

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

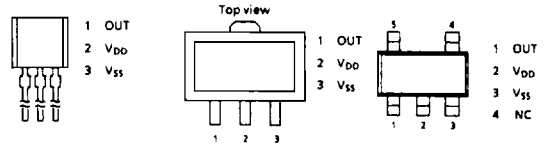
- Ultra-low current consumption: 1.0 μA typ.
- High-precision: $\pm 5\%$ or $\pm 2.4\%$
- High Reliability: -ESD protection and latch-up proof construction
- Wide Operating range: 1-15V
- Detection Range: 1.0V to 7.7V, 0.1V increments
- Good hysteresis characteristics: 5% typ.
- Wide operating temperature 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

● 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

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● Packages

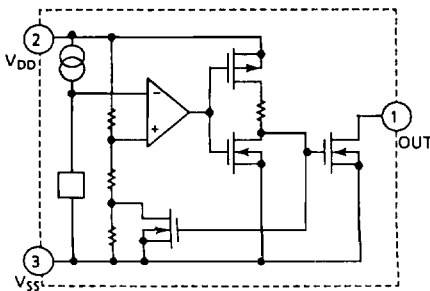


TO-92

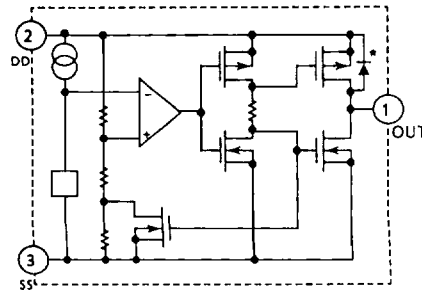
SOT-89-3

SOT-23-5

● Block Diagrams



(1) Nch opendrain output



(2) CMOS active low output

* Parasitic diode

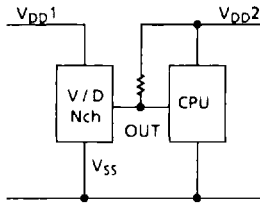
Section 4.1 DETECTOR SPECIFICATIONS

● Output configurations and their implementations

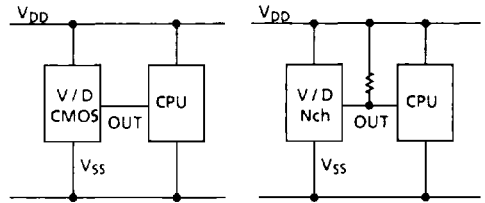
Implementation	Nch	CMOS ("L")
With different power supplies	YES	NO
With active low reset CPUs	YES	YES
With active high reset CPUs	NO	CMOS - H *
As power resets employing CR circuits	YES	NO
With voltage divider resistors to vary ($-V_{DET}$)	YES	NO

* 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, Ta = 25°C)

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

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

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

S-8052ALR

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

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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	--	--

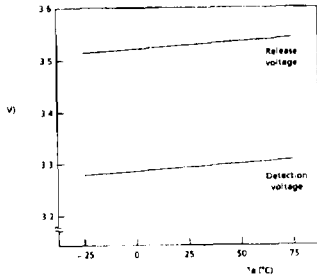
S-8054HNM

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	--

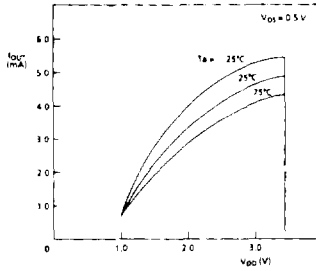
Section 4.1 DETECTOR SPECIFICATIONS

● Characteristics

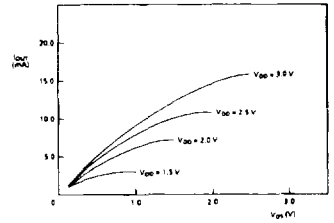
S-805
Temperature Characteristics



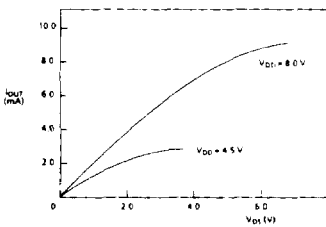
S-805
Opendrain I_{OUT} vs V_{DD}
 T_a vs V Characteristics
(VDS parameter)



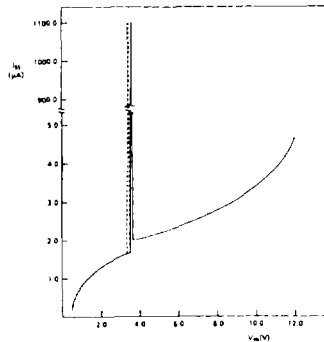
S-805
 I_{OUT} vs V_{DS} Characteristics
(V_{DD} parameter)



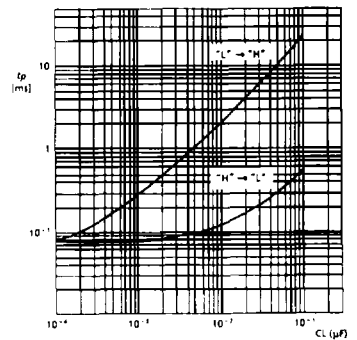
S-805
CMOS I_{OUT} vs V_{DD} Characteristics



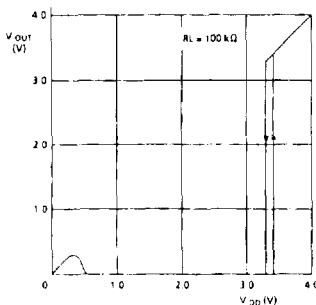
S-805
Current consumption Characteristics



S-805
Dynamic response Characteristics



S-805
Minimum operating voltage

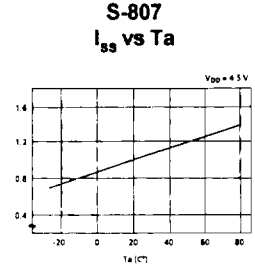
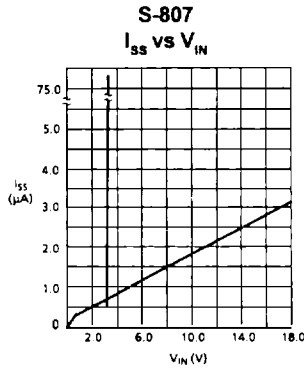
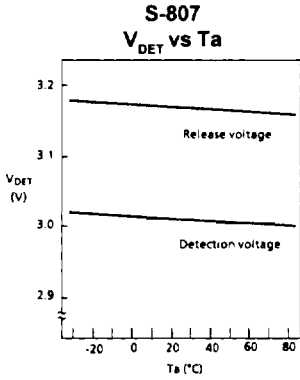


Broken line: Current consumption characteristics when power supply voltage < 12V. Where through type voltage flow is a detection voltage.

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

Section 4.1 DETECTOR SPECIFICATIONS

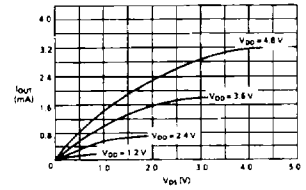
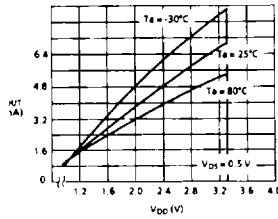
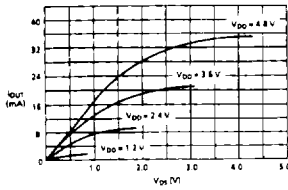
● Characteristics



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

