

Section 4.1

DETECTOR SPECIFICATIONS

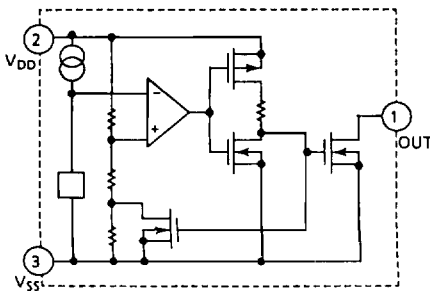
● Description

The S-805 and S-807 Series are non-adjusting high-precision voltage detectors made using the CMOS process. The detection voltages are fixed internally, with an accuracy of $\pm 5\%$ or $\pm 2.4\%$, respectively. Output forms are Nch opendrain and CMOS active low, both of which have various product lineups. These Series feature ultra low current consumption and high detection voltage accuracies. The super miniature package SOT-23-5 is available for the S-807 Series, allowing the designer to shrink the size of the finished product. These detectors enable battery-powered portable equipment to have a higher capacity in the smallest footprints.

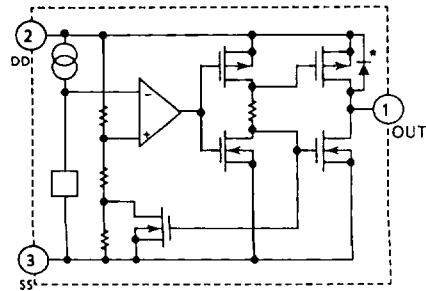
● Features

- Ultra-low current consumption: 1.0 μA typ.
- High-precision: $\pm 5\%$ or $\pm 2.4\%$
- High Reliability: -ESD protection and latch-up proof construction
- Wide Operating range: 1-15V
- Detection Range: 1.0V to 7.7V, 0.1V increments
- Good hysteresis characteristics: 5% typ.
- Wide operating temperature range: -30°C to $+80^\circ\text{C}$, can expand to -40°C to $+85^\circ\text{C}$ for certain voltages
- Packaging options: TO-92, SOT-89-3, SOT-23-5

● Block Diagrams



(1) Nch opendrain output



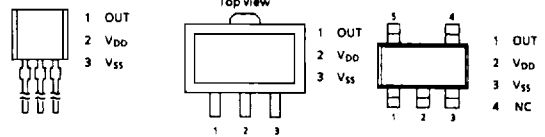
* Parasitic diode

(2) CMOS active low output

● Applications

- Reset for microcomputers and large circuits
- Battery checker and monitoring
- Battery backup for memories
- Power failure detector
- Store signal detector for non-volatile RAM
- Timing delays
- Level shifting and discrimination

● Packages



TO-92

SOT-89-3

SOT-23-5

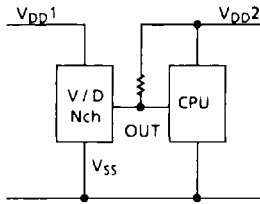
Section 4.1 DETECTOR SPECIFICATIONS

● Output configurations and their implementations

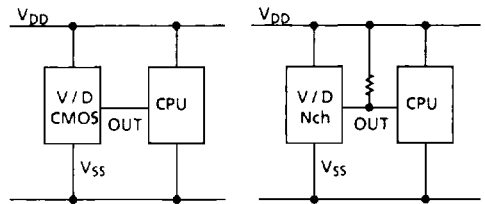
| Implementation | Nch | CMOS ("L") |
|---|-----|------------|
| With different power supplies | YES | NO |
| With active low reset CPUs | YES | YES |
| With active high reset CPUs | NO | CMOS - H * |
| As power resets employing CR circuits | YES | NO |
| With voltage divider resistors to vary ($-V_{DET}$) | YES | NO |

* Limited voltages available (see product selection)

