Contents

accuracy of ±2.0%. Two output types, Nch open-drain and C
output, are available.

■ Features

ù Ultra-low current consumption

1.3 µA typ. (V_{DD}=1.5 V)

Products with detection voltage of 1.4 V or less
electronic

0.8µA typ. (V_{DD}=3.5 V)

Products with detection voltage of 1.5 V or more

ù High-precision detection voltage

±2.0%

ù Low operating voltage

0.7 to 5.0 V

Products with detection voltage of 1.4 V or less

0.95 to 10.0 V

Products with a detection voltage of 1.5 V or more

ù Hysteresis characteristics

5% typ.

ù Detection voltage

0.8 to 6.0 V

(0.1 V step)

ù Nch open-drain active low and CMOS active low output

ù SC-82AB   Super-small plastic package

ù TO-92   Plastic package

ù SOT-89-3   Miniaturized power mold plastic package

ù SOT-23-5   Very-small plastic package

■ Applications

ù Battery checker

ù Power failure detector

ù Power monitor for pagers, calculators,
organizers,

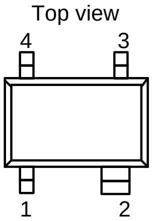
ù Constant voltage power monitor for camera
video equipment, communication devices

ù Power monitor for microcomputers and res
CPUs

■ Pin Assignment

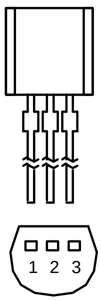
(1) SC-82AB

Top view



1 OUT
2 V_{DD}
3 NC
4 V_{SS}

(2) TO-92

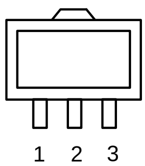


Bottom view

1 OUT
2 V_{DD}
3 V_{SS}

(3) SOT-89-3

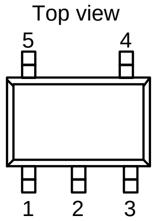
Top view



1 OUT
2 V_{DD}
3 V_{SS}

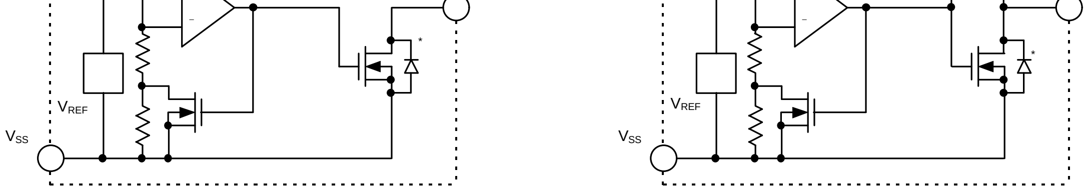
(4) SOT-23-5

Top view



1
2
3
4
5

Figure 1



*Parasitic diode

Figure 2

■ Selection Guide

S-808XX AX XX - XXX - T2

- T2: Directions of the IC for taping specifications
- XXX: Product name (abbreviation)
- XX: Package name (abbreviation)
  - NP: SC-82AB
  - MP: SOT-23-5
  - UP: SOT-89-3
  - Y: TO-92
- AX: Output type
  - N: Nch open-drain (active low output)
  - L: CMOS (active low output)
- XX (after S-808): Detection voltage rank

1.1V±2.0%	0.064	S-80811ANNP-E71-T2	—	—	—
1.2V±2.0%	0.073	S-80812ANNP-E72-T2	—	—	—
1.3V±2.0%	0.083	S-80813ANNP-EDA-T2	—	—	—
1.4V±2.0%	0.093	S-80814ANNP-EDB-T2	—	—	—
1.5V±2.0%	0.075	S-80815ANNP-EDC-T2	S-80815ANY	S-80815ANUP-EDC-T2	—
1.6V±2.0%	0.080	S-80816ANNP-EDD-T2	S-80816ANY	S-80816ANUP-EDD-T2	—
1.7V±2.0%	0.085	S-80817ANNP-EDE-T2	S-80817ANY	S-80817ANUP-EDE-T2	S-80817ANMP-ED
1.8V±2.0%	0.090	S-80818ANNP-EDF-T2	S-80818ANY	S-80818ANUP-EDF-T2	S-80818ANMP-ED
1.9V±2.0%	0.095	S-80819ANNP-EDG-T2	S-80819ANY	S-80819ANUP-EDG-T2	S-80819ANMP-ED
2.0V±2.0%	0.100	S-80820ANNP-EDH-T2	S-80820ANY	S-80820ANUP-EDH-T2	S-80820ANMP-ED
2.1V±2.0%	0.105	S-80821ANNP-EDJ-T2	S-80821ANY	S-80821ANUP-EDJ-T2	S-80821ANMP-ED
2.2V±2.0%	0.110	S-80822ANNP-EDK-T2	S-80822ANY	S-80822ANUP-EDK-T2	S-80822ANMP-ED
2.3V±2.0%	0.115	S-80823ANNP-EDL-T2	S-80823ANY	S-80823ANUP-EDL-T2	S-80823ANMP-ED
2.4V±2.0%	0.120	S-80824ANNP-EDM-T2	S-80824ANY	S-80824ANUP-EDM-T2	S-80824ANMP-ED
2.5V±2.0%	0.125	S-80825ANNP-EDN-T2	S-80825ANY	S-80825ANUP-EDN-T2	S-80825ANMP-ED
2.6V±2.0%	0.130	S-80826ANNP-EDP-T2	S-80826ANY	S-80826ANUP-EDP-T2	—
2.7V±2.0%	0.135	S-80827ANNP-EDQ-T2	S-80827ANY	S-80827ANUP-EDQ-T2	S-80827ANMP-ED
2.8V±2.0%	0.140	S-80828ANNP-EDR-T2	S-80828ANY	S-80828ANUP-EDR-T2	S-80828ANMP-ED
2.9V±2.0%	0.145	S-80829ANNP-EDS-T2	S-80829ANY	S-80829ANUP-EDS-T2	—
3.0V±2.0%	0.150	S-80830ANNP-EDT-T2	S-80830ANY	S-80830ANUP-EDT-T2	S-80830ANMP-ED
3.1V±2.0%	0.155	S-80831ANNP-EDV-T2	S-80831ANY	S-80831ANUP-EDV-T2	—
3.2V±2.0%	0.160	S-80832ANNP-EDW-T2	S-80832ANY	S-80832ANUP-EDW-T2	S-80832ANMP-ED
3.3V±2.0%	0.165	S-80833ANNP-EDX-T2	S-80833ANY	S-80833ANUP-EDX-T2	S-80833ANMP-ED
3.4V±2.0%	0.170	S-80834ANNP-EDY-T2	S-80834ANY	S-80834ANUP-EDY-T2	S-80834ANMP-ED
3.5V±2.0%	0.175	S-80835ANNP-EDZ-T2	S-80835ANY	S-80835ANUP-EDZ-T2	S-80835ANMP-ED
3.6V±2.0%	0.180	S-80836ANNP-ED0-T2	S-80836ANY	S-80836ANUP-ED0-T2	S-80836ANMP-ED
3.7V±2.0%	0.185	S-80837ANNP-ED1-T2	S-80837ANY	S-80837ANUP-ED1-T2	—
3.8V±2.0%	0.190	S-80838ANNP-ED2-T2	S-80838ANY	S-80838ANUP-ED2-T2	—
3.9V±2.0%	0.195	S-80839ANNP-ED3-T2	S-80839ANY	S-80839ANUP-ED3-T2	S-80839ANMP-ED
4.0V±2.0%	0.200	S-80840ANNP-ED4-T2	S-80840ANY	S-80840ANUP-ED4-T2	S-80840ANMP-ED
4.1V±2.0%	0.205	S-80841ANNP-ED5-T2	S-80841ANY	S-80841ANUP-ED5-T2	—
4.2V±2.0%	0.210	S-80842ANNP-ED6-T2	S-80842ANY	S-80842ANUP-ED6-T2	S-80842ANMP-ED
4.3V±2.0%	0.215	S-80843ANNP-ED7-T2	S-80843ANY	S-80843ANUP-ED7-T2	—
4.4V±2.0%	0.220	S-80844ANNP-ED8-T2	S-80844ANY	S-80844ANUP-ED8-T2	S-80844ANMP-ED
4.5V±2.0%	0.225	S-80845ANNP-ED9-T2	S-80845ANY	S-80845ANUP-ED9-T2	S-80845ANMP-ED
4.6V±2.0%	0.230	S-80846ANNP-EJA-T2	S-80846ANY	S-80846ANUP-EJA-T2	—
4.7V±2.0%	0.235	S-80847ANNP-EJB-T2	S-80847ANY	S-80847ANUP-EJB-T2	—
4.8V±2.0%	0.240	S-80848ANNP-EJC-T2	S-80848ANY	S-80848ANUP-EJC-T2	—
4.9V±2.0%	0.245	S-80849ANNP-EJD-T2	S-80849ANY	S-80849ANUP-EJD-T2	—
5.0V±2.0%	0.250	S-80850ANNP-EJE-T2	S-80850ANY	S-80850ANUP-EJE-T2	S-80850ANMP-EJ
5.1V±2.0%	0.255	S-80851ANNP-EJF-T2	S-80851ANY	S-80851ANUP-EJF-T2	S-80851ANMP-EJ
5.2V±2.0%	0.260	S-80852ANNP-EJG-T2	—	S-80852ANUP-EJG-T2	—
5.3V±2.0%	0.265	S-80853ANNP-EJH-T2	S-80853ANY	—	—
5.4V±2.0%	0.270	S-80854ANNP-EJJ-T2	—	—	—
5.5V±2.0%	0.275	S-80855ANNP-EJK-T2	—	—	—
5.6V±2.0%	0.280	S-80856ANNP-EJL-T2	—	—	—
5.7V±2.0%	0.285	S-80857ANNP-EJM-T2	—	—	—
5.8V±2.0%	0.290	S-80858ANNP-EJN-T2	—	—	—
5.9V±2.0%	0.295	S-80859ANNP-EJP-T2	—	—	—
6.0V±2.0%	0.300	S-80860ANNP-EJQ-T2	—	S-80860ANUP-EJQ-T2	—

