R3119N Series

AEC-Q100 Grade2

36 V Input Voltage Detector with Delay Function for Automotive Applications

NO.EC-187-180530

OUTLINE

The R3119N is a CMOS-based 36V input (absolute maximum ratings: 50V) voltage detector (VD) provided with high detector threshold accuracy and ultra-low supply current. Internally, the R3119N consists of a voltage reference unit, a hysteresis comparator, a resistor net for setting output voltage and an output driver transistor. The R3119NxxxA is equipped with a C_D pin and the R3119NxxxE is equipped with a SENSE pin.
The supply current of IC is only 3.3 μA. The detector threshold range is 2.3 V to 12 V, and the detector threshold accuracy is 1.5%. The output type is Nch. open drain “L” output.
The R3119N is available in a 5-pin SOT-23-5 package. Use of this package achieves high-density mounting on boards.

FEATURES

- Operating Voltage Range (Maximum Rating) ····· R3119NxxxA: 1.2 V to 36.0 V (50.0V)
  R3119NxxxE: 2.1 V to 6.0 V (7.0V)
- Operating Temperature Range ····· −40°C to 105°C
- Supply Current ····· Typ. 3.3 μA
- Detector Threshold Range ····· 2.3 V to 12.0 V (0.1 V steps)
- Detector Threshold Accuracy ····· ±1.5% (Ta=25°C)
- Detector Threshold Temperature Coefficient ····· Typ. ±100 ppm / °C
- Release Output Delay Time ····· R3119NxxxA : Typ.85 ms (at C_D = 0.01 μF)
- Release Output Delay Time Accuracy ····· R3119NxxxA : −50% to 80%
- Output Type ····· Nch. Open Drain
- Package ····· SOT-23-5

APPLICATIONS

- Voltage monitoring for electronic control units such as EV inverter and battery charge control unit.

SELECTION GUIDE

The detector threshold and the voltage detection type are user selectable options.

Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
R3119Nxxx∗-TR-#E	SOT-23-5	3,000 pcs	Yes	Yes

xxx : Specify the set detector threshold ($-V_{SET}$) in the range of 2.3 V (023) to 12.0 V (120) in 0.1 V steps.

∗: Select the voltage detection type from the following;

A: with C_D pin type

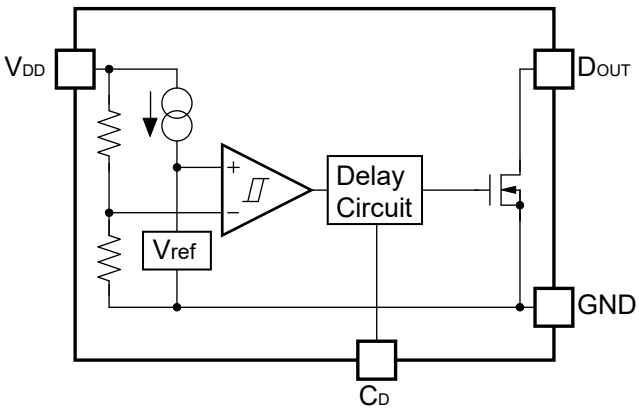
E: with SENSE pin type

#: Specify the automotive class code.

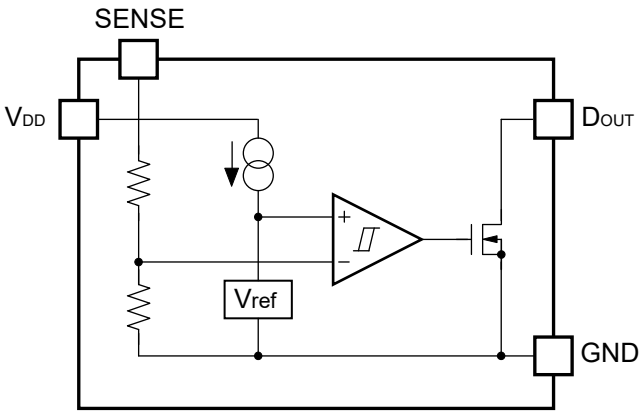
	Operating Temperature Range	Guaranteed Specs Temperature Range	Screening	AEC-Q100
J	−40°C to 105°C	−40°C to 105°C	Low and High Temperatures	Grade 2

BLOCK DIAGRAMS

R3119NxxxA

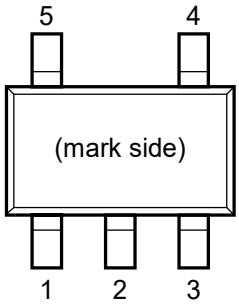


R3119NxxxE



PIN CONFIGURATIONS

SOT-23-5



R3119N Pin Configurations

Pin No.	Symbol	Description
1	V_{DD}	Input Pin
2	GND(1)	Ground Pin
3	GND1	Ground Pin
4	D_{OUT}	Output Pin (“L” active at detection)
5	C_D	Release Output Delay Set Pin (R3119NxxxA)
	SENSE	VD Voltage SENSE Pin (R3119NxxxE)

(1) No.2 and No.3 pins must be wired to the GND plane when mounted on board.

ABSOLUTE MAXIMUM RATINGS

Symbol	Item		Rating	Unit
V_{DD}	Supply Voltage (R3119NxxxA)		−0.3 to 50.0	V
	Supply Voltage (R3119NxxxE)		−0.3 to 7.0	V
V_{DOUT}	D_{OUT} Pin Output Voltage		−0.3 to 7.0	V
V_{CD}	C_D Pin Output Voltage (R3119NxxxA)		−0.3 to 7.0	V
V_{SENSE}	SENSE Pin Input Voltage (R3119NxxxE)		−0.3 to 50.0	V
I_{OUT}	D_{OUT} Pin Output Current		20	mA
P_D	Power Dissipation (SOT-23-5) [1]	Standard Land Pattern	420	mW
Tj	Junction Temperature		−40 to 125	°C
Tstg	Storage Temperature		−55 to 125	°C

ABSOLUTE MAXIMUM RATINGS

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause the permanent damages and may degrade the life time and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

RECOMMENDED OPERATING CONDITIONS

Symbol	Item	Rating	Unit
V_{DD}	Operating Voltage (R3119NxxxA)	1.25 to 36	V
	Operating Voltage (R3119NxxxE)	2.1 to 6	V
V_{SENSE}	SENSE Pin Input Voltage (R3119NxxxE)	0 to 36	V
Ta	Operating Temperature Range	−40 to 105	°C

RECOMMENDED OPERATING CONDITIONS

All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

[1] Refer to *POWER DISSIPATION* for detailed information.