Example with two power supplies



Examples with one power supply



or

● Ratings

| Item | Symbol | Ratings | |
|--|--------------------------------|--|------------------------------------|
| Power supply voltage | $V_{DD} - V_{SS}$ | 12V for S-805 18V for S-807 | |
| Input voltage | V_{IN} | $V_{SS} - 0.3V \sim V_{IN} + 0.3V$ | |
| Output voltage | Nch open drain | V_{OUT} | $V_{SS} - 0.3V \sim 12V$ for S-805 |
| | | V_{OUT} | $V_{SS} - 0.3V \sim 18V$ for S-807 |
| | CMOS | V_{OUT} | $V_{SS} - 0.3V \sim V_{IN} + 0.3V$ |
| Output current | I_{OUT} | 50 mA nom, 100 mA max | |
| Allowable power dissipation | P_D | TO-92, SOT-89 | 200 mW |
| | | SOT-23-5 | 150 mW |
| Operating temperature | T_{opr} | -20°C ~ +70°C for S-805 -30°C ~ +80°C for S-807 | |
| Storage temperature | T_{stg} | -40°C ~ +125°C | |
| Soldering condition | T_{slder} | 260° for 10 seconds | |
| Temperature characteristic of $-V_{DET}$ | $\Delta -V_{DET} / \Delta T_a$ | ± 0.125 mV/°C per volt | |

