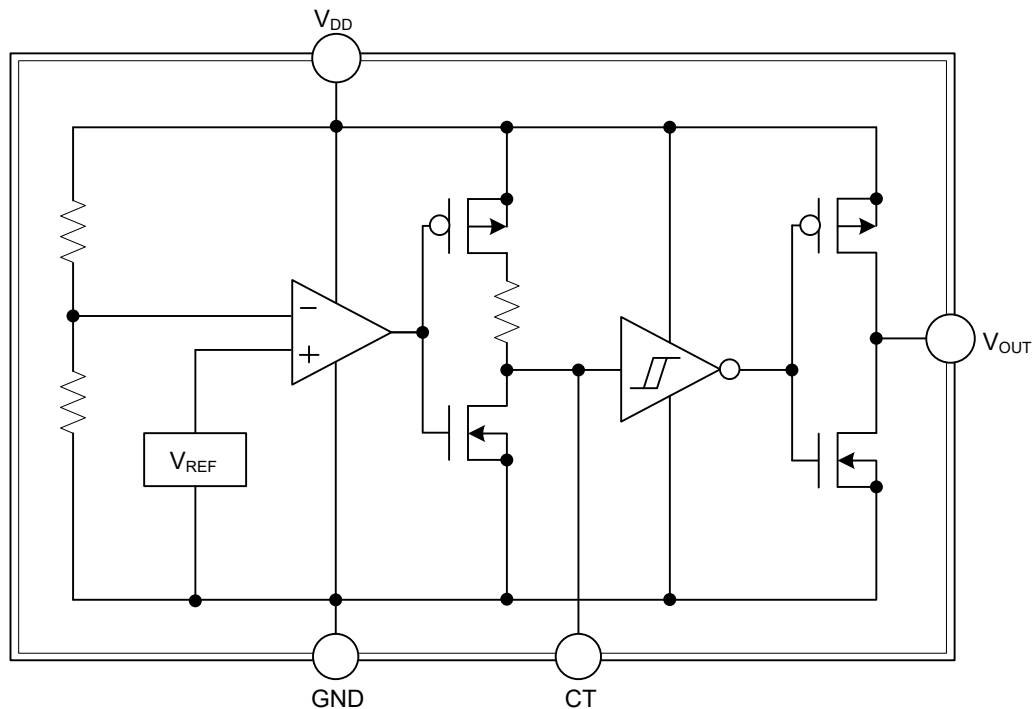


## PIN DESCRIPTION

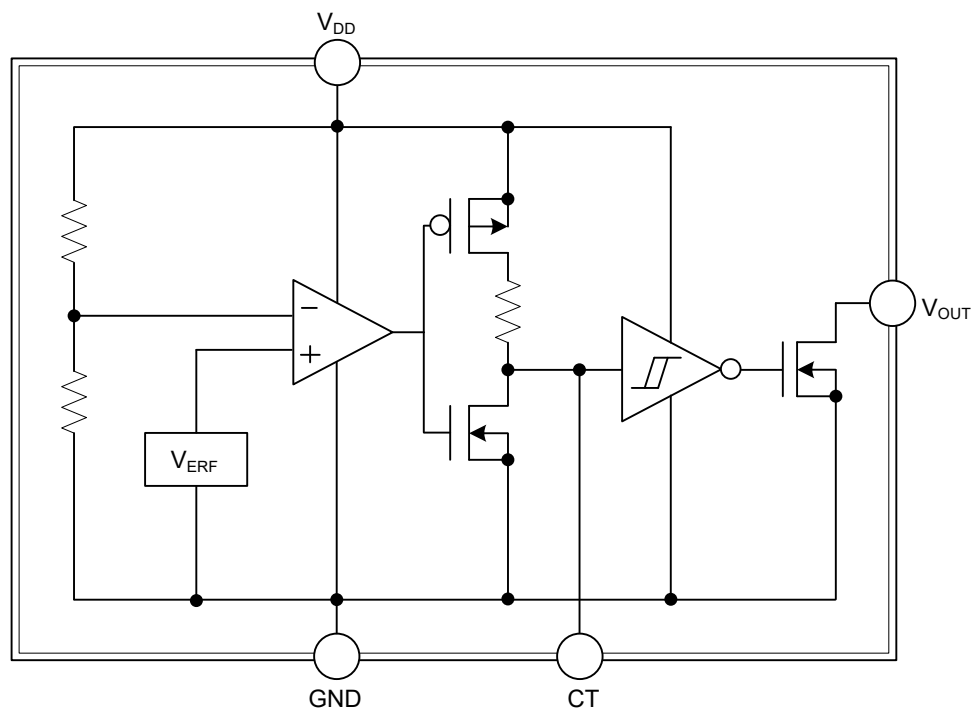
| PIN NO.  |         | PIN NAME         | DESCRIPTION                                          |
|----------|---------|------------------|------------------------------------------------------|
| SOT-23-5 | SOT-343 |                  |                                                      |
| 1        | 4       | V <sub>OUT</sub> | Reset output                                         |
| 2        | 2       | V <sub>DD</sub>  | Power supply voltage                                 |
| 3        | 1       | GND              | Ground                                               |
| 4        | -       | NC               | No Connect                                           |
| 5        | 3       | CT               | Output delay time control.(connected with capacitor) |