ELECTRICAL CHARACTERISTICS

C_D = 1000 pF, pulled-up to 5 V with 100 kΩ, unless otherwise specified.

R3119NxxxA (−40°C ≤ Ta ≤ 105°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
$-V_{DET}$	Detector Threshold	V_{DD} pin	Ta = 25°C	x 0.985		x 1.015	V
			−40°C ≤ Ta ≤ 105°C	x 0.970		x 1.020	
V_{HYS}	Detector Threshold Hysteresis			3.5	5	6.5	%
I_{SS}	Supply Current	V_{DD} = $-V_{SET}$ −0.1 V			3.3	5.6	µA
		V_{DD} = $-V_{SET}$ +1.0 V			3.3	5.5	
V_{DDL}	Minimum Operating Voltage(1)*	Ta = 25°C				1.2	V
		−40°C ≤ Ta ≤ 105°C				1.25	
I_{OUT}	Output Current (Nch Driver Output Pin)	V_{DD} = 1.5 V, V_{DS} = 0.05 V		230			µA
		2.3 V ≤ $-V_{SET}$ < 2.6 V	V_{DD} = 2.2 V V_{DS} = 0.5 V	2.8			mA
		2.6 V ≤ $-V_{SET}$ < 3.0 V	V_{DD} = 2.5 V V_{DS} = 0.5 V	3.3			
		3.0V ≤ $-V_{SET}$	V_{DD} = 2.9 V V_{DS} = 0.5 V	3.5			
I_{LEAK}	Nch. Driver Leakage Current	V_{DD} = 36 V, V_{DS} = 6.0 V				0.2	µA
tdelay	Release Output Delay Time	V_{DD} = 1.5 V → $-V_{SET}$ + 2.0 V C_D = 0.01 µF		45	85	150	ms

(1) The value is the minimum operating voltage when the output voltage is 0.1 V or less at detection. (The pull-up resistance; 100 kΩ, the pull-up voltage; 5.0 V)

Pulled-up to 5 V with 100 kΩ, unless otherwise specified.

R3119NxxxE (−40°C ≤ Ta ≤ 105°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
$-V_{DET}$	Detector Threshold	SENSE pin V_{DD} = 6 V	Ta = 25°C	x 0.985		x 1.015	V
			−40°C ≤ Ta ≤ 105°C	x 0.970		x 1.020	
V_{HYS}	Detector Threshold Hysteresis	V_{DD} = 6 V		3.5	5	6.5	%
I_{SS}	Supply Current	V_{DD} = 6 V, V_{SENSE} = $-V_{SET}$ − 0.1 V			3.3	5.5	µA
		V_{DD} = 6 V, V_{SENSE} = $-V_{SET}$ + 1.0 V			3.3	5.5	
V_{DDL}	Minimum Operating Voltage(1)*					2.1	V
R_{SENSE}	SENSE Resistance			4.5		120	MΩ
I_{OUT}	Output Current (Nch. Driver Output Pin)	V_{SENSE} < $-V_{DET}$	V_{DD} = 2.1 V V_{DS} = 0.05 V	420			µA
		V_{SENSE} < $-V_{DET}$	V_{DD} = 2.2 V V_{DS} = 0.5 V	2.8			mA
I_{LEAK}	Nch. Driver Leakage Current	V_{DD} = 6 V, V_{SENSE} = 36 V, V_{DS} = 6.0 V				0.2	µA
t_{PLH}	Release Output Delay Time	V_{DD} = 6 V V_{SENSE} = 1.5 V → $-V_{SET}$ + 2.0 V			15		µs

(1) The value is the minimum operating voltage to define V_{DOUT}.