Section 4.1 DETECTOR SPECIFICATIONS

● Product Selection

| Detection voltage range (V) | Hys. typ. (V) | Nch opendrain output | | | CMOS output (LOW) ¹ | | | Standard ² |
|-----------------------------|---------------|----------------------|----------------|----------------|--------------------------------|----------------|----------------|-----------------------|
| | | TO-92 | SOT-89-3 | SOT-23-5 | TO-92 | SOT-89-3 | SOT-23-5 | |
| 1.0V ± 5% | 0.053 | S-8051ANB | S-8051ANB-NA-X | | | | | |
| 1.15V ± 5% | 0.058 | S-8051ANR | S-8051ANR-NB-X | | | | | |
| 1.5V ± 2.4% | 0.075 | | S-80715AN-DC-X | | | S-80715AL-AC-X | | S |
| 1.6V ± 2.4% | 0.08 | S-80716AN | S-80716AN-DD-X | | | S-80716AL-AD-X | | |
| 1.7V ± 2.4% | 0.085 | S-80717AN | S-80717AN-DE-X | S-80717SN-DE-X | S-80717AL | S-80717AL-AE-X | | |
| 1.8V ± 2.4% | 0.09 | S-80718AN | S-80718AN-DF-X | | S-80718AL | S-80718AL-AF-X | S-80718SL-AF-X | |
| 1.9V ± 2.4% | 0.095 | S-80719AN | S-80719AN-DG-X | S-80719SN-DG-X | S-80719AL | S-80719AL-AG-X | S-80719SL-AG-X | |
| 2.0V ± 2.4% | 0.1 | S-80720AN | S-80720AN-DH-X | S-80720SN-DH-X | | S-80720AL-AH-X | S-80720SL-AH-X | S |
| 2.1V ± 2.4% | 0.105 | S-80721AN | S-80721AN-DJ-X | S-80721SN-DJ-X | S-80721AL | S-80721AL-AJ-X | S-80721SL-AJ-X | |
| 2.2V ± 2.4% | 0.11 | S-80722AN | S-80722AN-DK-X | | S-80722AL | S-80722AL-AK-X | | S |
| 2.3V ± 2.4% | 0.115 | S-80723AN | S-80723AN-DL-X | S-80723SN-DL-X | S-8052ALR ³ | S-80723AL-AL-X | S-80723SL-AL-X | |
| 2.4V ± 2.4% | 0.12 | S-80724AN | S-80724AN-DM-X | S-80724SN-DM-X | S-80724AL | S-80724AL-AM-X | | |
| 2.5V ± 2.4% | 0.125 | S-80725AN | S-80725AN-DN-X | S-80725SN-DN-X | S-80725AL | S-80725AL-AN-X | S-80725SL-AN-X | S |
| 2.6V ± 2.4% | 0.13 | S-80726AN | S-80726AN-DP-X | | | S-80726AL-AP-X | | |
| 2.7V ± 2.4% | 0.135 | S-80727AN | S-80727AN-DQ-X | S-80727SN-DQ-X | S-80727AL | S-80727AL-AQ-X | S-80727SL-AQ-X | |
| 2.8V ± 2.4% | 0.14 | S-80728AN | S-80728AN-DR-X | S-80728SN-DR-X | | S-80728AL-AR-X | S-80728SL-AR-X | S |
| 2.9V ± 2.4% | 0.145 | | S-80729AN-DS-X | | S-80729AL | S-80729AL-AS-X | | |
| 2.95V ± 5% | 0.148 | | | | S-8053ALB | S-8053ALB-LI-X | | |
| 3.0V ± 2.4% | 0.15 | S-80730AN | S-80730AN-DT-X | S-80730SN-DT-X | S-80730AL | S-80730AL-AT-X | S-80730SL-AT-X | S |
| 3.1V ± 2.4% | 0.155 | S-80731AN | S-80731AN-DV-X | | S-80731AL | S-80731AL-AV-X | | |
| 3.2V ± 2.4% | 0.16 | S-80732AN | S-80732AN-DW-X | | S-80732AL | S-80732AL-AW-X | S-80732SL-AW-X | S |
| 3.25V ± 5% | 0.163 | | | | S-8053ALR | S-8053ALR-LJ-X | | |
| 3.3V ± 2.4% | 0.165 | S-80733AN | S-80733AN-DX-X | S-80733SN-DX-X | S-80733AL | S-80733AL-AX-X | S-80733SL-AX-X | S |
| 3.4V ± 2.4% | 0.17 | S-80734AN | S-80734AN-DY-X | | S-80734AL | S-80734AL-AY-X | | |
| 3.5V ± 2.4% | 0.175 | S-80735AN | S-80735AN-DZ-X | S-80735SN-DZ-X | S-80735AL | S-80735AL-AZ-X | S-80735SL-AZ-X | S |
| 3.55V ± 5% | 0.178 | S-8053ANO | | | | | | |
| 3.6V ± 2.4% | 0.18 | S-80736AN | S-80736AN-DO-X | | | S-80736AL-AO-X | | |
| 3.7V ± 2.4% | 0.185 | S-80737AN | S-80737AN-D1-X | | S-80737AL | S-80737AL-A1-X | | |
| 3.8V ± 2.4% | 0.19 | S-80738AN | S-80738AN-D2-X | | S-80738AL | S-80738AL-A2-X | | |
| 3.9V ± 2.4% | 0.195 | S-80739AN | S-80739AN-D3-X | | S-80739AL | S-80739AL-A3-X | | |
| 4.0V ± 2.4% | 0.2 | S-80740AN | S-80740AN-D4-X | S-80740SN-D4-X | S-80740AL | S-80740AL-A4-X | S-80740SL-A4-X | S |
| 4.1V ± 2.4% | 0.205 | S-80741AN | S-80741AN-D5-X | | S-80741AL | S-80741AL-A5-X | | |
| 4.15V ± 5% | 0.208 | | | | S-8054ALB | S-8054ALB-LM-X | | |
| 4.2V ± 2.4% | 0.21 | S-80742AN | S-80742AN-D6-X | S-80742SN-D6-X | S-80742AL | S-80742AL-A6-X | S-80742SL-A6-X | |
| 4.3V ± 2.4% | 0.215 | S-80743AN | S-80743AN-D7-X | | S-80743AL | S-80743AL-A7-X | | |
| 4.4V ± 2.4% | 0.22 | S-80744AN | S-80744AN-D8-X | S-80744SN-D8-X | S-80744AL | S-80744AL-A8-X | | |
| 4.45V ± 5% | 0.223 | | | | S-8054ALR | S-8054ALR-LN-X | | |
| 4.5V ± 2.4% | 0.225 | S-80745AN | S-80745AN-D9-X | S-80745SN-D9-X | S-80745AL | S-80745AL-A9-X | S-80745SL-A9-X | S |
| 4.6V ± 2.4% | 0.23 | | S-80746AN-JA-X | | S-80746AL | S-80746AL-EA-X | | |
| 4.6V ± 5% | 0.05 | S-8054HNM | | | | | | S |
| 4.7V ± 2.4% | 0.235 | | S-80747AN-JB-X | | S-80747AL | S-80747AL-EB-X | | |
| 4.75V ± 5% | 0.238 | | | | S-8054ALO | | | |
| 4.8V ± 2.4% | 0.24 | S-80748AN | S-80748AN-JC-X | | | S-80748AL-EC-X | | |
| 4.9V ± 2.4% | 0.245 | | S-80749AN-JD-X | | | S-80749AL-ED-X | | |
| 5.0V ± 2.4% | 0.25 | S-80750AN | S-80750AN-JE-X | S-80750SN-JE-X | | S-80750AL-EE-X | S-80750SL-EE-X | S |
| 5.05V ± 5% | 0.253 | | | | S-8054ALY | | | |
| 5.1V ± 2.4% | 0.255 | S-80751AN | S-80751AN-JF-X | S-80751SN-JF-X | S-80751AL | | S-80751SL-EF-X | |
| 5.3V ± 2.4% | 0.265 | S-80753AN | | | | | | |
| 5.5V ± 2.4% | 0.275 | | | | | S-80755AL-EK-X | | S |
| 6.1V ± 2.4% | 0.305 | | | | | | S-80761SL-ER-X | |
| 6.3V ± 2.4% | 0.315 | | S-80763AN-JT-X | | | | | S |
| 7.7V ± 2.4% | 0.385 | | | S-80777SN-J8-X | | | | S |