1.1V±2.0%	0.064	S-80811ALNP-E51-T2	—	—	—
1.2V±2.0%	0.073	S-80812ALNP-E52-T2	—	—	—
1.3V±2.0%	0.083	S-80813ALNP-EAA-T2	—	—	—
1.4V±2.0%	0.093	S-80814ALNP-EAB-T2	—	—	—
1.5V±2.0%	0.075	S-80815ALNP-EAC-T2	S-80815ALY	S-80815ALUP-EAC-T2	S-80815ALMP-EAC-T2
1.6V±2.0%	0.080	S-80816ALNP-EAD-T2	S-80816ALY	S-80816ALUP-EAD-T2	—
1.7V±2.0%	0.085	S-80817ALNP-EAE-T2	S-80817ALY	S-80817ALUP-EAE-T2	—
1.8V±2.0%	0.090	S-80818ALNP-EAF-T2	S-80818ALY	S-80818ALUP-EAF-T2	S-80818ALMP-EAF-T2
1.9V±2.0%	0.095	S-80819ALNP-EAG-T2	S-80819ALY	S-80819ALUP-EAG-T2	S-80819ALMP-EAG-T2
2.0V±2.0%	0.100	S-80820ALNP-EAH-T2	S-80820ALY	S-80820ALUP-EAH-T2	S-80820ALMP-EAH-T2
2.1V±2.0%	0.105	S-80821ALNP-EAJ-T2	S-80821ALY	S-80821ALUP-EAJ-T2	S-80821ALMP-EAJ-T2
2.2V±2.0%	0.110	S-80822ALNP-EAK-T2	S-80822ALY	S-80822ALUP-EAK-T2	—
2.3V±2.0%	0.115	S-80823ALNP-EAL-T2	S-80823ALY	S-80823ALUP-EAL-T2	S-80823ALMP-EAL-T2
2.4V±2.0%	0.120	S-80824ALNP-EAM-T2	S-80824ALY	S-80824ALUP-EAM-T2	—
2.5V±2.0%	0.125	S-80825ALNP-EAN-T2	S-80825ALY	S-80825ALUP-EAN-T2	S-80825ALMP-EAN-T2
2.6V±2.0%	0.130	S-80826ALNP-EAP-T2	S-80826ALY	S-80826ALUP-EAP-T2	—
2.7V±2.0%	0.135	S-80827ALNP-EAQ-T2	S-80827ALY	S-80827ALUP-EAQ-T2	S-80827ALMP-EAQ-T2
2.8V±2.0%	0.140	S-80828ALNP-EAR-T2	S-80828ALY	S-80828ALUP-EAR-T2	S-80828ALMP-EAR-T2
2.9V±2.0%	0.145	S-80829ALNP-EAS-T2	S-80829ALY	S-80829ALUP-EAS-T2	—
3.0V±2.0%	0.150	S-80830ALNP-EAT-T2	S-80830ALY	S-80830ALUP-EAT-T2	S-80830ALMP-EAT-T2
3.1V±2.0%	0.155	S-80831ALNP-EAV-T2	S-80831ALY	S-80831ALUP-EAV-T2	—
3.2V±2.0%	0.160	S-80832ALNP-EAW-T2	S-80832ALY	S-80832ALUP-EAW-T2	S-80832ALMP-EAW-T2
3.3V±2.0%	0.165	S-80833ALNP-EAX-T2	S-80833ALY	S-80833ALUP-EAX-T2	S-80833ALMP-EAX-T2
3.4V±2.0%	0.170	S-80834ALNP-EAY-T2	S-80834ALY	S-80834ALUP-EAY-T2	—
3.5V±2.0%	0.175	S-80835ALNP-EAZ-T2	S-80835ALY	S-80835ALUP-EAZ-T2	S-80835ALMP-EAZ-T2
3.6V±2.0%	0.180	S-80836ALNP-EA0-T2	S-80836ALY	S-80836ALUP-EA0-T2	—
3.7V±2.0%	0.185	S-80837ALNP-EA1-T2	S-80837ALY	S-80837ALUP-EA1-T2	—
3.8V±2.0%	0.190	S-80838ALNP-EA2-T2	S-80838ALY	S-80838ALUP-EA2-T2	—
3.9V±2.0%	0.195	S-80839ALNP-EA3-T2	S-80839ALY	S-80839ALUP-EA3-T2	—
4.0V±2.0%	0.200	S-80840ALNP-EA4-T2	S-80840ALY	S-80840ALUP-EA4-T2	S-80840ALMP-EA4-T2
4.1V±2.0%	0.205	S-80841ALNP-EA5-T2	S-80841ALY	S-80841ALUP-EA5-T2	—
4.2V±2.0%	0.210	S-80842ALNP-EA6-T2	S-80842ALY	S-80842ALUP-EA6-T2	S-80842ALMP-EA6-T2
4.3V±2.0%	0.215	S-80843ALNP-EA7-T2	S-80843ALY	S-80843ALUP-EA7-T2	—
4.4V±2.0%	0.220	S-80844ALNP-EA8-T2	S-80844ALY	S-80844ALUP-EA8-T2	—
4.5V±2.0%	0.225	S-80845ALNP-EA9-T2	S-80845ALY	S-80845ALUP-EA9-T2	S-80845ALMP-EA9-T2
4.6V±2.0%	0.230	S-80846ALNP-EEA-T2	S-80846ALY	S-80846ALUP-EEA-T2	—
4.7V±2.0%	0.235	S-80847ALNP-EEB-T2	S-80847ALY	S-80847ALUP-EEB-T2	—
4.8V±2.0%	0.240	S-80848ALNP-EEC-T2	S-80848ALY	S-80848ALUP-EEC-T2	—
4.9V±2.0%	0.245	S-80849ALNP-EED-T2	S-80849ALY	S-80849ALUP-EED-T2	S-80849ALMP-EED-T2
5.0V±2.0%	0.250	S-80850ALNP-EEE-T2	S-80850ALY	S-80850ALUP-EEE-T2	S-80850ALMP-EEE-T2
5.1V±2.0%	0.255	S-80851ALNP-EEF-T2	S-80851ALY	S-80851ALUP-EEF-T2	S-80851ALMP-EEF-T2
5.2V±2.0%	0.260	S-80852ALNP-EEG-T2	—	S-80852ALUP-EEG-T2	S-80852ALMP-EEG-T2
5.3V±2.0%	0.265	S-80853ALNP-EEH-T2	—	—	—
5.4V±2.0%	0.270	S-80854ALNP-EEJ-T2	—	—	—
5.5V±2.0%	0.275	S-80855ALNP-EEK-T2	—	S-80855ALUP-EEK-T2	—
5.6V±2.0%	0.280	S-80856ALNP-EEL-T2	—	—	—
5.7V±2.0%	0.285	S-80857ALNP-EEM-T2	—	—	—
5.8V±2.0%	0.290	S-80858ALNP-EEN-T2	—	—	—
5.9V±2.0%	0.295	S-80859ALNP-EEP-T2	—	—	—
6.0V±2.0%	0.300	S-80860ALNP-EEQ-T2	—	—	—

Remark: Some products described here in are under development. Please contact us for Samples.

S-808 Series	"N" is the last letter of the model number. e.g. S-80808AN	"L" is the last letter of the model number. e.g. S-80808AL

2. Output configurations and their implementation

Implementation	Nch("L")	CMOS("L")
With different power supplies	Yes	No
With active low reset CPUs	Yes	Yes
With active high reset CPUs	No	No
With voltage divider variable resistors	Yes	No

ù Example with two power supplies ù Examples with one power supply

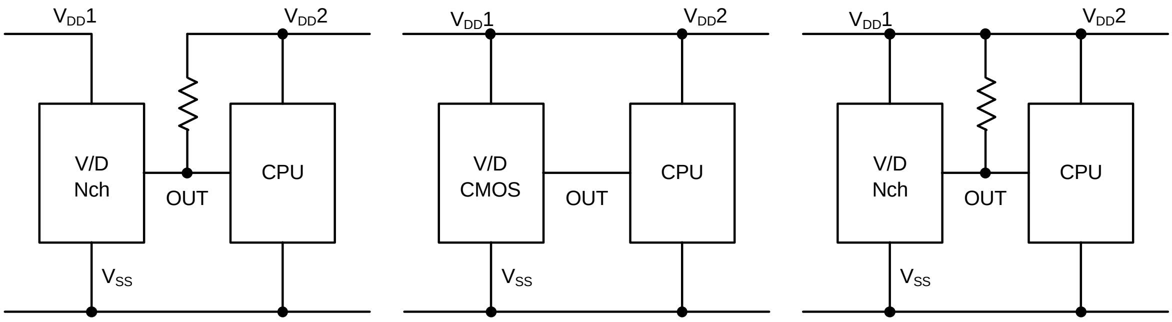


Figure 3

Output voltage	Nch open-drain	V_{OUT}	V_{SS}-0.3 to 7	V
	CMOS		V_{SS}-0.3 to V_{DD}+0.3	V
Output current		I_{OUT}	50	mA
Power dissipation		Pd	150	mW
Operating temperature		Topr	-20 to +70	°C
Storage temperature		Tstg	-40 to +125	°C

2. Products with detection voltage of 1.5 V or more

(Unless otherwise specified: Ta=25°C)

Parameter		Symbol		Ratings	Unit
Power supply voltage		V_{DD} - V_{SS}		12	V
Output voltage	Nch open-drain	V_{OUT}		V_{SS}-0.3 to 12	V
	CMOS			V_{SS}-0.3 to V_{DD}+0.3	V
Output current		I_{OUT}		50	mA
Power dissipation		Pd	TO-92	400	mW
			SOT-89-3	500	
			SC-82AB,SOT-23-5	150	
Operating temperature		Topr		-40 to +85	°C
Storage temperature		Tstg		-40 to +125	°C

Remark: This IC has a built-in protection circuit for static electricity. However, prevent contact with a large static electricity or electrostatic voltage which exceeds the performance of the protection circuit

Detection voltage	$-V_{DET}$		S-80808AX	0.784	0.800	0.816	V	1
			S-80809AX	0.882	0.900	0.918		
			S-80810AX	0.980	1.000	1.020		
			S-80811AX	1.078	1.100	1.122		
			S-80812AX	1.176	1.200	1.224		
			S-80813AX	1.274	1.300	1.326		
			S-80814AX	1.372	1.400	1.428		
Release voltage	$+V_{DET}$		S-80808AX	0.802	0.834	0.867	V	1
			S-80809AX	0.910	0.944	0.979		
			S-80810AX	1.017	1.054	1.091		
			S-80811AX	1.125	1.164	1.203		
			S-80812AX	1.232	1.273	1.315		
			S-80813AX	1.340	1.383	1.427		
			S-80814AX	1.448	1.493	1.538		
Hysteresis width	V_{HYS}		S-80808AX	0.018	0.034	0.051	V	1
			S-80809AX	0.028	0.044	0.061		
			S-80810AX	0.037	0.054	0.071		
			S-80811AX	0.047	0.064	0.081		
			S-80812AX	0.056	0.073	0.091		
			S-80813AX	0.066	0.083	0.101		
			S-80814AX	0.076	0.093	0.110		
Current consumption	I_{SS}	V_{DD}=1.5V	S-80808AX	—	1.3	3.7	µA	2
			S-80809AX					
		V_{DD}=2.0V	S-80810AX					
			S-80811AX					
			S-80812AX					
			S-80813AX					
			S-80814AX					
Operating voltage	V_{DD}			0.7	—	5.0	V	1
Output current	I_{OUT}	Nch	V_{DS}=0.5V V_{DD}=0.7V	0.04	0.2	—	mA	3
		Pch(CMOS output)	V_{DS}=2.1V V_{DD}=4.5V	2.9	5.8	—		4
Leakage current of output transistor	I_{LEAK}	Nch(Nch open drain)	V_{DS}=5.0V V_{DD}=5.0V	—	—	60	nA	3
Temperature characteristic of $-V_{DET}$	$\frac{\Delta -V_{DET}}{\Delta Ta}$	Ta=-20°C to +70°C	S-80808AX	—	±0.18	—	mV/°C	1
			S-80809AX	—	±0.20	—		
			S-80810AX	—	±0.22	—		
			S-80811AX	—	±0.24	—		
			S-80812AX	—	±0.27	—		
			S-80813AX	—	±0.29	—		
			S-80814AX	—	±0.31	—		

Detection voltage	$-V_{DET}$		S-80816AX	[illegible]	[illegible]	[illegible]	V	1
			S-80817AX	1.666	1.700	1.734		
			S-80818AX	1.764	1.800	1.836		
			S-80819AX	1.862	1.900	1.938		
			S-80820AX	1.960	2.000	2.040		
			S-80821AX	2.058	2.100	2.142		
			S-80822AX	2.156	2.200	2.244		
			S-80823AX	2.254	2.300	2.346		
			S-80824AX	2.352	2.400	2.448		
			S-80825AX	2.450	2.500	2.550		
			S-80826AX	2.548	2.600	2.652		
Hysteresis width	V_{HYS}			$-V_{DET}\times0.03$	$-V_{DET}\times0.05$	$-V_{DET}\times0.08$	V	1
Current consumption	I_{SS}	V_{DD}=3.5V		—	0.8	2.4	μA	2
Operating voltage	V_{DD}			0.95	—	10.0	V	1
Output current	I_{OUT}	Nch V_{DS}=0.5V	V_{DD}=1.2V	0.23	0.50	—	mA	3
		Pch(CMOS output) V_{DS}=0.5V	V_{DD}=4.8V	0.36	0.62	—		4
Leakage current of output transistor	I_{LEAK}	Nch(Nch open drain)	V_{DS}=10.0 V V_{DD}=10.0 V	—	—	0.1	μA	3
Response time	tPLH			—	—	60	μs	1
Temperature characteristic of $-V_{DET}$	$\frac{\Delta -V_{DET}}{\Delta Ta}$	Ta=-40°C to +85°C	S-80815AX	—	±0.18	±0.54	mV/°C	1
			S-80816AX	—	±0.19	±0.57		
			S-80817AX	—	±0.20	±0.60		
			S-80818AX	—	±0.21	±0.63		
			S-80819AX	—	±0.22	±0.66		
			S-80820AX	—	±0.24	±0.72		
			S-80821AX	—	±0.25	±0.75		
			S-80822AX	—	±0.26	±0.78		
			S-80823AX	—	±0.27	±0.81		
			S-80824AX	—	±0.28	±0.84		
			S-80825AX	—	±0.29	±0.87		
			S-80826AX	—	±0.31	±0.93		