Product-specific Electric Characteristics

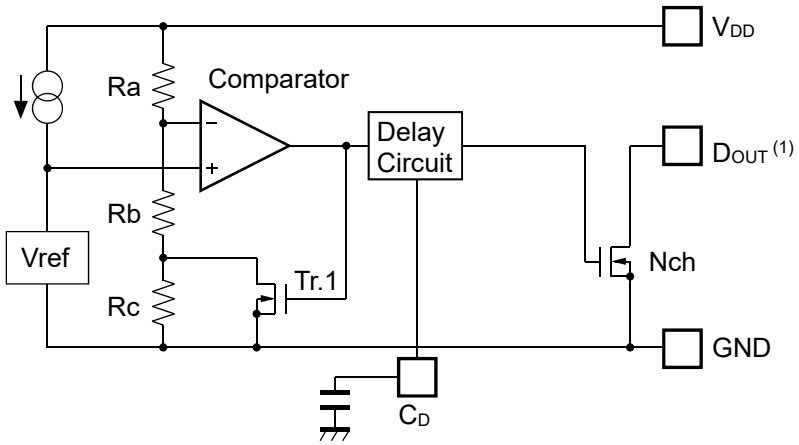
R3119NxxxA/E

Product Name	$-V_{DET}$ [V] (Ta = 25°C)			$-V_{DET}$ [V] (−40°C ≤ Ta ≤ 105°C)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
R3119N023x	2.266	2.300	2.334	2.231	2.300	2.346
R3119N024x	2.364	2.400	2.436	2.328	2.400	2.448
R3119N025x	2.463	2.500	2.537	2.425	2.500	2.550
R3119N026x	2.561	2.600	2.639	2.522	2.600	2.652
R3119N027x	2.660	2.700	2.740	2.619	2.700	2.754
R3119N028x	2.758	2.800	2.842	2.716	2.800	2.856
R3119N029x	2.857	2.900	2.943	2.813	2.900	2.958
R3119N030x	2.955	3.000	3.045	2.910	3.000	3.060
R3119N031x	3.054	3.100	3.146	3.007	3.100	3.162
R3119N032x	3.152	3.200	3.248	3.104	3.200	3.264
R3119N033x	3.251	3.300	3.349	3.201	3.300	3.366
R3119N034x	3.349	3.400	3.451	3.298	3.400	3.468
R3119N035x	3.448	3.500	3.552	3.395	3.500	3.570
R3119N036x	3.546	3.600	3.654	3.492	3.600	3.672
R3119N037x	3.645	3.700	3.755	3.589	3.700	3.774
R3119N038x	3.743	3.800	3.857	3.686	3.800	3.876
R3119N039x	3.842	3.900	3.958	3.783	3.900	3.978
R3119N040x	3.940	4.000	4.060	3.880	4.000	4.080
R3119N041x	4.039	4.100	4.161	3.977	4.100	4.182
R3119N042x	4.137	4.200	4.263	4.074	4.200	4.284
R3119N043x	4.236	4.300	4.364	4.171	4.300	4.386
R3119N044x	4.334	4.400	4.466	4.268	4.400	4.488
R3119N045x	4.433	4.500	4.567	4.365	4.500	4.590
R3119N046x	4.531	4.600	4.669	4.462	4.600	4.692
R3119N047x	4.630	4.700	4.770	4.559	4.700	4.794
R3119N048x	4.728	4.800	4.872	4.656	4.800	4.896
R3119N049x	4.827	4.900	4.973	4.753	4.900	4.998
R3119N050x	4.925	5.000	5.075	4.850	5.000	5.100
R3119N051x	5.024	5.100	5.176	4.947	5.100	5.202
R3119N052x	5.122	5.200	5.278	5.044	5.200	5.304
R3119N053x	5.221	5.300	5.379	5.141	5.300	5.406
R3119N054x	5.319	5.400	5.481	5.238	5.400	5.508
R3119N055x	5.418	5.500	5.582	5.335	5.500	5.610
R3119N056x	5.516	5.600	5.684	5.432	5.600	5.712
R3119N057x	5.615	5.700	5.785	5.529	5.700	5.814
R3119N058x	5.713	5.800	5.887	5.626	5.800	5.916
R3119N059x	5.812	5.900	5.988	5.723	5.900	6.018
R3119N060x	5.910	6.000	6.090	5.820	6.000	6.120
R3119N061x	6.009	6.100	6.191	5.917	6.100	6.222
R3119N062x	6.107	6.200	6.293	6.014	6.200	6.324
R3119N063x	6.206	6.300	6.394	6.111	6.300	6.426
R3119N064x	6.304	6.400	6.496	6.208	6.400	6.528
R3119N065x	6.403	6.500	6.597	6.305	6.500	6.630
R3119N066x	6.501	6.600	6.699	6.402	6.600	6.732
R3119N067x	6.600	6.700	6.800	6.499	6.700	6.834
R3119N068x	6.698	6.800	6.902	6.596	6.800	6.936
R3119N069x	6.797	6.900	7.003	6.693	6.900	7.038