1 CMOS "L" output products are: non-standard. CMOS "H" outputs are available for: 1.8V, 2.5V, 3.1V, 3.3V, 4.0V and 4.5V.

For further information, please contact the sales office for Seiko Instruments.

2 S - Standard, All others listed are non-standard, not custom. Customization is available for most other voltages levels and/or packages not shown.

3 Tolerance on S-805 parts are ± 5%.

Section 4.1 DETECTOR SPECIFICATIONS

● Electrical Characteristics

Entire S-807 Series

(Unless otherwise specified, $T_a = 25^\circ\text{C}$)

| Item | Symbol | Conditions | Min. | Typ. | Max. | |
|---------------------------------------|-------------------------------|--|-------------------------------|------------------------------|-------------------------------|----|
| Detection voltage | $-V_{\text{DET}}$ | + 2.4% tolerance | $-V_{\text{DET}}$ x 0.976V | $-V_{\text{DET}}$ | $-V_{\text{DET}}$ x 1.024V | |
| Hysteresis width | V_{HYS} | | $-V_{\text{DET}}$ x 0.02V | $-V_{\text{DET}}$ x 0.05V | $-V_{\text{DET}}$ x 0.08V | |
| Current consumption | I_{SS} | $V_{\text{DD}} = 3\text{V}$, up to V_{DET} of 2.1V $V_{\text{DD}} = 4.5\text{V}$, V_{DET} (2.1-3.6V) $V_{\text{DD}} = 6.0\text{V}$, V_{DET} (3.7-5.1V) | -- | 1 - 1.4 μA | 3-3.5 μA | |
| Operating voltage | V_{DD} | | 1.0V | -- | 15V | |
| Output current | I_{OUT} | Nch $V_{\text{DS}} = 0.5\text{V}$ | $V_{\text{DD}} = 1.2\text{V}$ | 0.23mA | 0.50mA | -- |
| | | | $V_{\text{DD}} = 2.4\text{V}$ | 1.60mA | 3.70mA | -- |
| | | | $V_{\text{DD}} = 3.6\text{V}$ | 3.18mA | 7.00mA | -- |
| | | CMOS $V_{\text{DS}} = 0.5\text{V}$ | $V_{\text{DD}} = 4.8\text{V}$ | 0.36mA | 0.62mA | -- |
| CMOS $V_{\text{DS}} = 0.5\text{V}$ | $V_{\text{DD}} = 6.0\text{V}$ | 0.46mA | 0.75mA | -- | | |