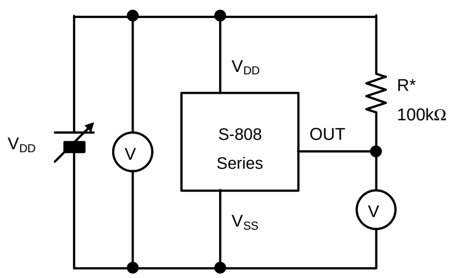
Detection voltage	$-V_{DET}$		S-80828AX	2.744	2.800	2.856	V	1
			S-80829AX	2.842	2.900	2.958		
			S-80830AX	2.940	3.000	3.060		
			S-80831AX	3.038	3.100	3.162		
			S-80832AX	3.136	3.200	3.264		
			S-80833AX	3.234	3.300	3.366		
			S-80834AX	3.332	3.400	3.468		
			S-80835AX	3.430	3.500	3.570		
			S-80836AX	3.528	3.600	3.672		
			S-80837AX	3.626	3.700	3.774		
			S-80838AX	3.724	3.800	3.876		
			S-80839AX	3.822	3.900	3.978		
Hysteresis width	V_{HYS}			$-V_{DET}$ ×0.03	$-V_{DET}$ ×0.05	$-V_{DET}$ ×0.08	V	1
Current consumption	I_{SS}	V_{DD}=4.5V		—	0.9	2.7	µA	2
Operating voltage	V_{DD}			0.95	—	10.0	V	1
Output current	I_{OUT}	Nch V_{DS}=0.5V	V_{DD}=1.2V	0.23	0.50	—	mA	3
			V_{DD}=2.4V	1.60	3.70	—		
		Pch(CMOS output) V_{DS}=0.5V	V_{DD}=4.8V	0.36	0.62	—		4
Leakage current of output transistor	I_{LEAK}	Nch(Nch open drain)	V_{DS}=10.0 V V_{DD}=10.0 V	—	—	0.1	µA	3
Response time	tPLH			—	—	60	µs	1
Temperature characteristic of $-V_{DET}$	$\frac{\Delta -V_{DET}}{\Delta Ta}$	Ta=-40°C to +85°C	S-80827AX	—	±0.32	±0.96	mV/°C	1
			S-80828AX	—	±0.33	±0.99		
			S-80829AX	—	±0.34	±1.02		
			S-80830AX	—	±0.35	±1.05		
			S-80831AX	—	±0.36	±1.08		
			S-80832AX	—	±0.38	±1.14		
			S-80833AX	—	±0.39	±1.17		
			S-80834AX	—	±0.40	±1.20		
			S-80835AX	—	±0.41	±1.23		
			S-80836AX	—	±0.42	±1.26		
			S-80837AX	—	±0.44	±1.32		
			S-80838AX	—	±0.45	±1.35		
			S-80839AX	—	±0.46	±1.38		

Detection voltage	$-V_{DET}$		S-80842AX	4.116	4.200	4.284	V	1
			S-80843AX	4.214	4.300	4.386		
			S-80844AX	4.312	4.400	4.488		
			S-80845AX	4.410	4.500	4.590		
			S-80846AX	4.508	4.600	4.692		
			S-80847AX	4.606	4.700	4.794		
			S-80848AX	4.704	4.800	4.896		
			S-80849AX	4.802	4.900	4.998		
			S-80850AX	4.900	5.000	5.100		
			S-80851AX	4.998	5.100	5.202		
			S-80852AX	5.096	5.200	5.304		
			S-80853AX	5.194	5.300	5.406		
			S-80854AX	5.292	5.400	5.508		
			S-80855AX	5.390	5.500	5.610		
			S-80856AX	5.488	5.600	5.712		
Hysteresis width	V_{HYS}			$-V_{DET} \times 0.03$	$-V_{DET} \times 0.05$	$-V_{DET} \times 0.08$	V	1
Current consumption	I_{SS}	V_{DD}=6.0V		—	1.0	3.0	μA	2
Operating voltage	V_{DD}			0.95	—	10.0	V	1
Output current	I_{OUT}	Nch V_{DS}=0.5V	V_{DD}=1.2V	0.23	0.50	—	mA	3
			V_{DD}=2.4V	1.60	3.70	—		
		Pch(CMOS output) V_{DS}=0.5V	V_{DD}=6.0V	0.46	0.75	—		4
Leakage current of output transistor	I_{LEAK}	Nch(Nch open drain)	V_{DS}=10.0 V V_{DD}=10.0 V	—	—	0.1	μA	3
Response time	tPLH			—	—	60	μs	1
Temperature characteristic of $-V_{DET}$	$\frac{\Delta -V_{DET}}{\Delta Ta}$	Ta=-40°C to +85°C	S-80840AX	—	±0.47	±1.41	mV/°C	1
			S-80841AX	—	±0.48	±1.44		
			S-80842AX	—	±0.49	±1.47		
			S-80843AX	—	±0.51	±1.53		
			S-80844AX	—	±0.52	±1.56		
			S-80845AX	—	±0.53	±1.59		
			S-80846AX	—	±0.54	±1.62		
			S-80847AX	—	±0.55	±1.65		
			S-80848AX	—	±0.56	±1.68		
			S-80849AX	—	±0.58	±1.74		
			S-80850AX	—	±0.59	±1.77		
			S-80851AX	—	±0.60	±1.80		
			S-80852AX	—	±0.61	±1.83		
			S-80853AX	—	±0.62	±1.86		
			S-80854AX	—	±0.64	±1.92		
			S-80855AX	—	±0.65	±1.95		
			S-80856AX	—	±0.66	±1.98		

			S-80859AX	5.782	5.900	6.018		
			S-80860AX	5.880	6.000	6.120		
Hysteresis width	V_{HYS}			$-V_{DET} \times 0.03$	$-V_{DET} \times 0.05$	$-V_{DET} \times 0.08$	V	1
Current consumption	I_{SS}	V_{DD}=7.5V		—	1.0	3.0	µA	2
Operating voltage	V_{DD}			0.95	—	10.0	V	1
Output current	I_{OUT}	Nch V_{DS}=0.5V	V_{DD}=1.2V	0.23	0.50	—	mA	3
			V_{DD}=2.4V	1.60	3.70	—		
		Pch(CMOS output) V_{DS}=0.5V	V_{DD}=8.4V	0.59	0.96	—		4
Leakage current of output transistor	I_{LEAK}	Nch(Nch open drain)	V_{DS}=10.0 V V_{DD}=10.0 V	—	—	0.1	µA	3
Response time	tPLH			—	—	60	µs	1
Temperature characteristic of $-V_{DET}$	$\frac{\Delta -V_{DET}}{\Delta Ta}$	Ta=-40°C to +85°C	S-80857AX	—	±0.67	±2.01	mV/°C	1
			S-80858AX	—	±0.68	±2.04		
			S-80859AX	—	±0.69	±2.07		
			S-80860AX	—	±0.71	±2.13		

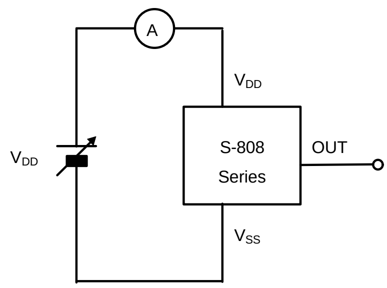
■ Test Circuits

(1)

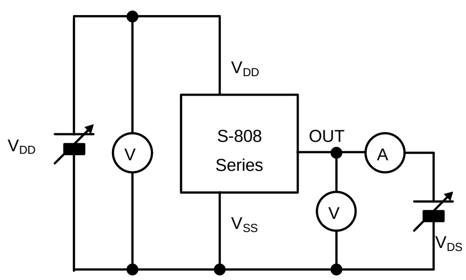


* R is unnecessary for CMOS output products.

(2)



(3)



(4)

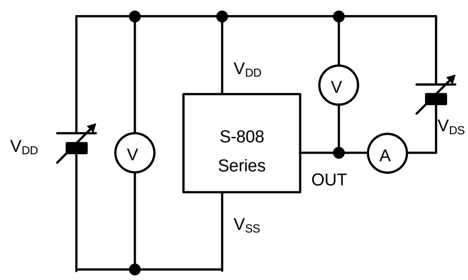


Figure 4

Example : For the S-80808AN, detection voltage lies in the range of $0.784 \le (-V_{DET}) \le 0.816$.
This means that $-V_{DET}$ is 0.784 in a product while $-V_{DET}$ is 0.816 in another of the same S-80808AN.

2. Release voltage ($+V_{DET}$)

The release voltage $+V_{DET}$ is the voltage at which the output returns (is "released") to high. This release voltage varies slightly among products of the same type. The variation of voltages between the specified minimum [$(+V_{DET})$min.] and maximum [$(+V_{DET})$max.] values is called the release voltage range (See Figure 6).

Example : For the S-80808AN, the release voltage lies in the range of $0.802 \le (+V_{DET}) \le 0.867$. This means that $+V_{DET}$ is 0.802 in a product while $+V_{DET}$ is 0.867 in another of the same S-80808AN.

Remark: Although the detection voltage and release voltage overlap in the range of 0.802 V to 0.816 V, $+V_{DET}$ will always be larger than $-V_{DET}$.

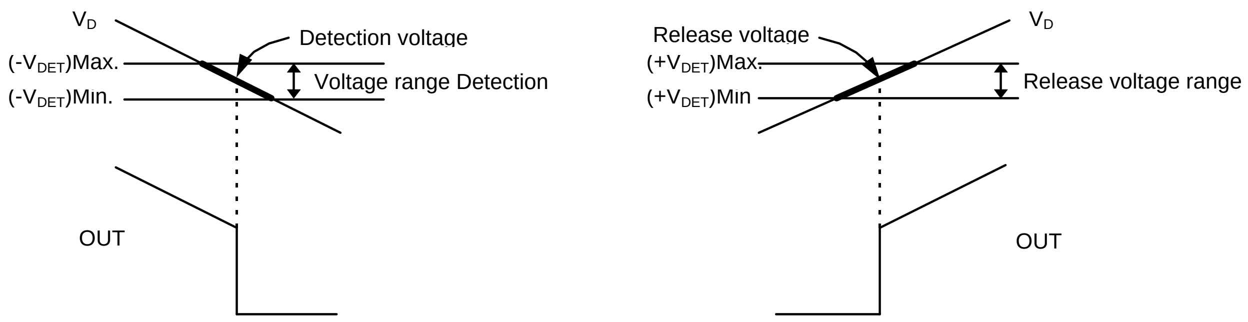


Figure 5 **Figure 6**

3. Hysteresis width (V_{HYS})

The hysteresis width is the voltage difference between the detection voltage and the release voltage (B-A=V_{HYS} in Figure 10). By giving a device hysteresis, trouble such as noise at the input is avoided.

4. Through-type current

Through-type current refers to the current which flows instantaneously at the time of detection and release of a voltage detector. Through-type current is large in CMOS output devices, and also flows to some extent in Nch open-drain output devices.

have disappeared, and the output goes back from low to high. A through-type current is again generated, a voltage appears, and the process repeats. This unstable condition is referred to as oscillation.

ù Misimplementation with input voltage divider

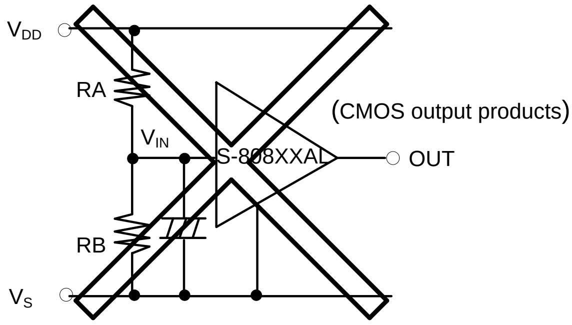
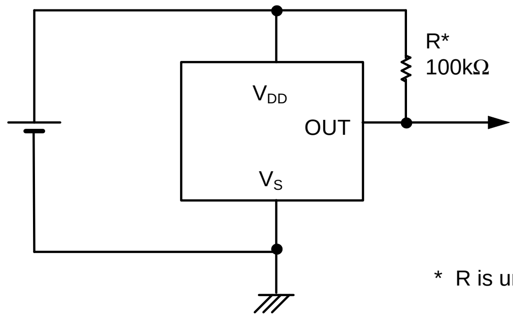


Figure 7

■ Standard Circuit



* R is unnecessary for* CMOS output

Figure 8

input voltage is (RB+RC)/(RA+RB+RC)×V_{DD}.

(2) When power supply voltage V_{DD} goes below $+V_{DET}$, the output maintains the power supply voltage level, as long as V_{DD} remains above the detection voltage $-V_{DET}$. When V_{DD} does fall below $-V_{DET}$ (A in Figure 10), the Nch transistor goes ON, the Pch transistor goes OFF, and V_{SS} appears at the output. With the Nch transistor N 1 of Figure 9 ON, the comparator input voltage is RB/(RA+RB) ×V_{DD}.

(3) When V_{DD} falls below the minimum operating voltage, the output becomes undefined. However, output will revert to V_{DD} if a pull-up has been employed.

(4) V_{SS} will again be output when V_{DD} rises above the minimum operating voltage. V_{SS} will continue to be output even when V_{DD} surpasses $-V_{DET}$, as long as it does not exceed the release voltage $+V_{DET}$.

(5) When V_{DD} rises above $+V_{DET}$ (B in Figure 10), the Nch transistor goes OFF, the Pch transistor goes ON, and V_{DD} appears at the output.