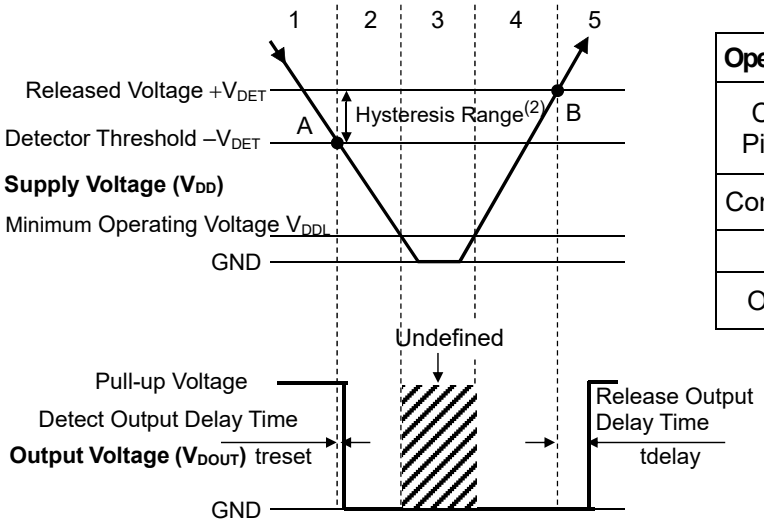
Product Name	$-V_{DET}$ [V] (Ta = 25°C)			$-V_{DET}$ [V] (−40°C ≤ Ta ≤ 105°C)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
R3119N070x	6.895	7.000	7.105	6.790	7.000	7.140
R3119N071x	6.994	7.100	7.206	6.887	7.100	7.242
R3119N072x	7.092	7.200	7.308	6.984	7.200	7.344
R3119N073x	7.191	7.300	7.409	7.081	7.300	7.446
R3119N074x	7.289	7.400	7.511	7.178	7.400	7.548
R3119N075x	7.388	7.500	7.612	7.275	7.500	7.650
R3119N076x	7.486	7.600	7.714	7.372	7.600	7.752
R3119N077x	7.585	7.700	7.815	7.469	7.700	7.854
R3119N078x	7.684	7.800	7.917	7.567	7.800	7.956
R3119N079x	7.782	7.900	8.018	7.663	7.900	8.058
R3119N080x	7.880	8.000	8.120	7.760	8.000	8.160
R3119N081x	7.979	8.100	8.221	7.858	8.100	8.262
R3119N082x	8.078	8.200	8.323	7.955	8.200	8.364
R3119N083x	8.176	8.300	8.424	8.052	8.300	8.466
R3119N084x	8.274	8.400	8.526	8.148	8.400	8.568
R3119N085x	8.373	8.500	8.627	8.246	8.500	8.670
R3119N086x	8.472	8.600	8.729	8.343	8.600	8.772
R3119N087x	8.570	8.700	8.830	8.440	8.700	8.874
R3119N088x	8.669	8.800	8.932	8.537	8.800	8.976
R3119N089x	8.767	8.900	9.033	8.634	8.900	9.078
R3119N090x	8.866	9.000	9.135	8.731	9.000	9.180
R3119N091x	8.964	9.100	9.236	8.828	9.100	9.282
R3119N092x	9.063	9.200	9.338	8.925	9.200	9.384
R3119N093x	9.161	9.300	9.439	9.022	9.300	9.486
R3119N094x	9.260	9.400	9.541	9.119	9.400	9.588
R3119N095x	9.358	9.500	9.642	9.216	9.500	9.690
R3119N096x	9.457	9.600	9.744	9.313	9.600	9.792
R3119N097x	9.555	9.700	9.845	9.410	9.700	9.894
R3119N098x	9.654	9.800	9.947	9.507	9.800	9.996
R3119N099x	9.752	9.900	10.048	9.604	9.900	10.098
R3119N100x	9.850	10.000	10.150	9.700	10.000	10.200
R3119N101x	9.949	10.100	10.251	9.797	10.100	10.302
R3119N102x	10.047	10.200	10.353	9.894	10.200	10.404
R3119N103x	10.146	10.300	10.454	9.991	10.300	10.506
R3119N104x	10.244	10.400	10.556	10.088	10.400	10.608
R3119N105x	10.343	10.500	10.657	10.185	10.500	10.710
R3119N106x	10.441	10.600	10.759	10.282	10.600	10.812
R3119N107x	10.540	10.700	10.860	10.379	10.700	10.914
R3119N108x	10.638	10.800	10.962	10.476	10.800	11.016
R3119N109x	10.737	10.900	11.063	10.573	10.900	11.118
R3119N110x	10.835	11.000	11.165	10.670	11.000	11.220
R3119N111x	10.934	11.100	11.266	10.767	11.100	11.322
R3119N112x	11.032	11.200	11.368	10.864	11.200	11.424
R3119N113x	11.131	11.300	11.469	10.961	11.300	11.526
R3119N114x	11.229	11.400	11.571	11.058	11.400	11.628
R3119N115x	11.328	11.500	11.672	11.155	11.500	11.730
R3119N116x	11.426	11.600	11.774	11.252	11.600	11.832
R3119N117x	11.525	11.700	11.875	11.349	11.700	11.934
R3119N118x	11.623	11.800	11.977	11.446	11.800	12.036
R3119N119x	11.722	11.900	12.078	11.543	11.900	12.138
R3119N120x	11.820	12.000	12.180	11.640	12.000	12.240

THEORY OF OPERATION

R3119NxxxA (C_D Pin Type)



Block Diagram with External Capacitors



Operating Conditions	1	2	3	4	5
Comparator (−) Pin Input Voltage	I	II	II	II	I
Comparator Output	L	H	Undefined	H	L
Tr.1	OFF	ON	Undefined	ON	OFF
Output Tr. (Nch)	OFF	ON	Undefined	ON	OFF

I $\frac{Rb + Rc}{Ra + Rb + Rc}$ x V_{DD}

II $\frac{Rb}{Ra + Rb}$ x V_{DD}

Operation Diagram

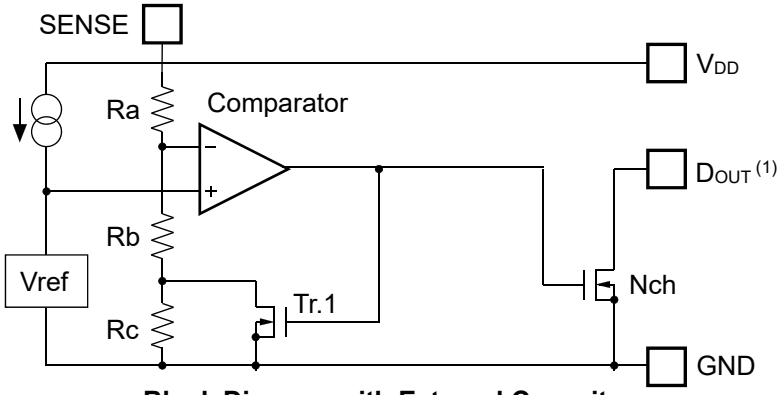
OPERATING CONDITIONS

1. The output voltage is equal to the pull-up voltage.
2. At A point, Vref ≥ V_{DD} x (Rb+Rc) / (Ra+Rb+Rc) is true. So, the comparator output voltage will be reversed from “L” to “H”. As a result, the output voltage will be “L”.
3. If the supply voltage remains lower than the minimum operating voltage, the output voltage will be undefined.
4. The “L” voltage is output.
5. At B point, Vref ≤ V_{DD} x Rb / (Ra+Rb) is true. So, the comparator output voltage will be reversed from “H” to “L”. As a result, output voltage will be equal to the pull-up voltage.

