# CMOS VOLTAGE DETECTOR

## ■ DESCRIPTION

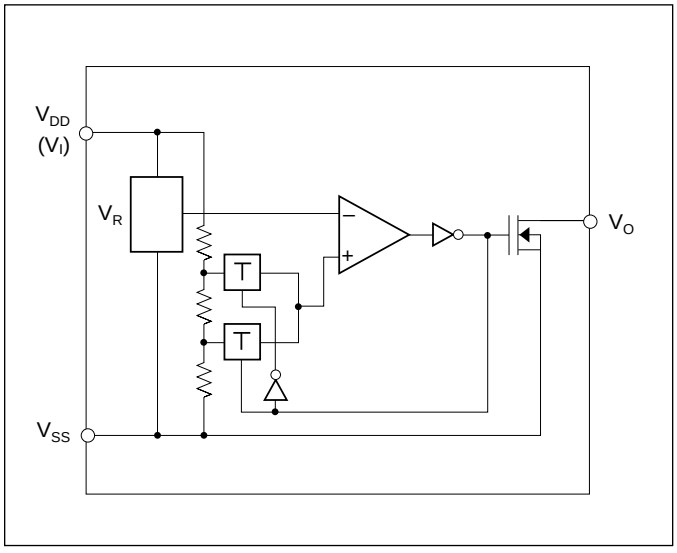
The SCI7700YSeries/SCI7701YSeries are a series of low-power precision voltage detectors, which do not require external adjustments. The SCI7700YSeries/SCI7701YSeries have such applications as battery-life detection, power supply fault monitoring, over/under-voltage protection and battery back-up switching. The SCI7700YSeries is an open-drain Nch output type and the SCI7701YSeries is a CMOS output type. Both are available in SOT 89-3pin (plastic) packages.

## ■ FEATURES

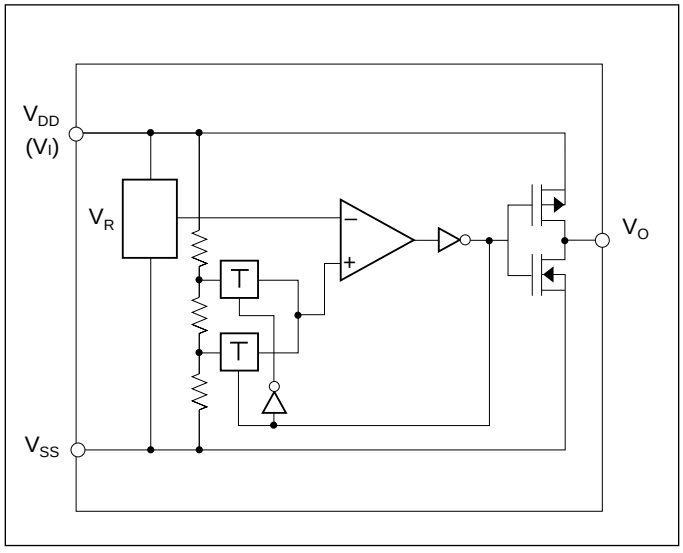
- Many types ..... see the next page
- Low operating supply current ..... Typ 1.8µA (SCI7700YNA, $V_{DD}$=3.0V)
- Low range of operating voltage ..... Typ 1.2V (SCI7700YNA)
- Temperature coefficient of detection voltage ..... Typ (detection voltage/reference voltage) x 0.1 (mV/°C)
- Hysteresis difference ..... Typ detection voltage x 0.05V
- Package ..... SOT 89-3pin (plastic)

## ■ BLOCK DIAGRAM

- **SCI7700YSeries**

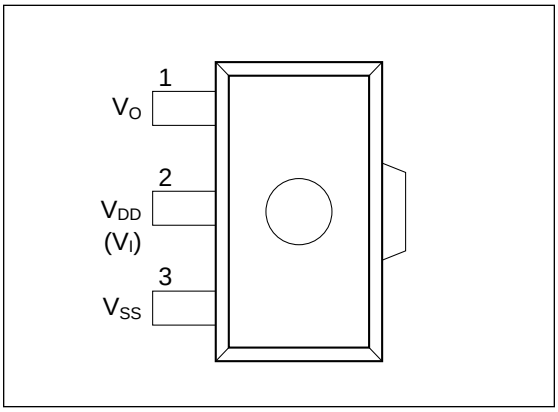



- **SCI7701YSeries**



**November 1996**

## ■ PIN CONFIGURATION




(Ta = 25°C)