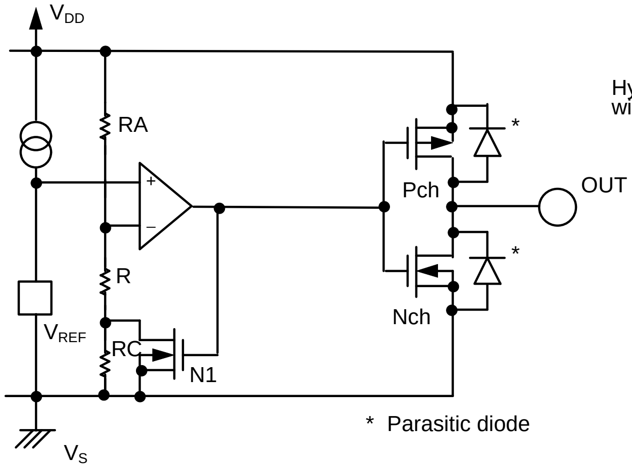


Figure 9

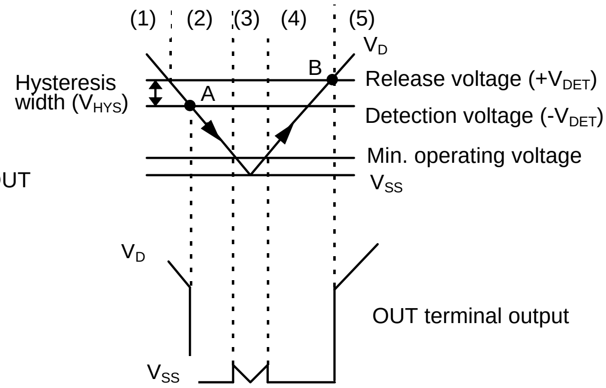


Figure 10

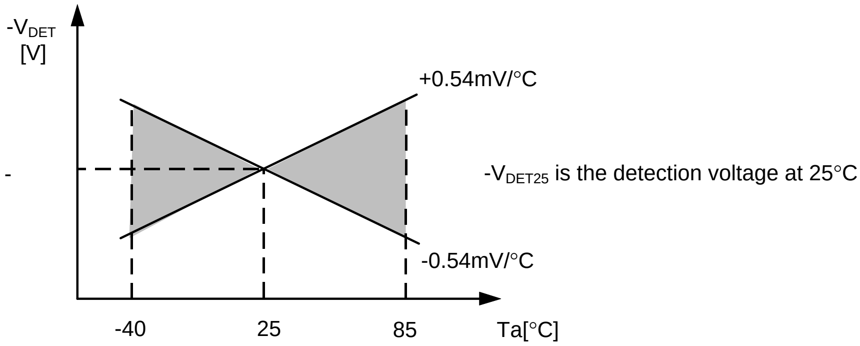


Figure 11

(2) Temperature characteristics of release voltage

The temperature factor $\left(\frac{\Delta +V_{DET}}{\Delta Ta}\right)$ of the release voltage is calculated by the temperature factor of the detection voltage as follows:

$$\frac{\Delta +V_{DET}}{\Delta Ta} = \frac{+V_{DET}}{-V_{DET}} \times \frac{\Delta -V_{DET}}{\Delta Ta}$$

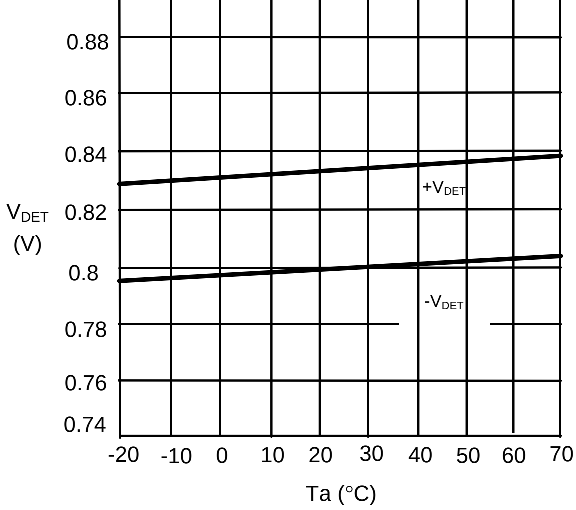
The temperature factor of the release voltage has a same sign characteristics as the temperature factor of the detection voltage.

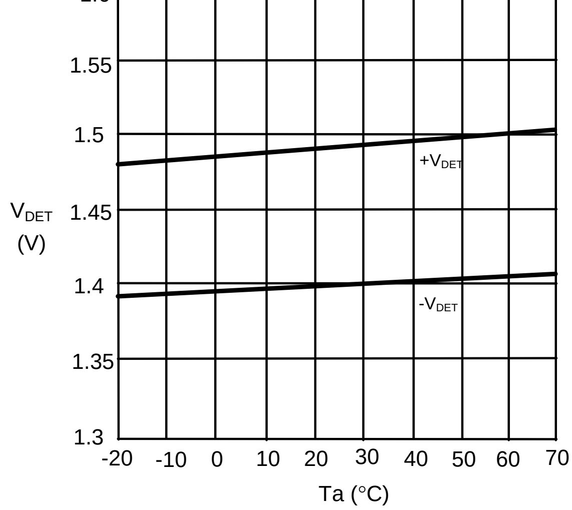
(3) Temperature characteristics of hysteresis voltage

The temperature characteristics of hysteresis voltage $\left(\frac{\Delta +V_{DET}}{\Delta Ta} - \frac{\Delta -V_{DET}}{\Delta Ta}\right)$ is calculated as

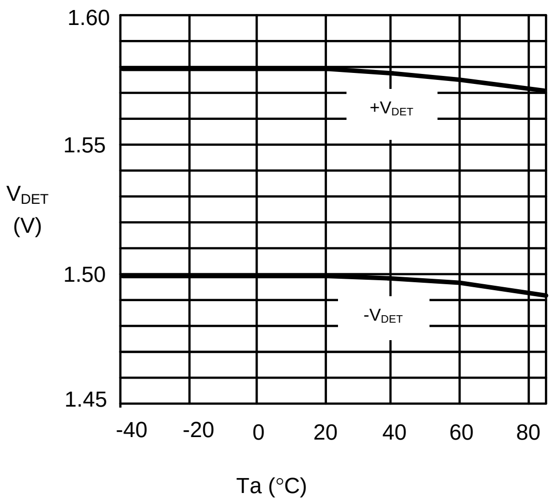
$$\frac{\Delta +V_{DET}}{\Delta Ta} - \frac{\Delta -V_{DET}}{\Delta Ta} = \frac{V_{HY}}{-V_{DET}} \times \frac{\Delta -V_{DET}}{\Delta Ta}$$

Remark: An example of temperature characteristics of (1) to (3) is shown on pages 16 and 17.

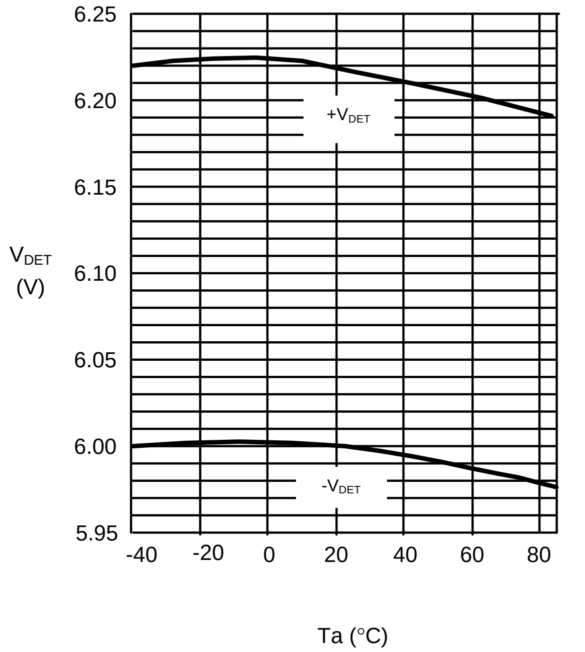


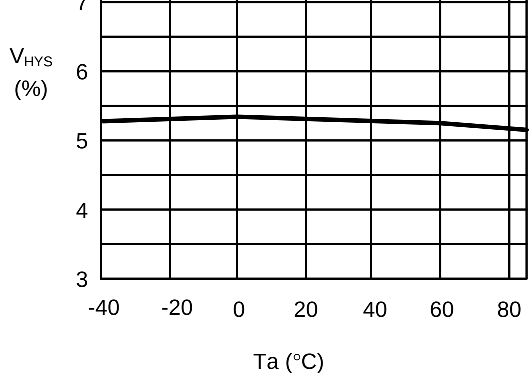


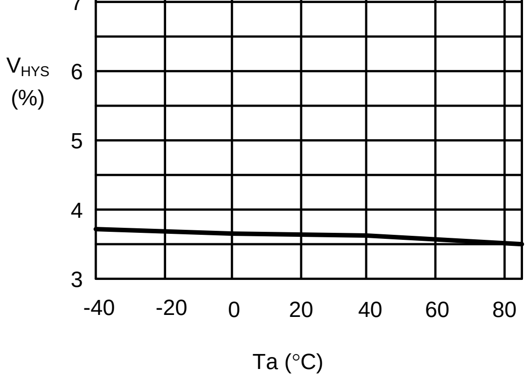
(c) S-80815AL



(d) S-80860AL

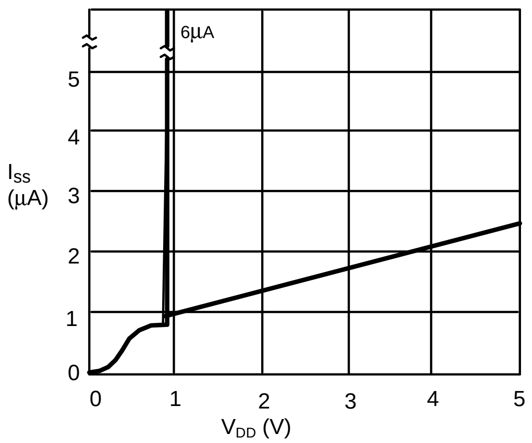




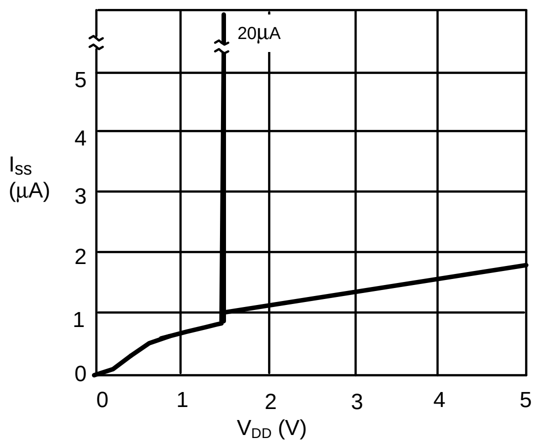


(3) Current consumption (I_{SS}) - Input voltage (V_{DD})