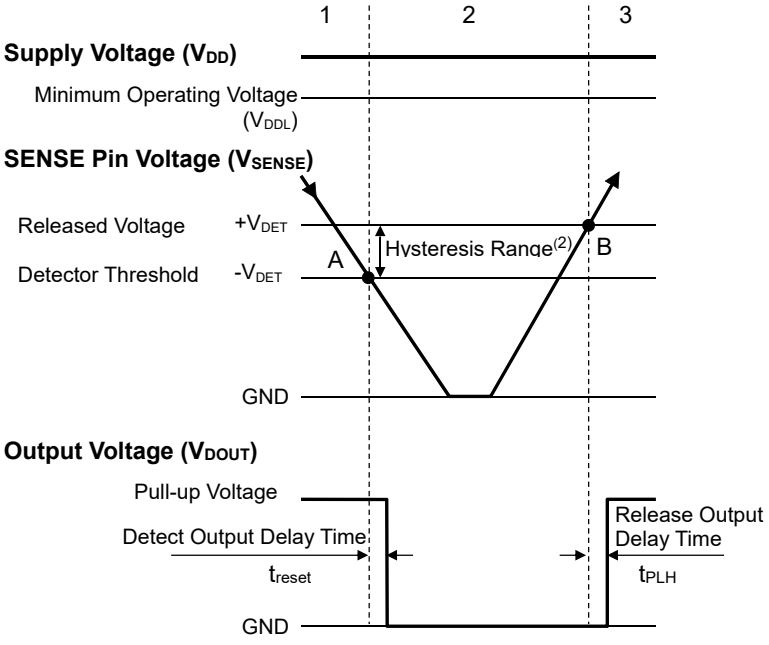
(1) The D_{OUT} pin should be pulled-up to an external voltage level.
(2) Hysteresis is a voltage differential between the released voltage and the detector threshold.

NO.EC-187-180530

R3119NxxxE (SENSE Pin Type)



Block Diagram with External Capacitors



Operating Conditions	1	2	3
Comparator (–) Pin Input Voltage	I	II	I
Comparator Output	L	H	L
Tr.1	OFF	ON	OFF
Output Tr. (Nch)	OFF	ON	OFF

$$\text{I} \quad \frac{Rb + Rc}{Ra + Rb + Rc} \times V_{SENSE}$$

$$\text{II} \quad \frac{Rb}{Ra + Rb} \times V_{SENS}$$

Operation Diagram

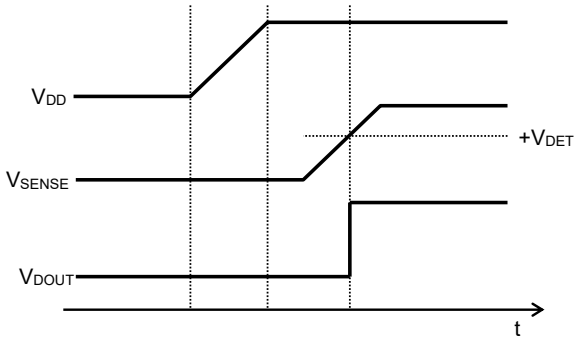
Operating Conditions

1. The SENSE pin voltage is higher than the detector threshold; the output voltage is equal to the pull-up voltage.
2. At A point, Vref ≥ V_{SENSE} x (Rb+Rc) / (Ra+Rb+Rc) is true. So, the comparator output voltage will be reversed from “L” to “H”. As a result, the output voltage will be “L”. If the supply voltage remains higher than the minimum operating voltage, the output voltage will stay in “L”.
3. At B point, Vref ≤ V_{SENSE} x Rb / (Ra+Rb) is true. So, the comparator output voltage will be reversed from “H” to “L”. As a result, output voltage will be equal to the pull-up voltage.

(1) The D_{OUT} pin should be pulled-up to an external voltage level.
(2) Hysteresis is a voltage differential between the released voltage and the detector threshold.

Power Sequence

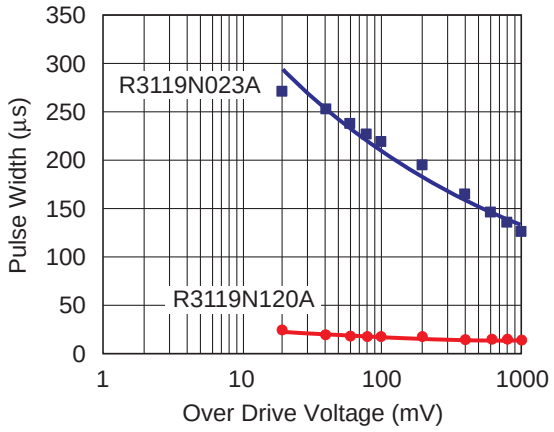
The R3119NxxxE can supervise the voltage of the SENSE pin. Regarding the power-on sequence, the SENSE pin must be powered on after the power-on to the V_{DD} pin, as shown below.
If the SENSE pin voltage is equal or more than the released voltage ($+V_{DET}$), D_{OUT} pin becomes "H". Besides, a voltage beyond V_{DD} pin is also acceptable to SENSE pin.



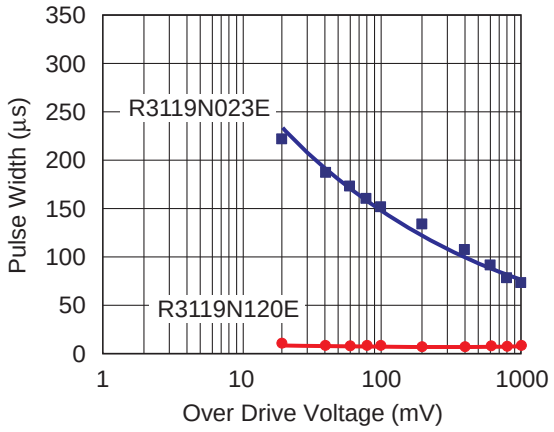
Power-On Timing Diagram

Glitch Detection bY V_{dd}, Sense Pins

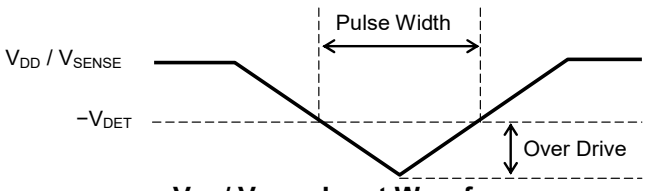
The following graphs are the released conditions when a pulse voltage less than or equal to the detector threshold ($-V_{DET}$) is applied to V_{DD} (R3119NxxxA) / V_{SENSE} (R3119NxxxE) pin during the release operation. This graph indicates the maximum pulse condition. If a pulse increased in width and voltage is applied to V_{DD} (R3119NxxxA) / V_{SENSE} (R3119NxxxE), the reset signal may occur.