| Type No. | Output Mode | Detection Voltage (V) | | | Operating Voltage (V) | Operating Supply Current (μA) |
|---|---|---|---|---|---|---|
| | | Min | Typ | Max | | |
| SCI7700YVA | Open drain Nch | 0.90 | 0.95 | 1.00 | 0.8 to 5.0 | Typ 1.4 (VDD=1.5V) |
| SCI7700YAA | Open drain Nch | 1.00 | 1.05 | 1.10 | 0.9 to 5.0 | Typ 1.4 (VDD=1.5V) |
| SCI7700YAS | Open drain Nch | 1.05 | 1.10 | 1.15 | 0.8 to 10.0 | Typ 1.4 (VDD=1.5V) |
| SCI7700YBA | Open drain Nch | 1.10 | 1.15 | 1.20 | 0.9 to 5.0 | Typ 1.4 (VDD=1.5V) |
| SCI7700YNA | Open drain Nch | 1.85 | 1.90 | 1.95 | 1.2 to 10.0 | Typ 1.8 (VDD=3.0) |
| SCI7700YCA | Open drain Nch | 2.10 | 2.15 | 2.20 | 0.9 to 5.0 | Typ 1.8 (VDD=3.0V) |
| SCI7700YFA | Open drain Nch | 2.60 | 2.70 | 2.80 | 1.5 to 10.0 | Typ 1.8 (VDD=3.0V) |
| SCI7700YTA | Open drain Nch | 3.80 | 4.00 | 4.20 | 1.5 to 10.0 | Typ 2.6 (VDD=6.0V) |
| SCI7701YCA | CMOS | 2.10 | 2.15 | 2.20 | 1.5 to 10.0 | Typ 1.8 (VDD=3.0V) |
| SCI7701YCB* | | | | | | |
| SCI7701YPA | CMOS | 2.20 | 2.25 | 2.30 | 1.5 to 10.0 | Typ 1.8 (VDD=3.0V) |
| SCI7701YSA | CMOS | 2.30 | 2.35 | 2.40 | 1.5 to 10.0 | Typ 1.8 (VDD=3.0V) |
| SCI7701YEA | CMOS | 2.50 | 2.55 | 2.60 | 1.5 to 10.0 | Typ 1.8 (VDD=3.0V) |
| SCI7701YFA | CMOS | 2.60 | 2.70 | 2.80 | 1.5 to 10.0 | Typ 1.8 (VDD=3.0V) |
| SCI7701YFB* | | | | | | |
| SCI7701YRA | CMOS | 2.70 | 2.80 | 2.90 | 1.5 to 10.0 | Typ 1.8 (VDD=3.0V) |
| SCI7701YGA | CMOS | 2.90 | 3.00 | 3.10 | 1.5 to 10.0 | Typ 2.2 (VDD=4.5V) |
| SCI7701YHA | CMOS | 3.10 | 3.20 | 3.30 | 1.5 to 10.0 | Typ 2.2 (VDD=4.5V) |
| SCI7701YTA | CMOS | 3.80 | 4.00 | 4.20 | 1.5 to 10.0 | Typ 2.6 (VDD=6.0V) |
| SCI7701YMA | CMOS | 4.00 | 4.15 | 4.30 | 1.5 to 10.0 | Typ 2.6 (VDD=6.0V) |
| SCI7701YJA | CMOS | 4.30 | 4.45 | 4.60 | 1.5 to 10.0 | Typ 2.6 (VDD=6.0V) |
| SCI7701YKA | CMOS | 4.60 | 4.75 | 4.90 | 1.5 to 10.0 | Typ 2.6 (VDD=6.0V) |
| SCI7701YLA | CMOS | 4.90 | 5.10 | 5.30 | 1.5 to 10.0 | Typ 2.6 (VDD=6.0V) |

* Reverse output polarity

## ■ ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Input voltage (supply voltage) | $V_{DD}$ ($V_I$) – $V_{SS}$ | 12 | V |
| Output voltage | $V_O$ | VDD + 0.3 to VSS – 0.3 | V |
| Output current | $I_O$ | 50 | mA |
| Power dissipation (TA ≤ 25°C) | $P_D$ | 400 | mW |
| Operating temperature | $T_{opr}$ | –30 to 85 | °C |
| Storage temperature | $T_{stg}$ | –65 to 150 | °C |
| Soldering temperature and time | $T_{sol}$ | 260°C, 10s (at lead) | — |

Note: Although this IC has electrostatic protection circuit, damage may still occur if very high electrostatic potentials are applied.