## ■ BLOCK DIAGRAM

For CMOS



For Open Drain



# ■ ABSOLUTE MAXIMUM RATING

| PARAMETER                   |                       | SYMBOL    | RATINGS                | UNIT |
|-----------------------------|-----------------------|-----------|------------------------|------|
| Power Supply Voltage        |                       | $V_{DD}$  | -0.3 ~ +7              | V    |
| Output Voltage              | Nch Open Drain Output | $V_{OUT}$ | GND-0.3 ~ +7           | V    |
|                             | CMOS Output           |           | GND-0.3 ~ $V_{DD}+0.3$ |      |
| Output Current              |                       | $I_O$     | 70                     | mA   |
| Power Dissipation           | SOT-343               | $P_D$     | 350                    | mW   |
|                             | SOT-23-5              |           | 450                    | mW   |
|                             | SOT-25                |           | 500                    | mW   |
| Operation Temperature Range |                       | $T_{OPT}$ | -40 ~ +125             | °C   |
| Ambient Storage Temperature |                       | $T_{STG}$ | -55 ~ +125             | °C   |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

# ■ ELECTRICAL CHARACTERISTICS ( $T_A=-25\sim 125^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                | SYMBOL    | TEST CONDITIONS                                                               |                                                     | MIN                      | TYP          | MAX                      | UNIT          |
|--------------------------|-----------|-------------------------------------------------------------------------------|-----------------------------------------------------|--------------------------|--------------|--------------------------|---------------|
| Detection Voltage        | $V_{DET}$ | $V_{DD}=H \rightarrow L$ , $T_A=25^{\circ}\text{C}$ , $R_L=470\text{k}\Omega$ |                                                     | $V_{DET}(T) \times 0.99$ | $V_{DET}(T)$ | $V_{DET}(T) \times 1.01$ | V             |
|                          |           | $V_{DET}=1.8\text{V}$                                                         | $T_A=+25^{\circ}\text{C}$                           | 1.782                    | 1.8          | 1.818                    |               |
|                          |           |                                                                               | $T_A=-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$ | 1.718                    |              | 1.883                    |               |
|                          |           | $V_{DET}=2.5\text{V}$                                                         | $T_A=25^{\circ}\text{C}$                            | 2.475                    | 2.5          | 2.525                    |               |
|                          |           |                                                                               | $T_A=-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$ | 2.386                    |              | 2.615                    |               |
|                          |           | $V_{DET}=3.0\text{V}$                                                         | $T_A=25^{\circ}\text{C}$                            | 2.970                    | 3.0          | 3.030                    |               |
|                          |           |                                                                               | $T_A=-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$ | 2.864                    |              | 3.139                    |               |
|                          |           | $V_{DET}=3.3\text{V}$                                                         | $T_A=25^{\circ}\text{C}$                            | 3.267                    | 3.3          | 3.333                    |               |
|                          |           |                                                                               | $T_A=-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$ | 3.150                    |              | 3.452                    |               |
|                          |           | $V_{DET}=4.2\text{V}$                                                         | $T_A=25^{\circ}\text{C}$                            | 4.158                    | 4.2          | 4.242                    |               |
|                          |           |                                                                               | $T_A=-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$ | 4.009                    |              | 4.394                    |               |
| Circuit Current When ON  | $I_{DD1}$ | $V_{DD}=V_{DET}-0.2\text{V}$                                                  | $V_{DET}=0.9\sim 1.3\text{V}$                       |                          | 0.15         | 0.9                      | $\mu\text{A}$ |
|                          |           |                                                                               | $V_{DET}=1.4\sim 2.1\text{V}$                       |                          | 0.20         | 1.1                      |               |
|                          |           |                                                                               | $V_{DET}=2.2\sim 2.7\text{V}$                       |                          | 0.25         | 1.3                      |               |
|                          |           |                                                                               | $V_{DET}=2.8\sim 3.3\text{V}$                       |                          | 0.30         | 1.5                      |               |
|                          |           |                                                                               | $V_{DET}=3.4\sim 4.2\text{V}$                       |                          | 0.35         | 1.6                      |               |
|                          |           |                                                                               | $V_{DET}=4.3\sim 4.8\text{V}$                       |                          | 0.40         | 1.8                      |               |
| Circuit Current When OFF | $I_{DD2}$ | $V_{DD}=V_{DET}+2.0\text{V}$                                                  | $V_{DET}=0.9\sim 1.3\text{V}$                       |                          | 0.30         | 1.5                      | $\mu\text{A}$ |
|                          |           |                                                                               | $V_{DET}=1.4\sim 2.1\text{V}$                       |                          | 0.35         | 1.6                      |               |
|                          |           |                                                                               | $V_{DET}=2.2\sim 2.7\text{V}$                       |                          | 0.40         | 1.8                      |               |
|                          |           |                                                                               | $V_{DET}=2.8\sim 3.3\text{V}$                       |                          | 0.45         | 2.0                      |               |
|                          |           |                                                                               | $V_{DET}=3.4\sim 4.2\text{V}$                       |                          | 0.50         | 2.2                      |               |
|                          |           |                                                                               | $V_{DET}=4.3\sim 4.8\text{V}$                       |                          | 0.55         | 2.3                      |               |