R3119NxxxA Pulse Width vs. Over Drive Voltage



R3119NxxxE Pulse Width vs. Over Drive Voltage

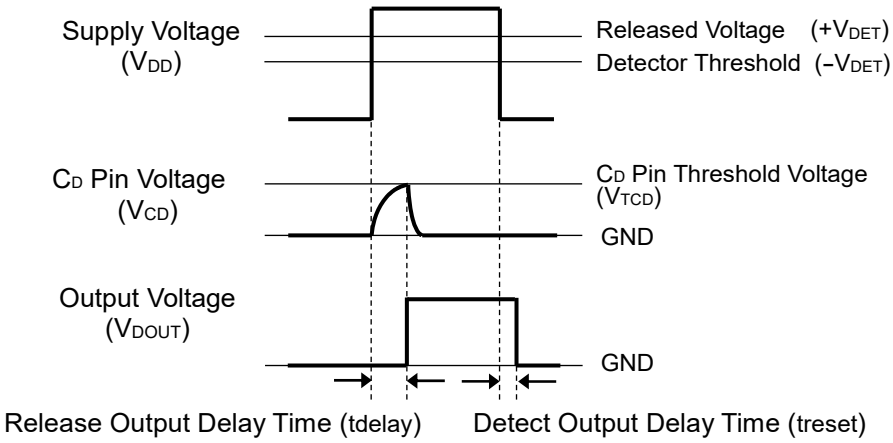


V_{DD} / V_{SENSE} Input Waveform

Timing Chart

When the operating voltage higher than the released voltage is applied to V_{DD} pin, charge to an external capacitor starts, then C_D pin voltage (V_{CD}) increases. The output voltage maintains the released output until V_{CD} reaches the threshold voltage of the release output delay pin (V_{TCD}). And when V_{CD} is over V_{TCD}, the output voltage is inverted from the detected output to the released output. That is, the charged external capacitor starts discharging.

When the operating voltage lower than the detector threshold is applied to V_{DD} pin, the detect output delay time, which is the time until the output voltage is inverted from “H” to “L”, remains constant independent of the external capacitor.

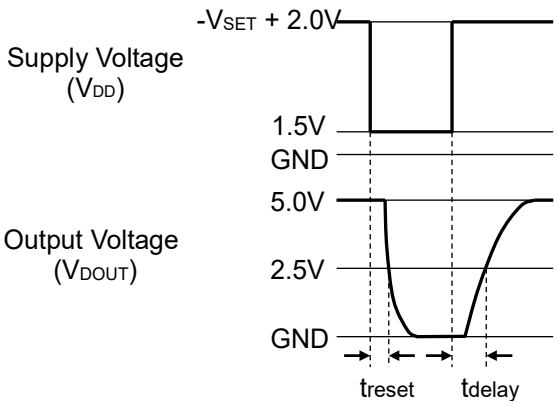


Delay Timing Diagram

Release Output Delay Time (tdelay)

Release Output Delay Time (tdelay) indicates the time between the instance when V_{DD} shift from “1.5 V” to “$-V_{SET}$ + 2.0 V” by the application of a pulse voltage and the instance when the output voltage reaches 2.5 V after pulled up the output pin (D_{OUT}) to 5.0 V with a resistor of 100 kΩ.

This is given by the expression tdelay (s) = 8.5 x 10^6 x C_D (F), where C_D (F) represents capacitance of the external capacitor.