Note: When this IC is soldered in the solder-reflow process, be sure to maintain the reflow furnace at the curve shown in “Fig. 3–5 Reflow Furnace Temperature Curve” of DATA BOOK. This IC cannot be exposed to the high temperature of the the solder dipping.

## ■ ELECTRICAL CHARACTERISTICS

### ● SCI7700YSeries/SCI7701YSeries

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Detection voltage | $V_{DET}$ | Ta=25°C | See page 2 | | | V |
| Operating supply current | $I_{DDO}$ | $V_{DD}$=1.5V, Ta=25°C | — | 1.4 | 3.0 | µA |
| | | $V_{DD}$=3.0V, Ta=25°C | — | 1.8 | 4.0 | |
| | | $V_{DD}$=4.5V, Ta=25°C | — | 2.2 | 5.0 | |
| | | $V_{DD}$=6.0V, Ta=25°C | — | 2.6 | 6.0 | |
| Supply (Operating) voltage | $V_{DD}$ ($V_I$) | Ta=–30 to 85°C | See page 2 | | | V |
| Hysteresis difference | $\Delta V_{DET}$ | Ta=–30 to 85°C | — | $V_{DET}$x0.05* | — | V |
| Temperature coefficient of $V_{DET}$ | $\frac{V_{DET}(Ta=70°C)-V_{DET}(Ta=-20°C)}{90}$ | Ta=–30 to 85°C | Typ($V_{DET}$/$V_R$)x0.1 | | | mV/°C |

* $V_{DET}$ x 0.04 (Typ) about SCI7700Y$_{TA}$/SCI7701Y$_{TA}$/SCI7701Y$_{MA}$/SCI7701Y$_{JA}$/SCI7701Y$_{KA}$/SCI7701Y$_{LA}$

### ● SCI7700Y$_{VA}$/SCI7700Y$_{AA}$/SCI7700Y$_{BA}$

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Output current | | $V_{DD}$ = 0.85V, $V_{DS}$ = 0.5V, Ta = 25°C | 0.05 | 0.40 | 1.00 | mA |
| | $I_O$ (Nch) | $V_{DD}$ = 0.95V, $V_{DS}$ = 0.5V, Ta = 25°C | 0.15 | 0.70 | 1.50 | |
| | | $V_{DD}$ = 1.05V, $V_{DS}$ = 0.5V, Ta = 25°C | 0.30 | 1.00 | 2.00 | |
| Reference voltage supply | $V_R$ | Ta = 25°C | 0.70 | 0.80 | 0.90 | V |

$V_{DS}$: Voltage between drain and source

## ■ ELECTRICAL CHARACTERISTICS (Cont.)

- **SCI7700YNA/SCI7700YTA/SCI7701YCA/SCI7701YPA/SCI7701YSA/SCI7701YEA/SCI7701YFA/ SCI7701YRA/SCI7701YGA/SCI7701YHA/SCI7701YTA/SCI7701YMA/SCI7701YJA/SCI7701YKA/ SCI7701YLA**

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Output current | IO (Nch) | VDD=0.95V, VDS=0.5V, Ta=25°C | 0.03 | 0.15 | 0.50 | mA |
| | | VDD=1.00V, VDS=0.5V, Ta=25°C | 0.05 | 0.22 | 0.60 | |
| | | VDD=1.20V, VDS=0.5V, Ta=25°C | 0.30 | 0.70 | 1.50 | |
| | | VDD=2.40V, VDS=0.5V, Ta=25°C | 1.40 | 2.00 | 2.30*1 | |
| | | VDD=3.60V, VDS=0.5V, Ta=25°C | 1.50 | 2.30 | 2.60*2 | |
| | IO (Pch) | VDD=4.50V, VDS=2.1V, Ta=25°C | 1.7 | 2.0 | 2.3 | |
| | | VDD=8.00V, VDS=2.1V, Ta=25°C | 2.8 | 3.1 | 3.8 | |
| Reference voltage supply | VR | Ta=25°C | 0.90 | 1.00 | 1.10 | V |

* 1: 3.30 mA about SCI7700YTA, * 2: 4.00 mA about SCI7700TA VDS: Voltage between drain and source

* Please inquire IC sales department about SCI7700YCA.