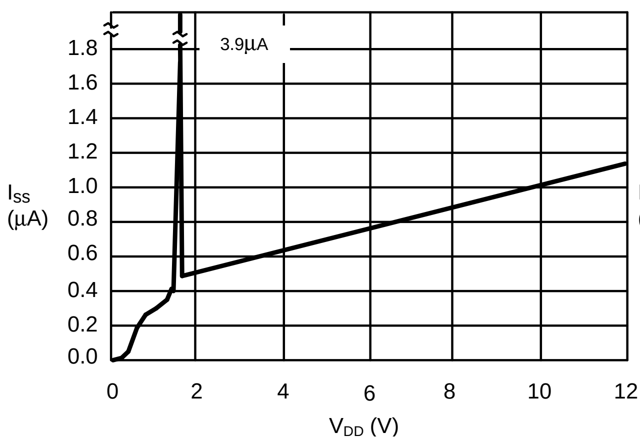
(a) S-80808AL



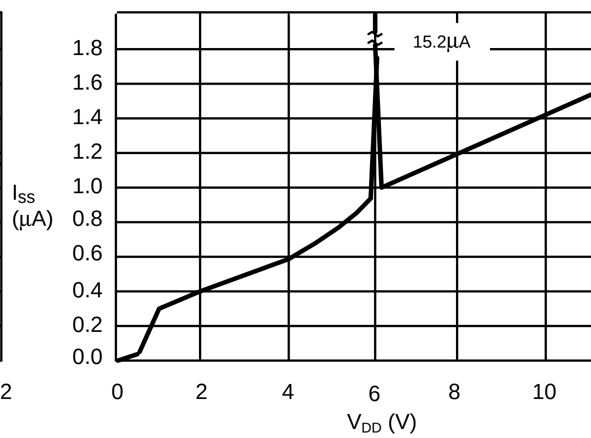
(b) S-80814AL

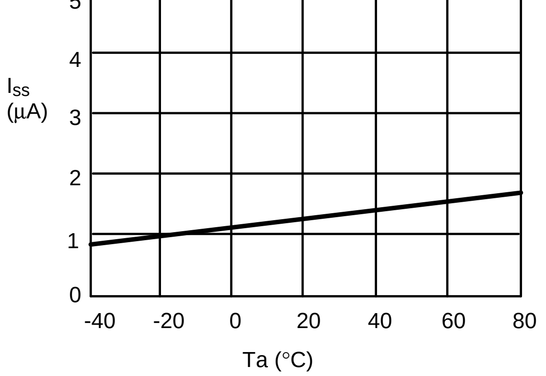


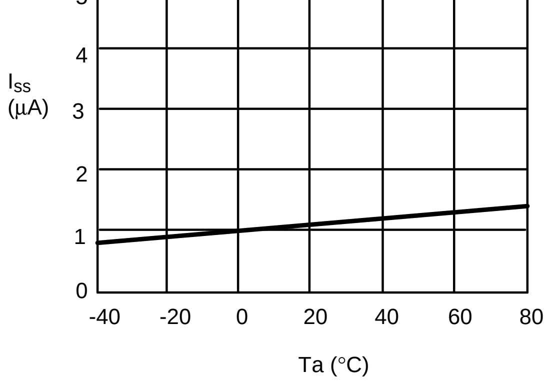
(c) S-80815AL



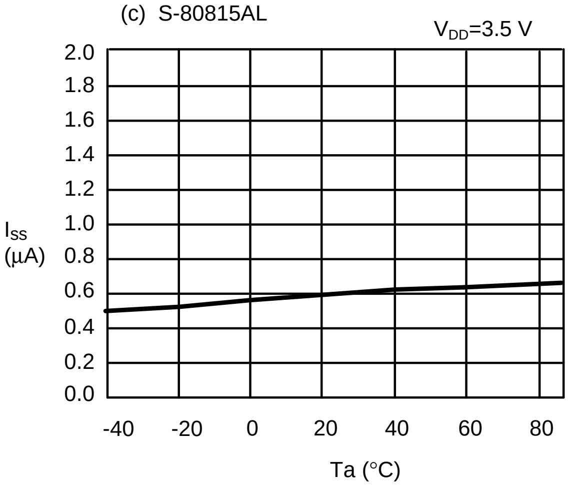
(d) S-80860AL



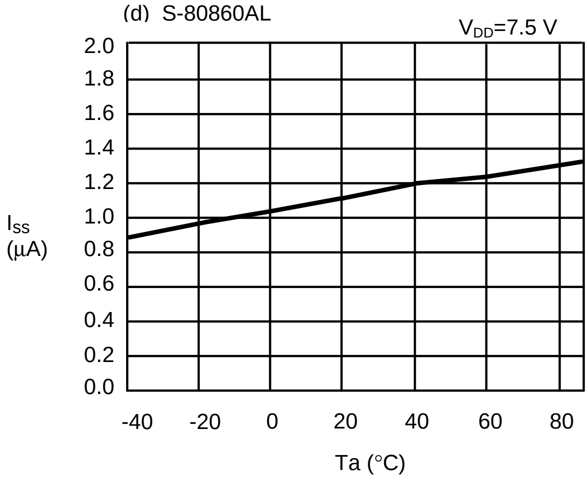


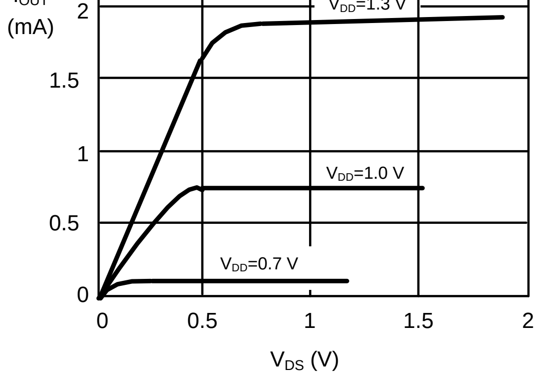


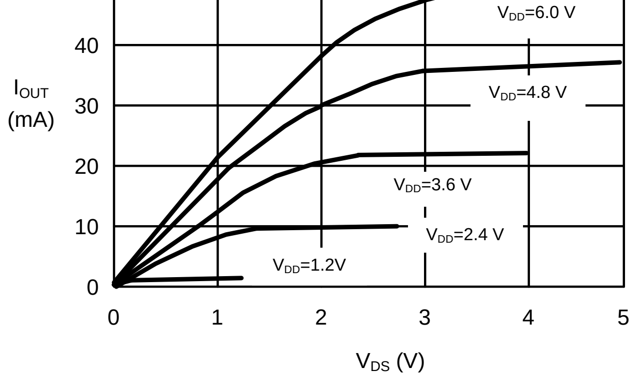
(c) S-80815AL



(d) S-80860AL

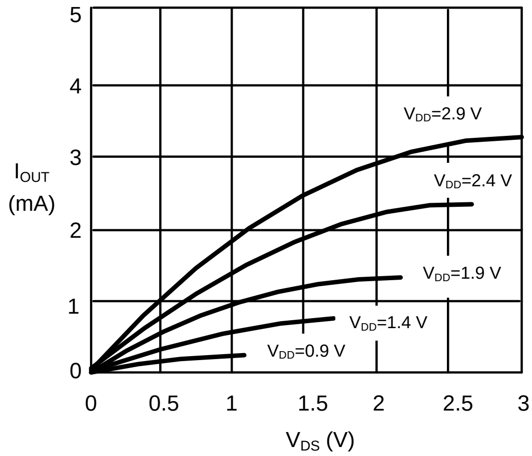




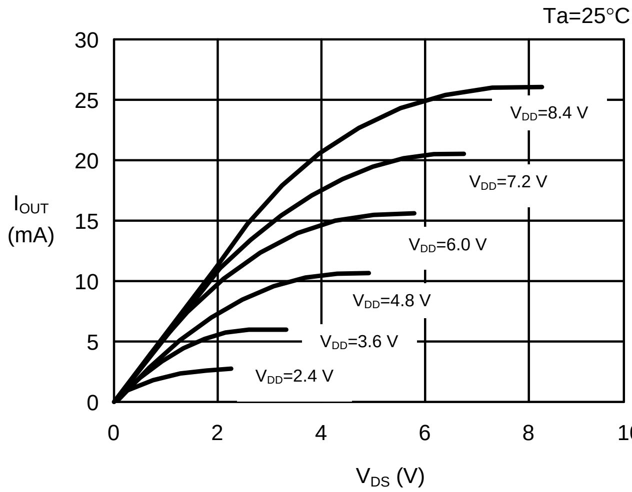


(6) Pch transistor output current (I_{OUT}) - V_{DS}

(a) S-80808AL

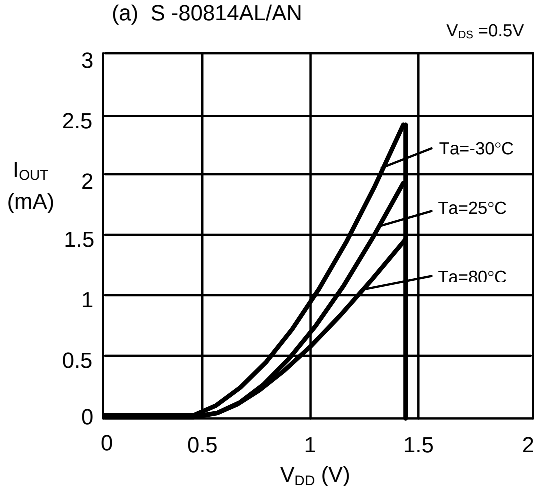


(b) S-80815AL

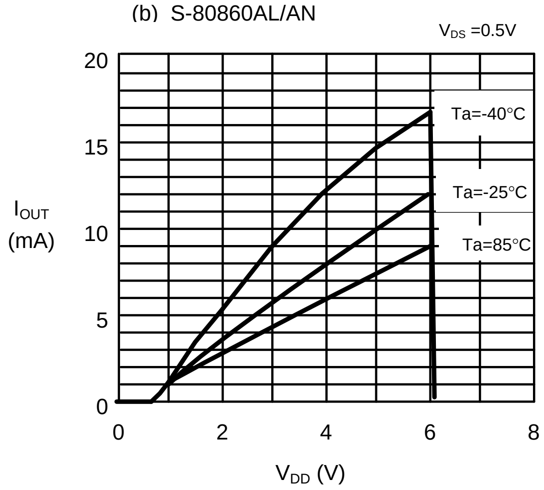


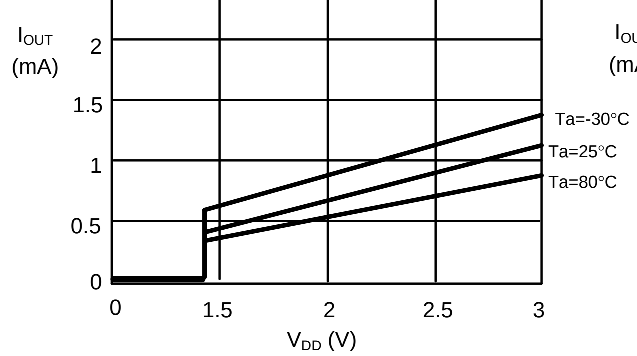
(7) Nch transistor output current (I_{OUT}) - Input voltage(V_{DD})

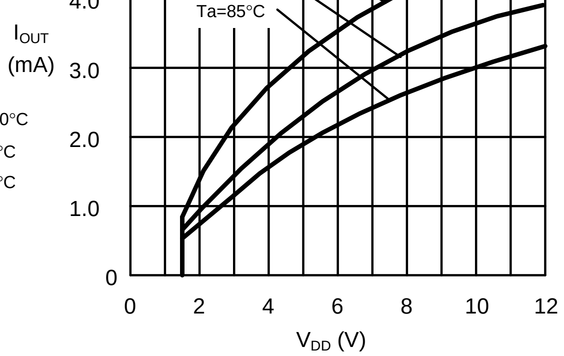
(a) S -80814AL/AN



(b) S-80860AL/AN

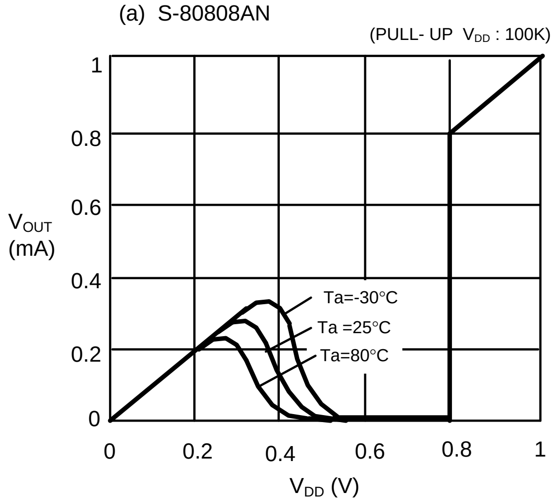




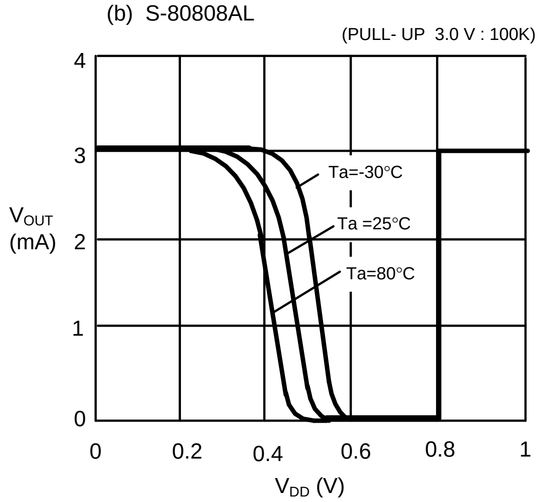


(9) Minimum operating voltage

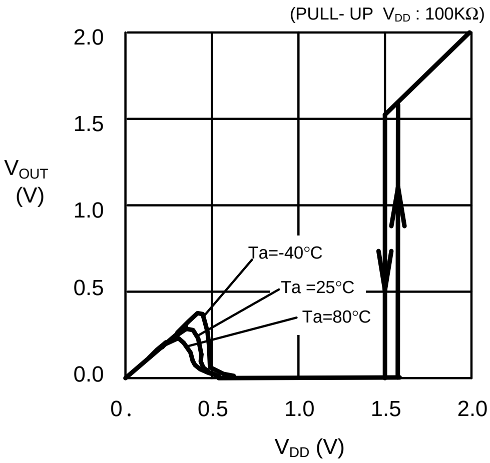
(a) S-80808AN



(b) S-80808AL

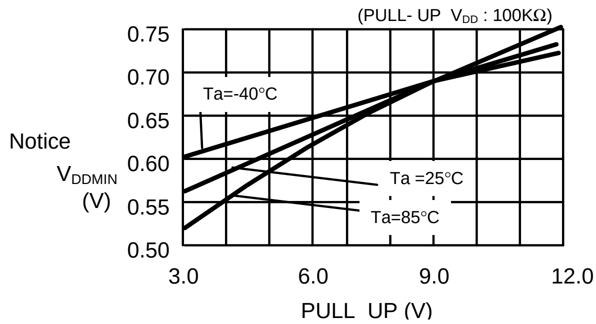


(c) S-80815AN



Remark:
V_{DDMIN} is defined with V_{DD} when V_{OUT} goes below 10% of the PULL UP voltage as shown in Figure 12 when raising V_{DD} from 0 V.