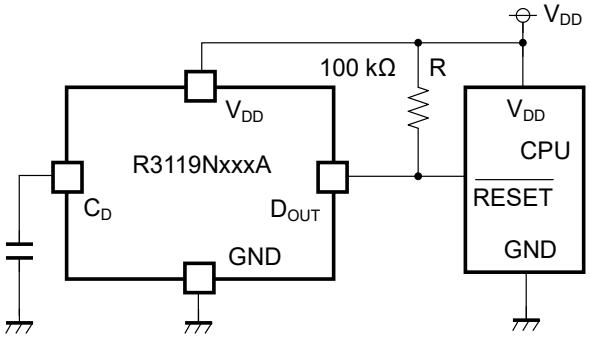


R3119NxxxA

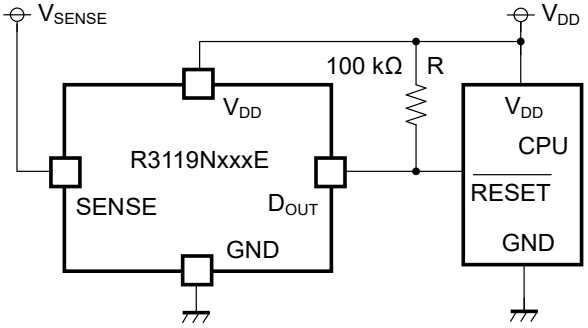
APPLICATION INFORMATION

Typical Application Circuits

■ **When using a shared input voltage between R3119N and CPU**

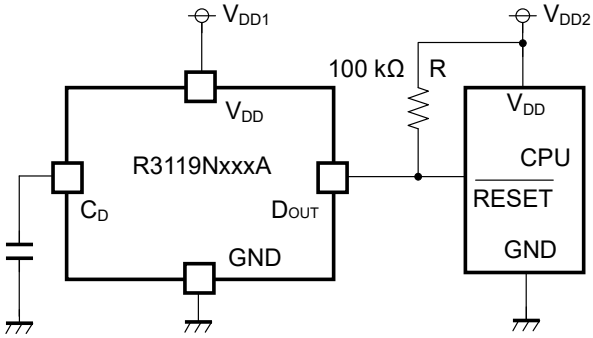


R3119NxxxA Typical Application Circuit

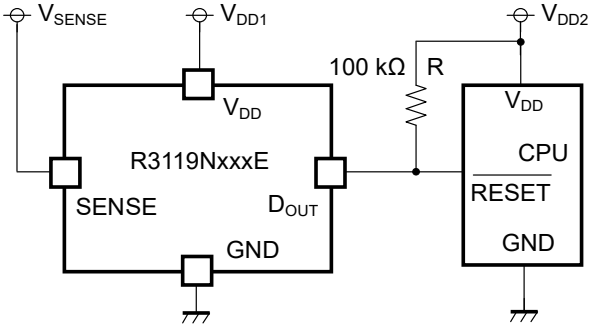


R3119NxxxE Typical Application Circuit

■ **When using different input voltages between R3119N and CPU**



R3119NxxxA Typical Application Circuit



R3119NxxxE Typical Application Circuit

TECHNICAL NOTES

When connecting resistors to the device's input pin

When connecting a resistor (R1) to an input of this device, the input voltage decreases by [Device's Consumption Current] x [Resistance Value] only. And, the cross conduction current(1), which occurs when changing from the detecting state to the release state, is decreased the input voltage by [Cross Conduction Current] x [Resistance Value] only. And then, this device will enter the re-detecting state if the input voltage reduction is larger than the difference between the detector voltage and the released voltage.

When the input resistance value is large and the VDD is gone up at mildly in the vicinity of the released voltage, repeating the above operation may result in the occurrence of output.

As shown in Figure A/B, set R1 to become 100kΩ or less as a guide, and connect C_{IN}(2) of 0.1µF and more to between the input pin and GND. Besides, make evaluations including temperature properties under the actual usage condition, with using the evaluation board like this way. As result, make sure that the cross conduction current has no problem.

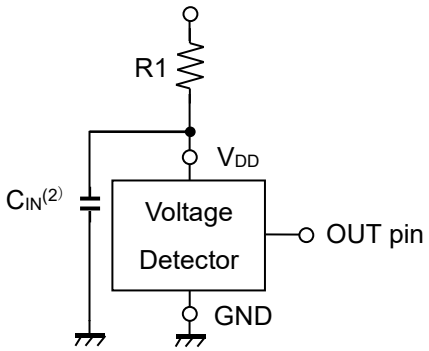


Figure A

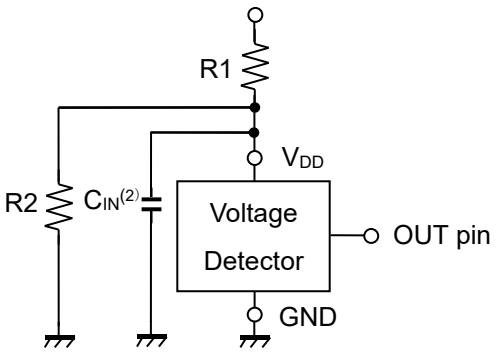


Figure B

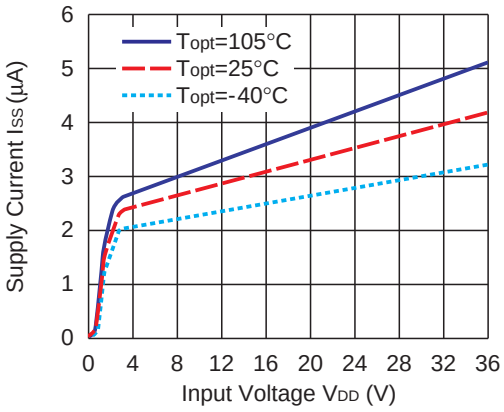
(1) In the CMOS output type, a charging current for OUT pin is included.
(2) Note the bias dependence of capacitors.

TYPICAL CHARACTERISTICS

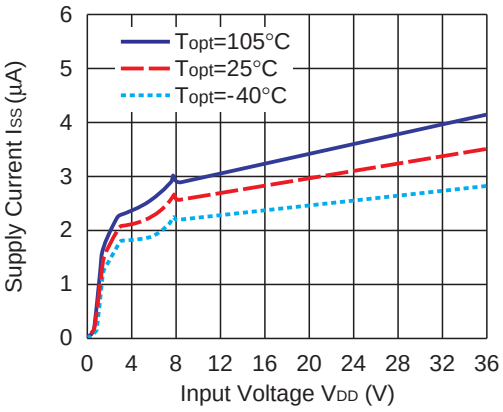
Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

1）Supply Current vs. Input Voltage

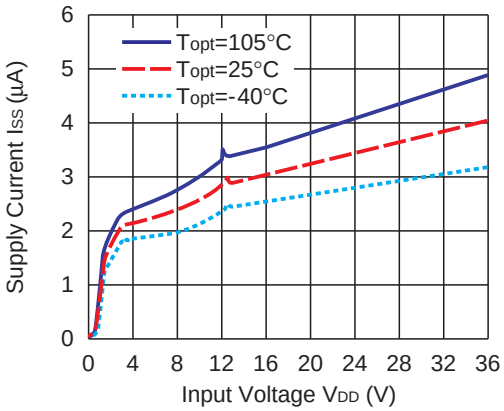
R3119N023A



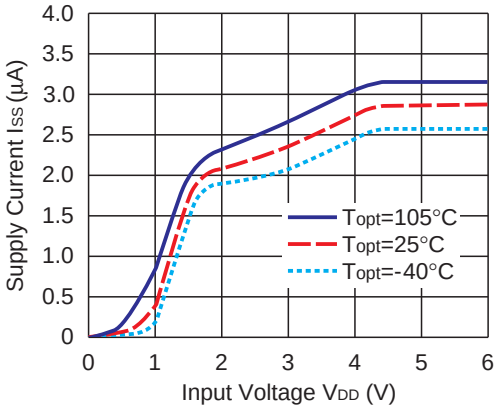
R3119N077A



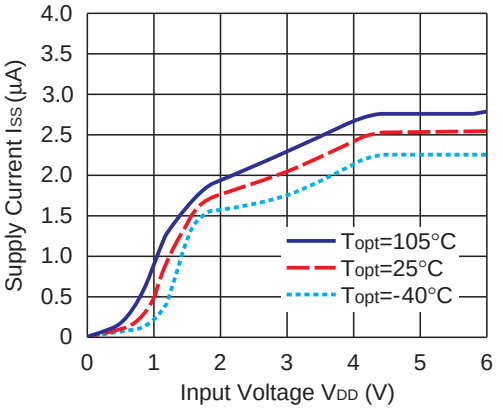
R3119N120A



R3119NxxxE (at release)