- **SCI7700YAS/SCI7700YFA/SCI7701YCB/SCI7700YFB**

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Output current | IO (Nch) | VDD=0.8V, VOUT=0.1V, Ta=25°C*1 | 0.01 | — | — | mA |
| | | VDD=2.4V, VOUT=0.5V, Ta=25°C*2 | 1.7 | 2.5 | 3.3 | |
| | | VDD=2.4V, VOUT=0.5V, Ta=25°C*3 | 1.4 | 1.8 | 2.3 | |
| | | VDD=3.0V, VOUT=0.5V, Ta=25°C*4 | 1.5 | 2.0 | 2.5 | |
| | IO (Pch) | VDD=2.0V, VOUT=1.5V, Ta=25°C*3 | 0.1 | 0.3 | 0.9 | |
| | | VDD=2.0V, VOUT=1.5V, Ta=25°C*4 | 0.1 | 2.0 | 2.5 | |
| Reference voltage supply | VR | Ta=25°C*1 | 0.7 | 0.8 | 0.9 | V |
| | | Ta=25°C*2,*3,*4 | 0.9 | 1.0 | 1.1 | |

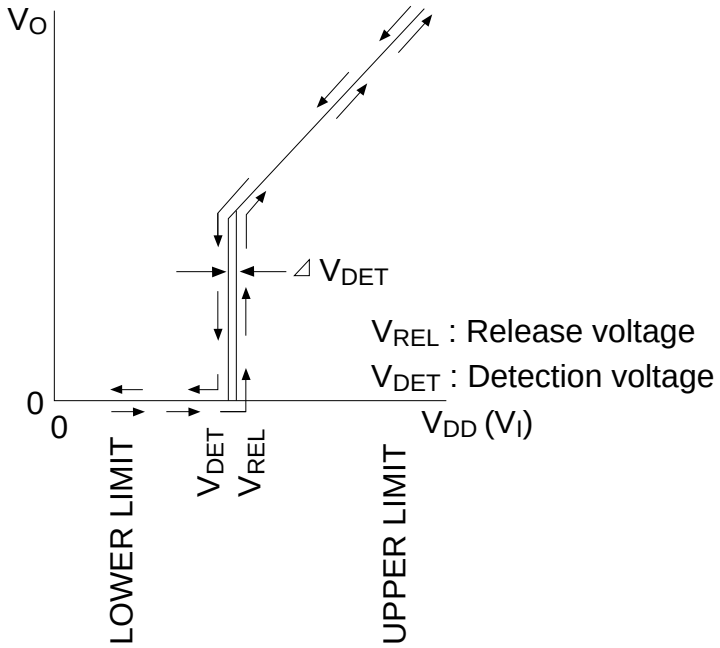
* 1: Applicable to SCI7700YAS