(d) S-80815AN



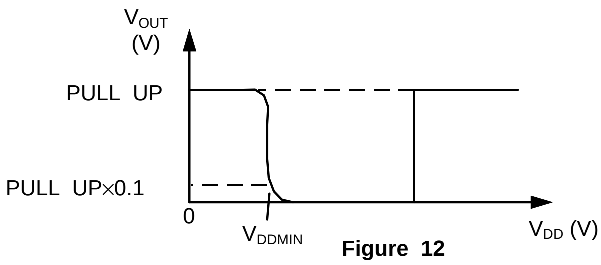
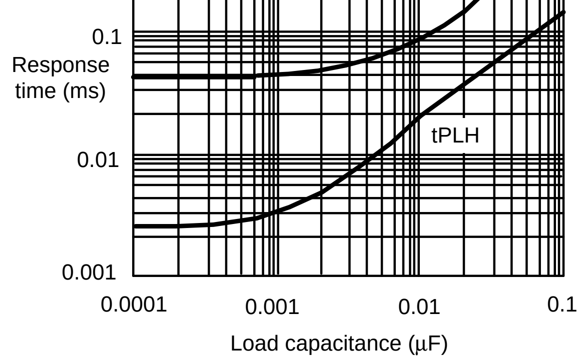
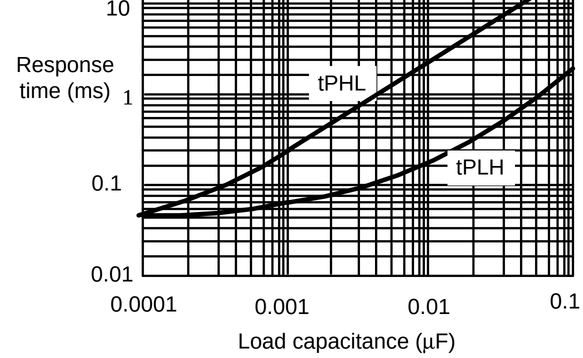
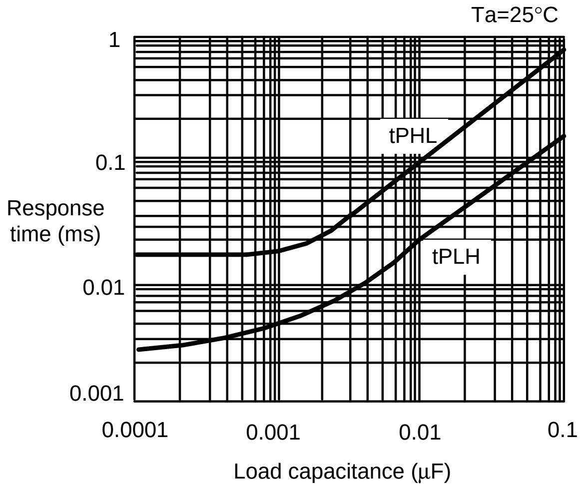


Figure 12

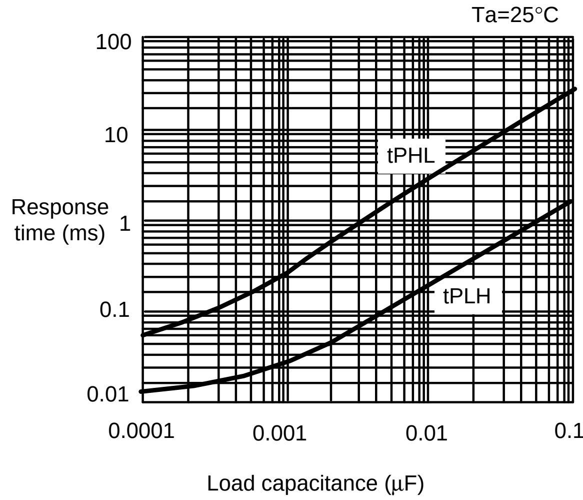




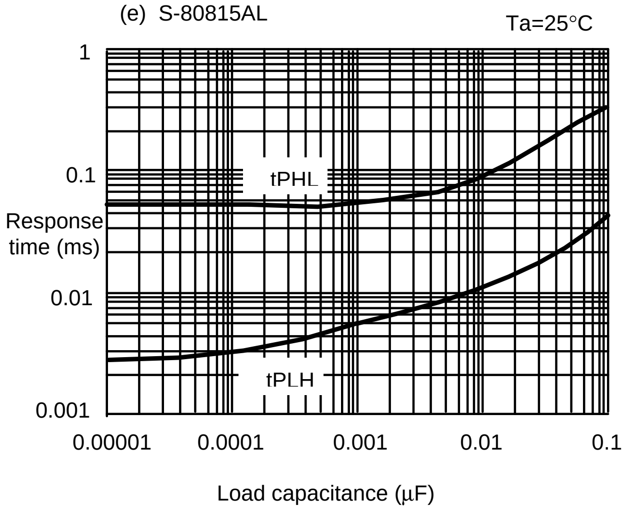
(c) S-80814AL



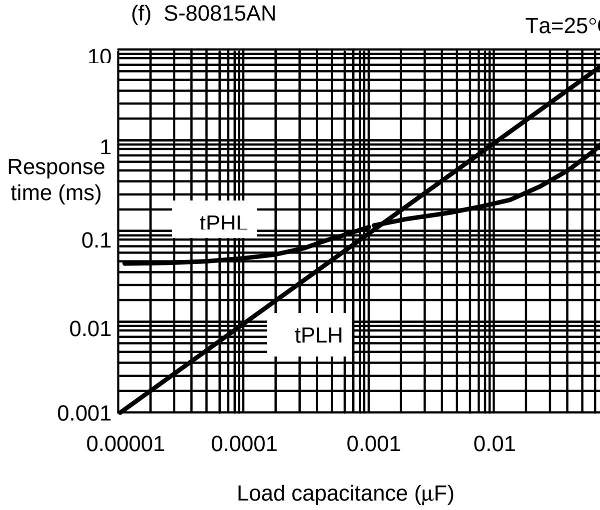
(d) S-80814AN



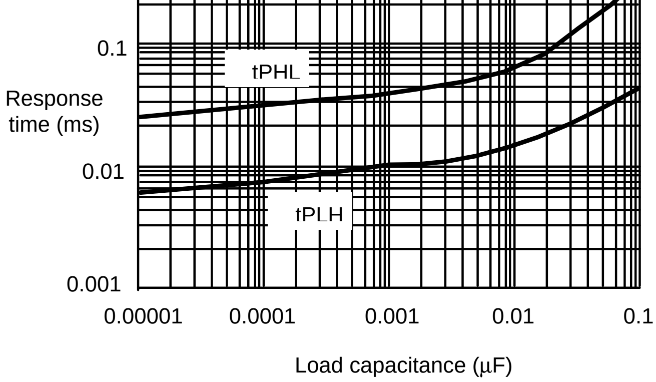
(e) S-80815AL

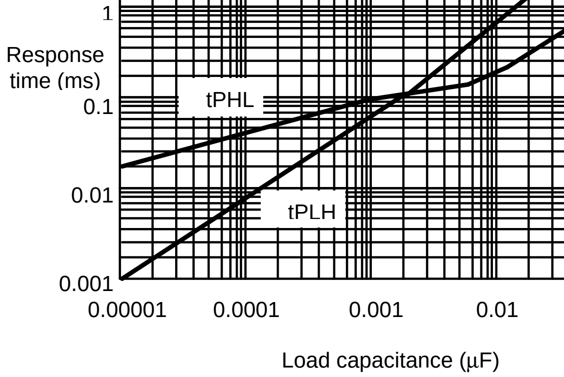


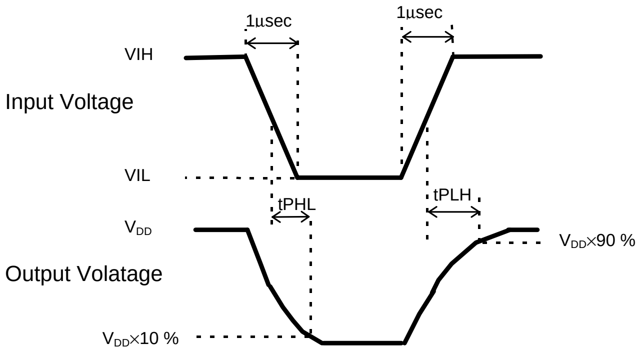
(f) S-80815AN



Response

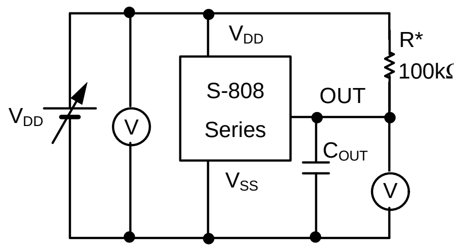






(a) - (d) : VIH=5.0V, VIL=0.7V
(e) - (h) : VIH=10V, VIL=0.95V

Figure 13



* ‘R’ is not needed for CMOS output pro

Figure 14

be initialized before normal operations can be done.

Reset circuits protect microcomputers in the event of current being momentarily switched off or lo
With the S-808 Series which has a low operating voltage, a high-precision detection voltage and hysteresis characterist
reset circuits shown in Figures 15 to 16 can be easily constructed.

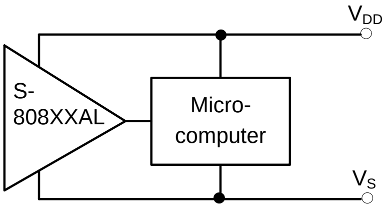
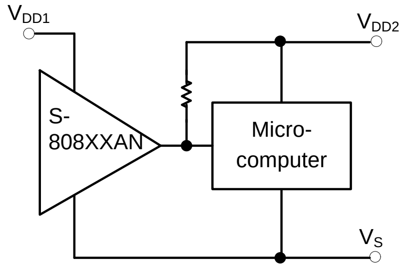


Figure 15

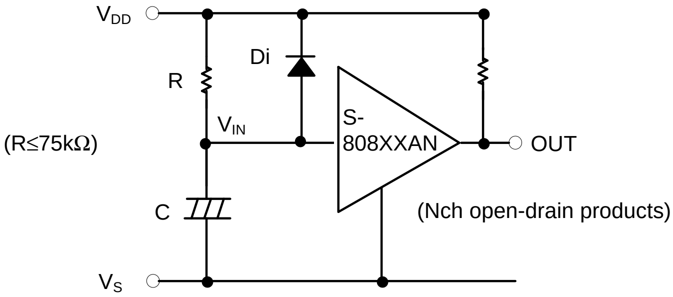


(Nch open-drain output products only)

Figure 16

2. Addition of power-on reset circuit

A power-on reset circuit can be constructed using <u>Nch open-drain product</u> of S-808 Series.



Note 1: R should be 75 kΩ or less for purpose of protection against oscillation.
Note 2: Di instantaneously discharges the electric charge stored by C at the falling of the power.
Di is not necessary if delay in falling time is normal.

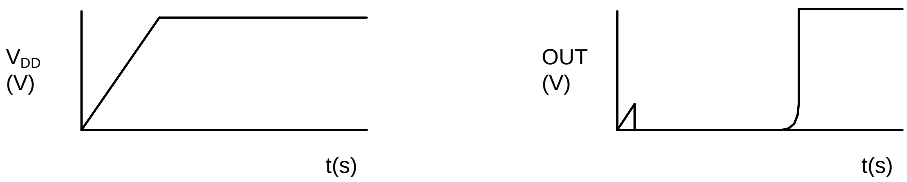


Figure 17

Note 3: When the power steeply rises, output may goes high for a instant due to the IC inconstant region characteristics (output voltage is unstable in the region under minimum operating voltage) as shown in Figure. 18.

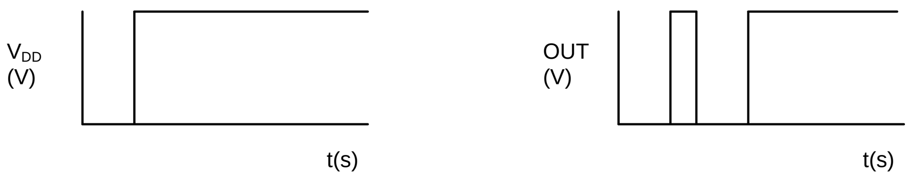
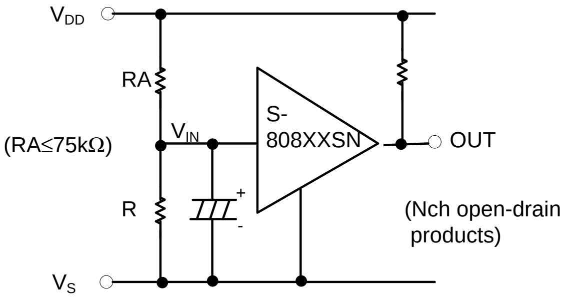


Figure 18



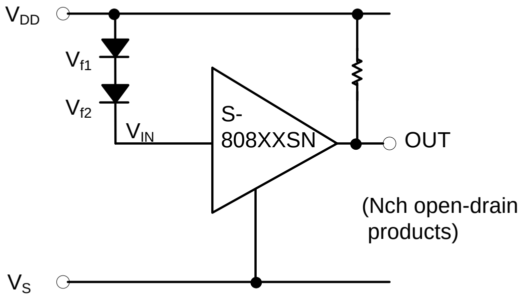
$$\text{Detection voltage} = \frac{RA+RB}{RB} \text{ ù } -V_{DET}$$

$$\text{Hysteresis width} = \frac{RA+RB}{RB} \text{ ù } V_{HYS}$$

Note1: If RA and RB are large, the hysteresis width may be larger than the value given by the formula above due to through-type current (which flows slightly in Nch open-drain circuit).