S-8051ANB, S-8051ANB-NA-X, S-8051ANR, S-8051ANR-NB-X

| Item | Symbol | Condition | Min. | Typ. | Max. | |
|---------------------|-------------------|--------------------------------------|------------------------------|------------------------------|------------------------------|----|
| Detection voltage | $-V_{\text{DET}}$ | $\pm 5\%$ tolerance | $-V_{\text{DET}}$ x 0.95V | $-V_{\text{DET}}$ | $-V_{\text{DET}}$ x 1.05V | |
| Hysteresis width | V_{HYS} | | -- | $-V_{\text{DET}}$ x 0.05V | -- | |
| Current consumption | I_{SS} | $V_{\text{DD}} = 1.5\text{V}$ | -- | 1.4 μA | 3.0 μA | |
| Operating voltage | V_{DD} | | 0.9V | -- | 5.0V | |
| Output current | I_{OUT} | Nch $V_{\text{DS}} = 0.5\text{V}$ | $V_{\text{DD}} = 95\text{V}$ | 0.03mA | 0.25mA | -- |

S-8052ALR

| Item | Symbol | Condition | Min. | Typ. | Max. | |
|---------------------|-------------------|---------------------------------------|--------------------------------|------------------------------|------------------------------|----|
| Detection voltage | $-V_{\text{DET}}$ | $\pm 5\%$ tolerance | $-V_{\text{DET}}$ x 0.95V | 2.3V | $-V_{\text{DET}}$ x 1.05V | |
| Hysteresis width | V_{HYS} | | -- | $-V_{\text{DET}}$ x 0.05V | -- | |
| Current consumption | I_{SS} | $V_{\text{DD}} = 3.0\text{V}$ | -- | 1.8 μA | 4 μA | |
| Operating voltage | V_{DD} | | 1.5V | -- | 10V | |
| Output current | I_{OUT} | Nch $V_{\text{DS}} = 0.5\text{V}$ | $V_{\text{DD}} = 0.95\text{V}$ | 0.03mA | 0.25mA | -- |
| | | | $V_{\text{DD}} = 1.20\text{V}$ | 0.23mA | 0.50mA | -- |
| | | CMOS $V_{\text{DS}} = 2.1\text{V}$ | $V_{\text{DD}} = 4.5\text{V}$ | 0.04mA | -- | -- |

Section 4.1

DETECTOR SPECIFICATIONS

● **Electrical Characteristics, *cont.***

S-8053ALB, S-8053ALB-LI-X, S-8053ALR, S-8053ALR-LJ-X, S-8053ANO

| Item | Symbol | Condition | | Min. | Typ. | Max. |
|---------------------|------------|-------------------------|-----------------|------------------------------|------------------------------|------------------------------|
| Detection voltage | $-V_{DET}$ | $\pm 5\%$ tolerance | | $-V_{DET}$ $\times 0.95V$ | $-V_{DET}$ | $-V_{DET}$ $\times 1.05V$ |
| Hysteresis width | V_{HYS} | | | -- | $-V_{DET}$ $\times 0.05V$ | -- |
| Current consumption | I_{SS} | $V_{DD} = 4.5V$ | | -- | 2.2 μA | 5.0 μA |
| Operating voltage | V_{DD} | | | 1.6V | -- | 10.0V |
| Output current | I_{OUT} | Nch $V_{DS} = 0.5V$ | $V_{DD} = 1.2V$ | 0.23mA | 0.50mA | -- |
| | | | $V_{DD} = 2.4V$ | 1.60mA | 3.70mA | -- |
| | | CMOS $V_{DS} = 2.1V$ | $V_{DD} = 4.5V$ | 0.04mA | -- | -- |