■ **ELECTRICAL CHARACTERISTICS** (T<sub>A</sub>=25, unless otherwise specified)

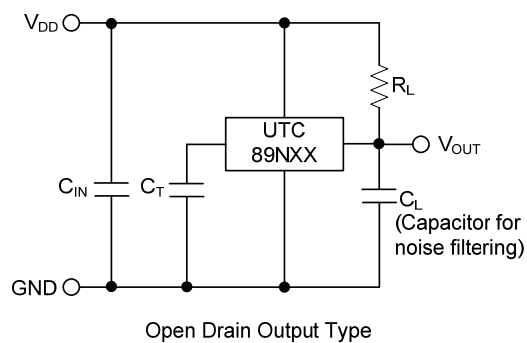
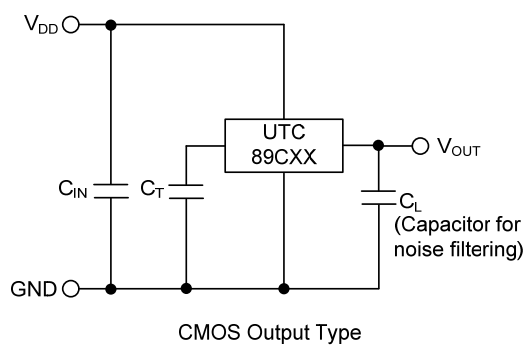
| PARAMETER                                 | SYMBOL               | TEST CONDITIONS                                                                                                 | MIN                    | TYP                    | MAX                    | UNIT   |
|-------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------|------------------------|------------------------|------------------------|--------|
| Operating Voltage Range                   | V <sub>OPL</sub>     | V <sub>OL</sub> ≤0.4V, T <sub>A</sub> =25~+125°C, R <sub>L</sub> =470kΩ                                         | 0.70                   |                        |                        | V      |
|                                           |                      | V <sub>OL</sub> ≤0.4V, T <sub>A</sub> =-40~+25°C, R <sub>L</sub> =470kΩ                                         | 0.90                   |                        |                        |        |
| High Output Voltage (Pch)                 | V <sub>OH</sub>      | V <sub>DD</sub> =4.8V, I <sub>SOURCE</sub> =1.7mA, V <sub>DET</sub> =0.9V~3.9V                                  | V <sub>DD</sub> -0.5   |                        |                        | V      |
|                                           |                      | V <sub>DD</sub> =6.0V, I <sub>SOURCE</sub> =2.0mA, V <sub>DET</sub> =4.0V~4.8V                                  | V <sub>DD</sub> -0.5   |                        |                        |        |
| Low Output Voltage (Nch)                  | V <sub>OL</sub>      | V <sub>DD</sub> =0.85V, I <sub>SINK</sub> =20μA                                                                 |                        |                        | 0.05                   | V      |
|                                           |                      | V <sub>DD</sub> =1.5V, I <sub>SINK</sub> =1mA, V <sub>DET</sub> =1.7~4.8V                                       |                        |                        | 0.5                    |        |
|                                           |                      | V <sub>DD</sub> =2.4V, I <sub>SINK</sub> =3.6mA, V <sub>DET</sub> =2.7~4.8V                                     |                        |                        | 0.5                    |        |
| Leak Current When OFF                     | I <sub>leak</sub>    | V <sub>DD</sub> =V <sub>DS</sub> =7V, T <sub>A</sub> =25°C                                                      |                        | 0                      | 0.1                    | μA     |
|                                           |                      | V <sub>DD</sub> =V <sub>DS</sub> =7V, T <sub>A</sub> =-40~125°C                                                 |                        | 0                      | 1                      |        |
| CT Pin Threshold Voltage                  | V <sub>CTH</sub>     | V <sub>DD</sub> =V <sub>DET</sub> ×1.1, V <sub>DET</sub> =0.9~2.5V, T <sub>A</sub> =25°C, R <sub>L</sub> =470kΩ | V <sub>DD</sub> ×0.35  | V <sub>DD</sub> ×0.45  | V <sub>DD</sub> ×0.55  | V      |
|                                           |                      | V <sub>DD</sub> =V <sub>DET</sub> ×1.1, V <sub>DET</sub> =2.6~4.8V, T <sub>A</sub> =25°C, R <sub>L</sub> =470kΩ | V <sub>DD</sub> ×0.40  | V <sub>DD</sub> ×0.50  | V <sub>DD</sub> ×0.60  |        |
| Output Delay Resistance                   | R <sub>CT</sub>      | V <sub>DD</sub> =V <sub>DET</sub> ×1.1, V <sub>CT</sub> =0.5V, T <sub>A</sub> =25°C (Note 1)                    | 9                      | 10                     | 11                     | MΩ     |
| Detection Voltage Temperature Coefficient | V <sub>DET</sub> /ΔT | T <sub>A</sub> =-40°C~125°C                                                                                     |                        | ±30                    |                        | ppm/°C |
| Hysteresis Voltage                        | ΔV <sub>DET</sub>    | V <sub>DD</sub> =L→H→L, T <sub>A</sub> =-40~125°C, R <sub>L</sub> =470kΩ                                        | V <sub>DET</sub> ≤1.0V | V <sub>DET</sub> ×0.03 | V <sub>DET</sub> ×0.05 | V      |
|                                           |                      |                                                                                                                 | V <sub>DET</sub> ≥1.1V | V <sub>DET</sub> ×0.03 | V <sub>DET</sub> ×0.07 |        |