Note2: RA should be 75kΩor less for purpose of protection against oscillation.

Figure 19



Detection voltage $=V_{f1}+V_{f2}+(-V_{DET})$

Figure 20

■ Remarks

- In CMOS output products of the S-808 Series, through-type current flows when the device is detecting or releasing. If a high impedance is connected to the input, oscillation may be caused due to the fall of the voltage by the through-type current when lowering the voltage during releasing.

- When designing for mass production using an application circuit described herein, take the product deviation and temperature characteristic into consideration.

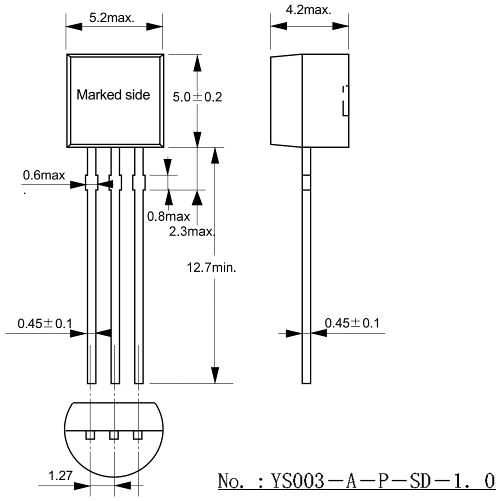
- Seiko Instruments Inc. shall not bear any responsibility for the patents on the circuits described herein.

■ TO-92

YF003-A 990531

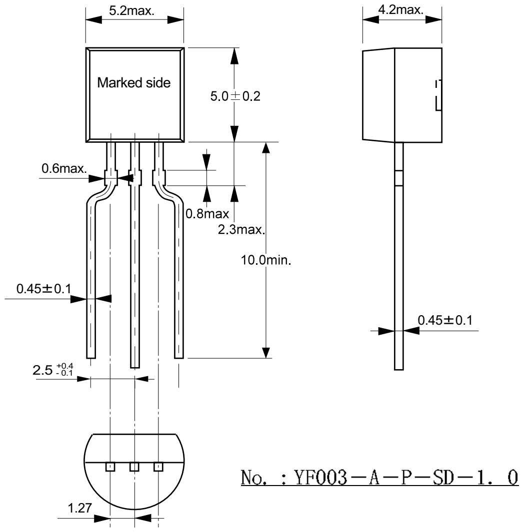
●Dimensions

(1)Loose

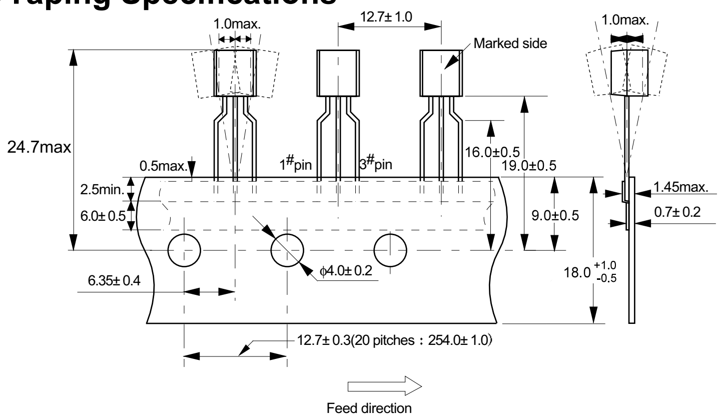


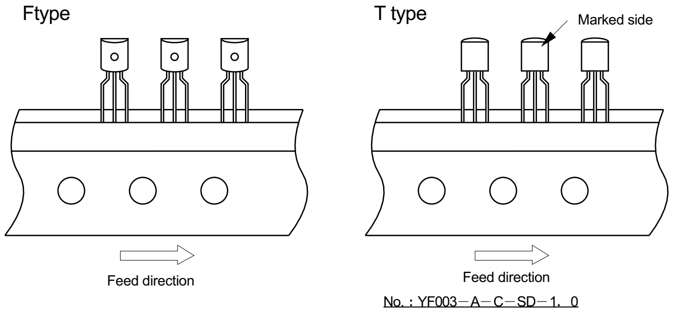
(2)Taped (reel/zigzag)

Unit:mm



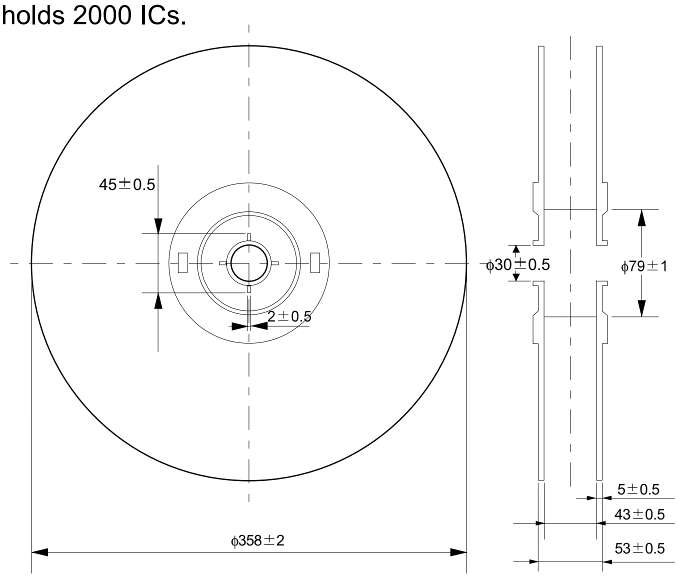
●Taping Specifications



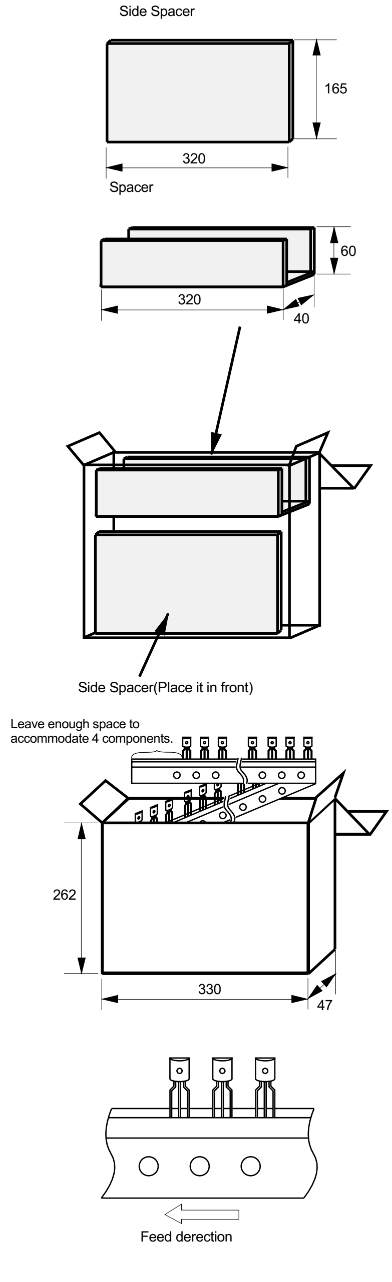


●Reel Specifications

1 reel holds 2000 ICs.



●Switch-back(wrap) Specifications

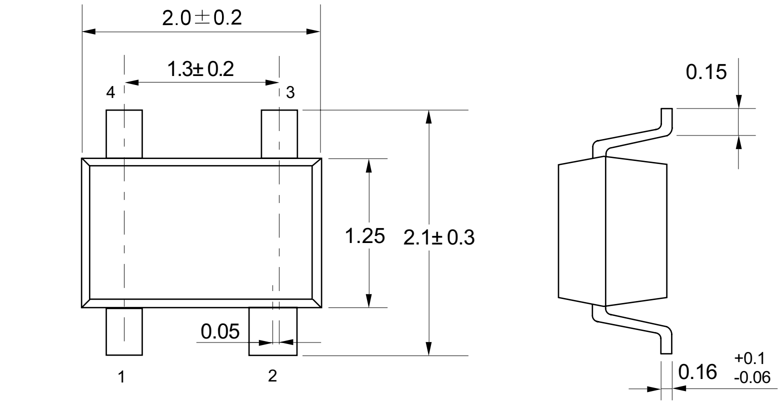


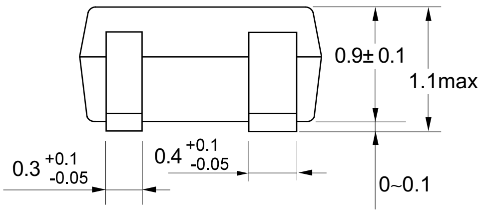
■ SC-82AB

NP004-A 990531

Unit:mm

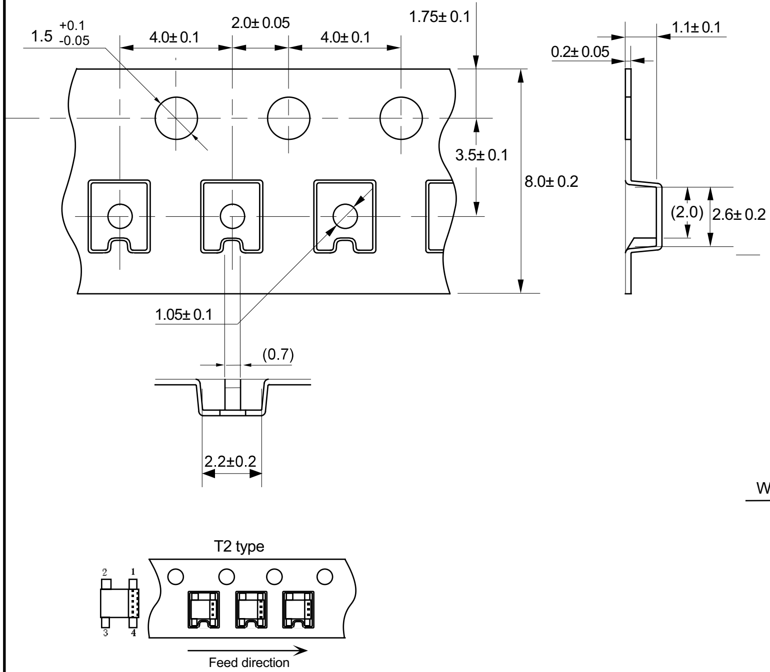
●Dimensions





No.：NP004−A−P−SD−1．0

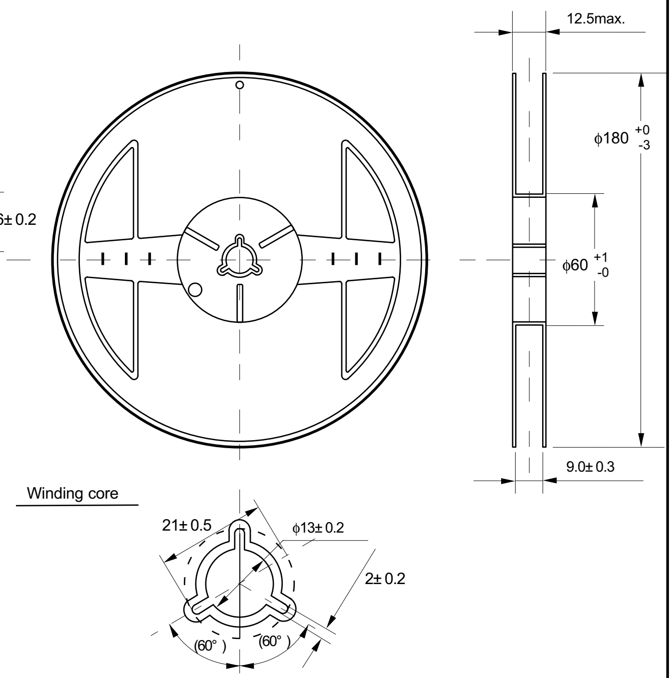
●Taping Specifications



No.：NP004−A−C−SD−1．0

●Reel Specifications

1 reel holds 3000 ICs.