S-8054ALB, S-8054ALB-LM-X, S-8054ALR, S-8054ALR-LN-X, S-8054ALO, S-8054ALY

| Item | Symbol | Condition | | Min. | Typ. | Max. |
|---------------------|------------|-----------------------------|-----------------|------------------------------|------------------------------|------------------------------|
| Detection voltage | $-V_{DET}$ | $\pm 5\%$ tolerance | | $-V_{DET}$ $\times 0.95V$ | $-V_{DET}$ | $-V_{DET}$ $\times 1.05V$ |
| Hysteresis width | V_{HYS} | | | -- | $-V_{DET}$ $\times 0.05V$ | -- |
| Current consumption | I_{SS} | $V_{DD} = 6.0V$ | | -- | 2.6 μA | 6.0 μA |
| Operating voltage | V_{DD} | | | 1.6V | -- | 10.0V |
| Output current | I_{OUT} | Nch $V_{DS} = 0.5V$ | $V_{DD} = 1.2V$ | 0.23mA | 0.50mA | -- |
| | | | $V_{DD} = 2.4V$ | 1.60mA | 3.70mA | -- |
| | | | $V_{DD} = 3.6V$ | 3.18mA | 7.00mA | -- |
| | | Pch CMOS $V_{DS} = 2.1V$ | $V_{DD} = 8.0V$ | 1.00mA | -- | -- |

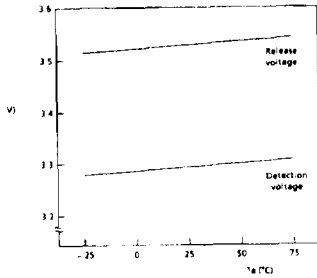
S-8054HNM

| Item | Symbol | Condition | | Min. | Typ. | Max. |
|---------------------|------------|------------------------|-----------------|--------|-------------|-------------|
| Detection voltage | $-V_{DET}$ | $\pm 5\%$ tolerance | | 4.50V | 4.60V | 4.70V |
| Hysteresis width | V_{HYS} | | | -- | 0.05V | 0.10V |
| Current consumption | I_{SS} | $V_{DD} = 6.0V$ | | -- | 2.6 μA | 6.0 μA |
| Operating voltage | V_{DD} | | | 1.6V | -- | 10.0V |
| Output current | I_{OUT} | Nch $V_{DS} = 0.5V$ | $V_{DD} = 1.2V$ | 0.23mA | 0.50mA | -- |
| | | | $V_{DD} = 2.4V$ | 1.60mA | 3.70mA | -- |

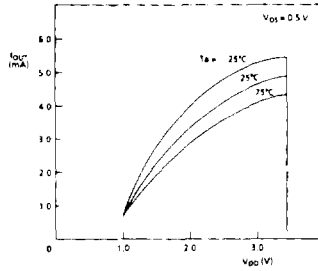
Section 4.1 DETECTOR SPECIFICATIONS

● Characteristics

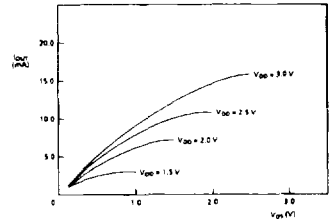
S-805
Temperature Characteristics



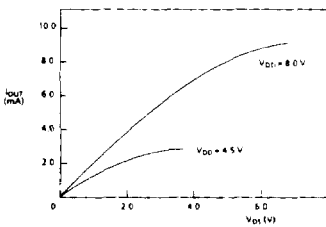
S-805
Opendrain I_{OUT} vs V_{DD}
 T_a vs V Characteristics
(V_{DS} parameter)