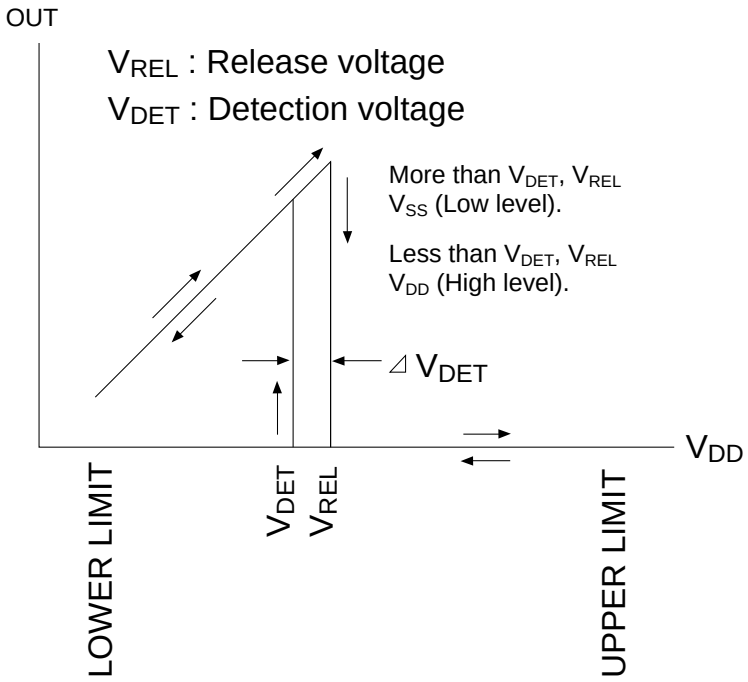
* 2: Applicable to SCI7700YFA

* 3: Applicable to SCI7701YCB

* 4: Applicable to SCI7701YFB

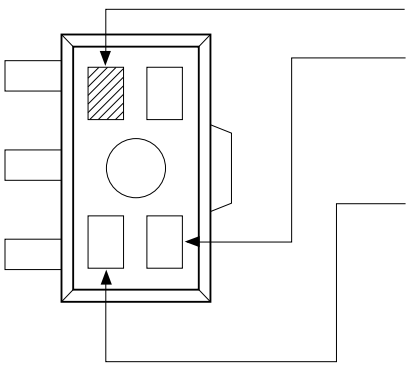
## ■ PERFORMANCE CURVES



## ■ MARKING

An abbreviation is printed on SCI7700Yseries/SCI7701Yseries below, because its package size is very small.



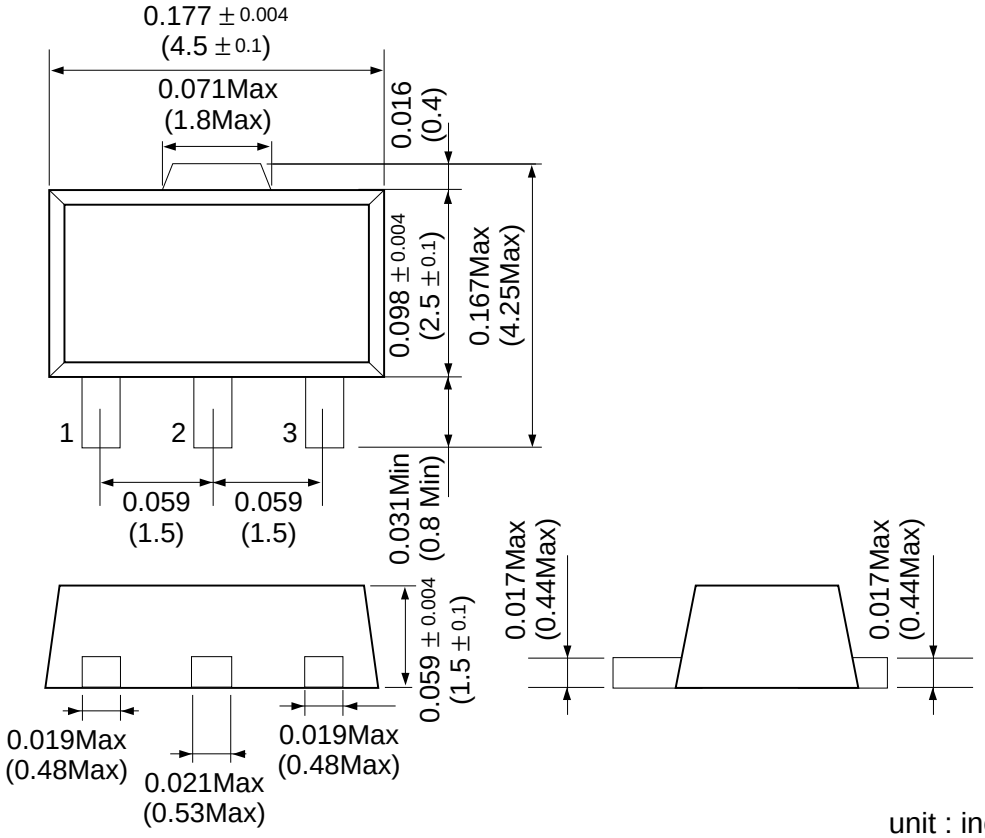
Brand mark.

Detection voltage code
The first code of sub code
(Ex. B with SCI7700Y$_{BA}$)

Series code
C : CMOS output (SCI7701 Y series)
D : Open drain Nch output
(SCI7700Y series)

## ■ PACKAGE DIMENSIONS

SOT 89-3 pin




unit : inch (mm)

**November 1996**

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