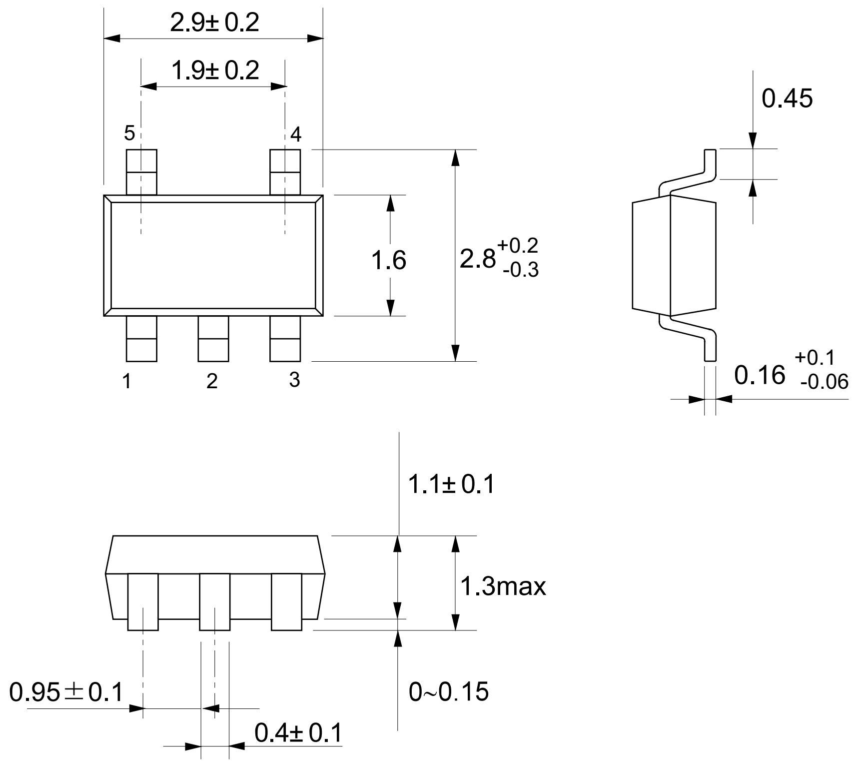
No.：NP004−A−R−SD−1．0

MP005-A 990531

■ SOT-23-5

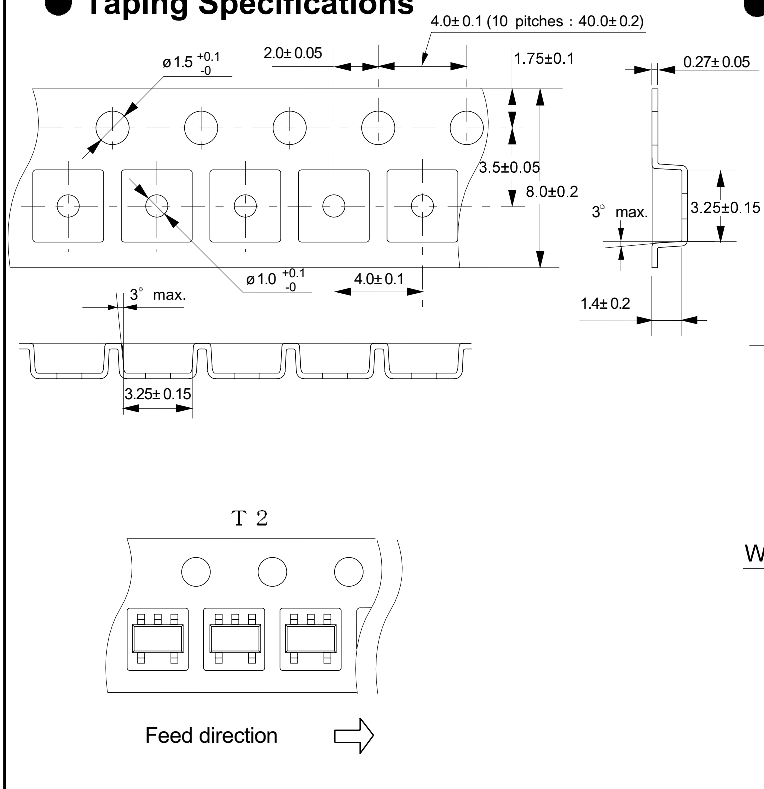
Unit : mm

● Dimensions



No.：MP００５－A－P－SD－１．０

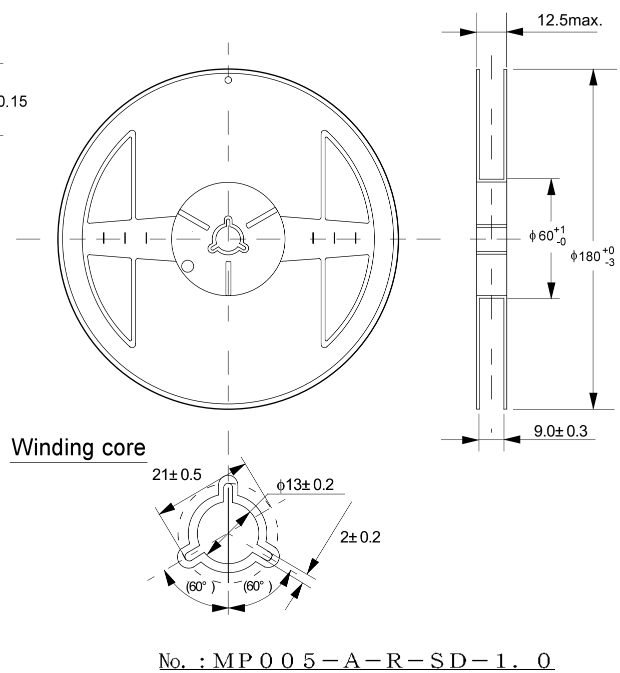
● Taping Specifications



No.：MP００５－A－C－SD－１．０

● Reel Specifications

1 reel holds 3000 ICs.



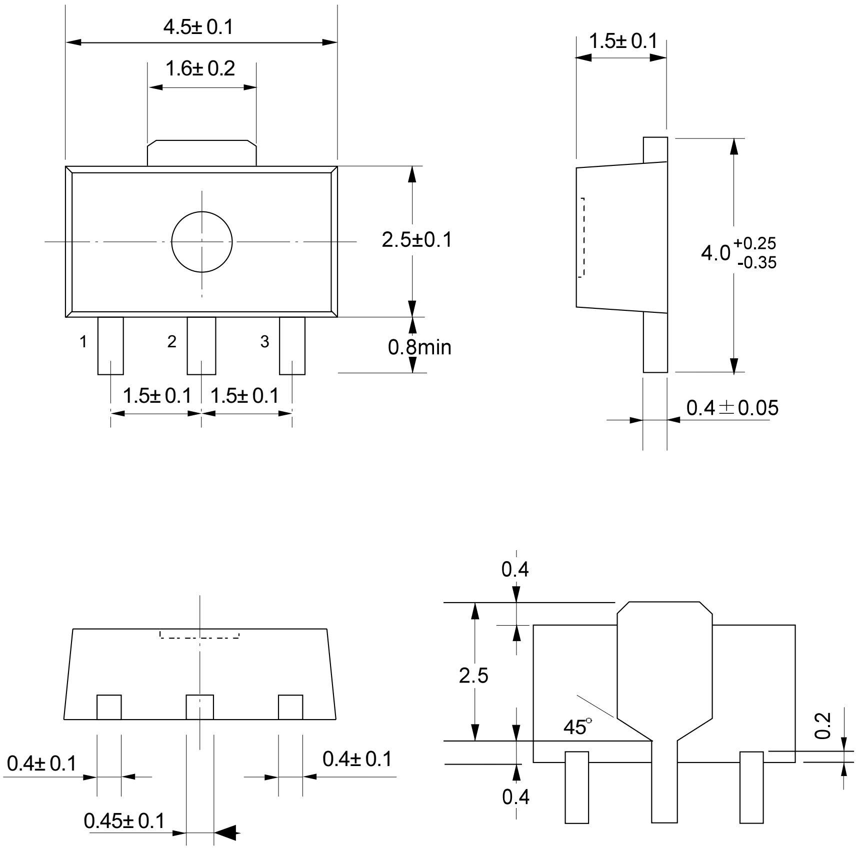
No.：MP００５－A－R－SD－１．０

■ SOT-89-3

UP003-A 990531

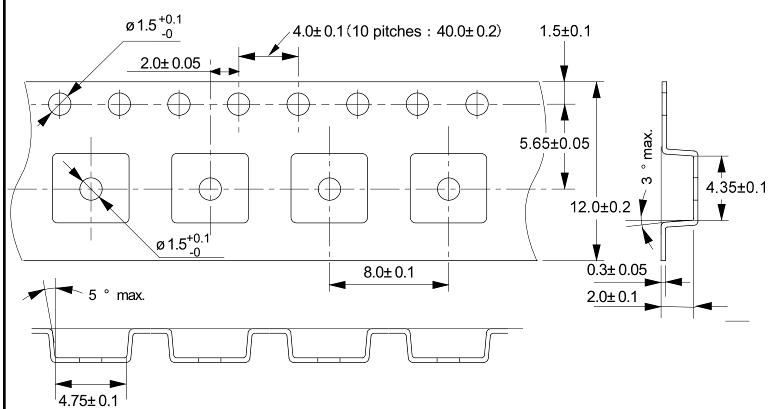
●Dimensions

Unit:mm

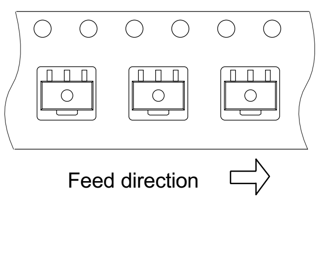


No.：UP003－A－P－SD－1．0

●Taping Specifications



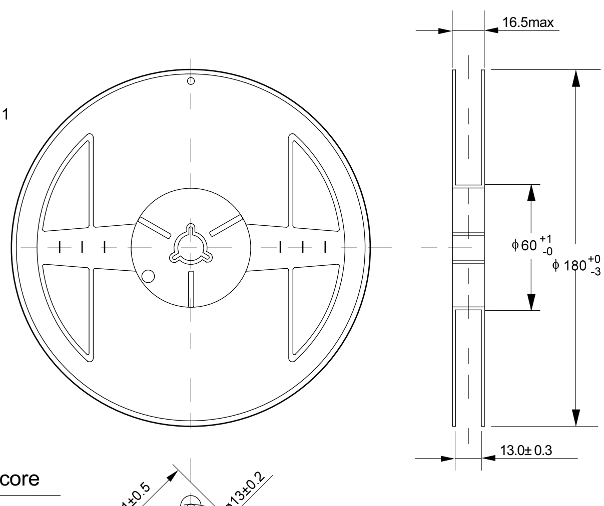
T2



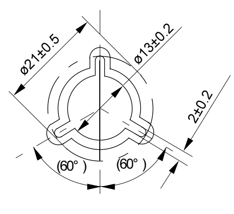
No.：UP003－A－C－SD－1．0

●Reel Specifications

1 reel holds 1000 ICs.



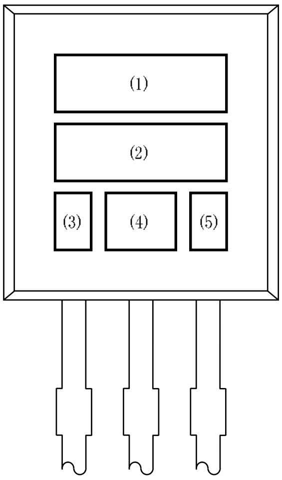
Winding core



No.：UP003－A－R－SD－1．0

■Markings

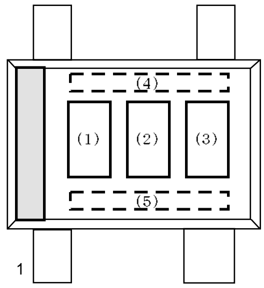
● TO-92



(1) to (2) : Product name
(3) : Year of assembly
(4) : Month of assembly and week code
(5) : Wafer lot No. (last digit)

No. : YF003-A-M-S1-1. 0

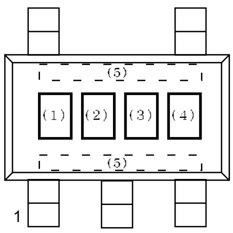
● SC-82AB



(1) to (3) : Product name (abbreviation)
(4) and (5) : Product lot

No. : NP004-A-M-S1-1. 0

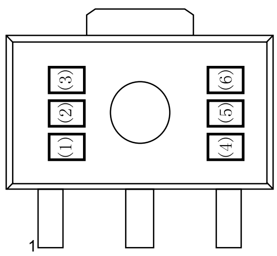
● SOT-23-5



(1) to (3) : Product name (abbreviation)
(4) : Month of assembly
(5) : Dot on one side
(Year and week of assembly)

No. : MP005-A-M-S1-1. 0

● SOT-89-3



(1) to (3) : Product name (abbreviation)
(4) : Year of assembly
(5) : Month of assembly
(6) : Week of assembly

No. : UP003-A-M-S1-1. 0