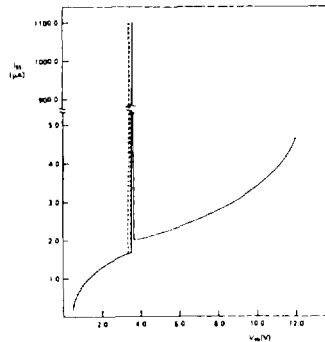
S-805
 I_{OUT} vs V_{DS} Characteristics
(V_{DD} parameter)



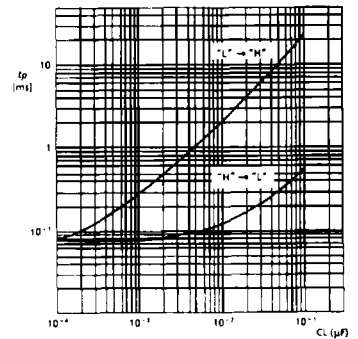
S-805
CMOS I_{OUT} vs V_{DD} Characteristics



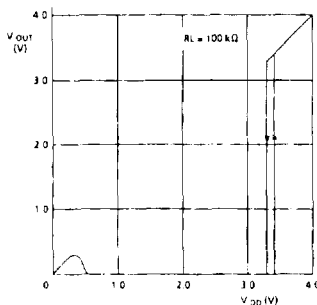
S-805
Current consumption Characteristics



S-805
Dynamic response Characteristics



S-805
Minimum operating voltage

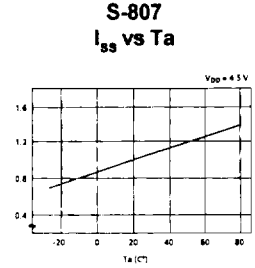
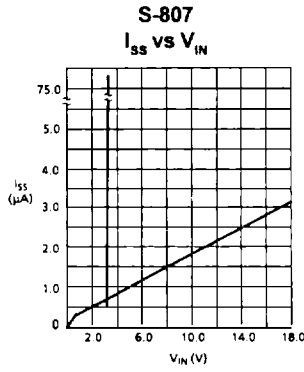
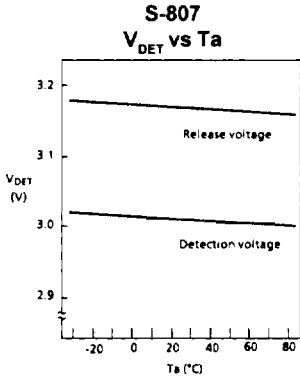


Broken line: Current consumption characteristics when power supply voltage < 12V. Where through type voltage flow is a detection voltage.

Continuous line: Current consumption characteristics when power supply voltage rises. Where through type voltage flow is a release voltage.

Section 4.1 DETECTOR SPECIFICATIONS

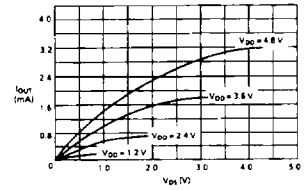
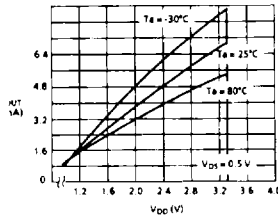
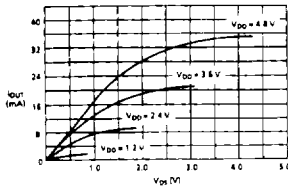
● Characteristics



S-807 Nch
transistor current
 I_{OUT} vs V_{DS}

S-807 Nch
transistor current
 I_{OUT} vs V_{DD}

S-807 CMOS
transistor current
 I_{OUT} vs V_{DS}



S-807 CMOS
Minimum operating voltage
 V_{OUT} vs V_{DD}

S-807 Nch output
dynamic response

S-807 CMOS
output dynamic response