Note: Design Guarantee. (Outgoing inspection is not done on all products.)

V<sub>DET</sub>(T): Standard Detection Voltage (0.9V~4.8V, 0.1V step)

R<sub>L</sub>: Pull-up resistor to be connected between V<sub>OUT</sub> and power supply.

## ■ TYPICAL APPLICATION CIRCUIT



## ■ APPLICATION INFORMATION

### Setting of detector delay time

The delay time of UTC 89CXX/89NXX can be set by the capacitor between CT and GND pin.

Use Equation (1) to set the delay time:

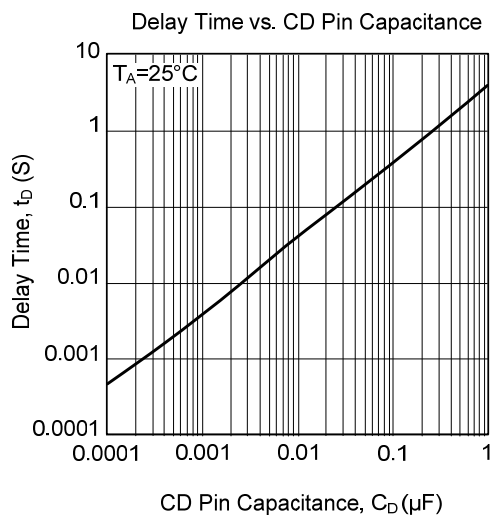
$$T_{PLH} = C_{CT} \times R_{CT} \times \ln \left( \frac{V_{DD}}{V_{DD} - V_{CTH}} \right) \quad (1)$$

$C_{CT}$ : CT pin externally attached capacitance;

$R_{CT}$ : CT pin internal impedance;

$V_{CTH}$ : CT pin threshold voltage;

# ■ TYPICAL CHARACTERISTICS (Cont.)



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