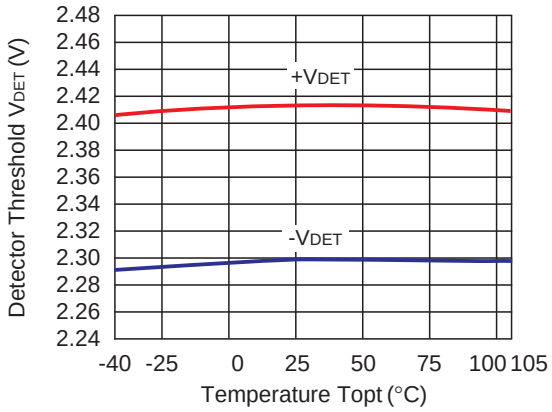


R3119NxxxE (at detecting)

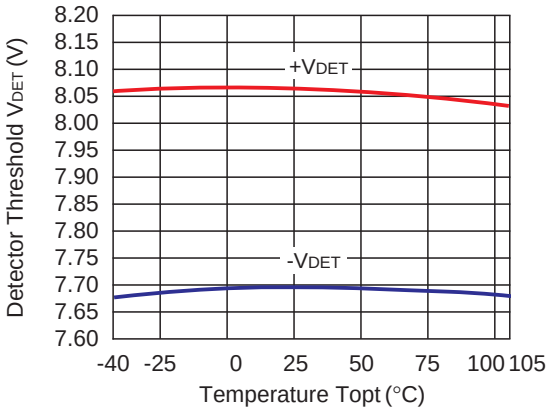


2）Detector Threshold vs. Temperature

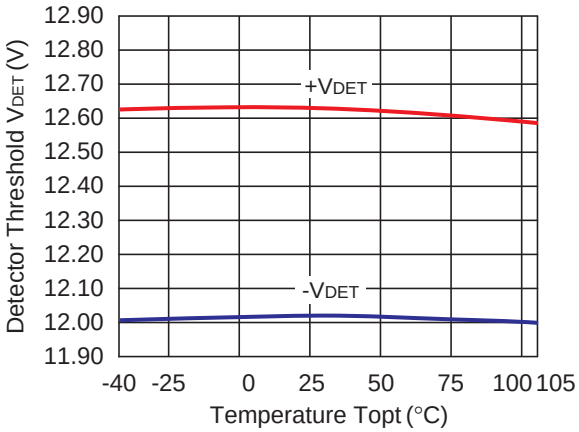
R3119N023A/E



R3119N077A/E

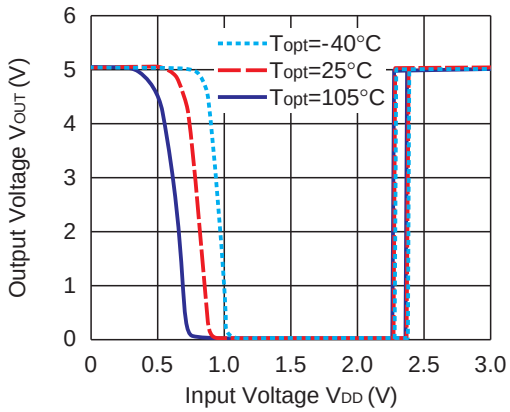


R3119N120A/E

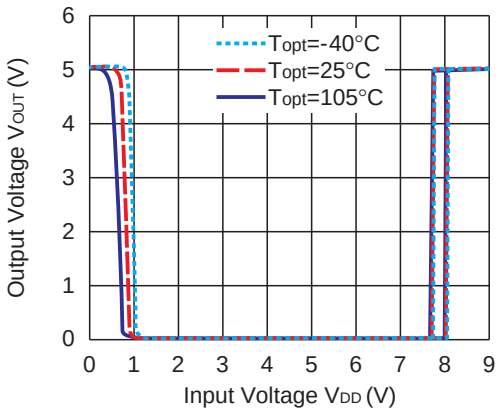


3）Output Voltage vs. Input Voltage

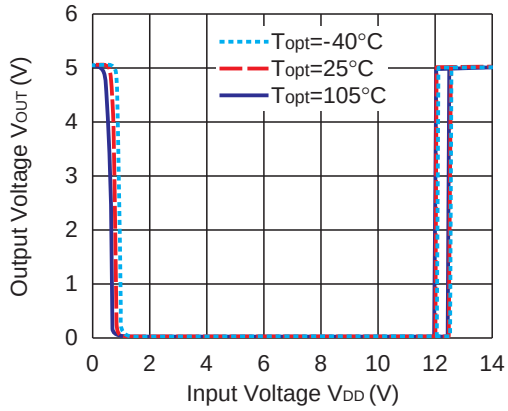
R3119N023A/E



R3119N077A/E

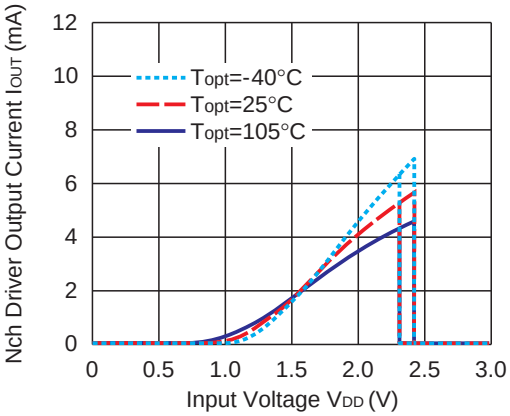


R3119N120A/E

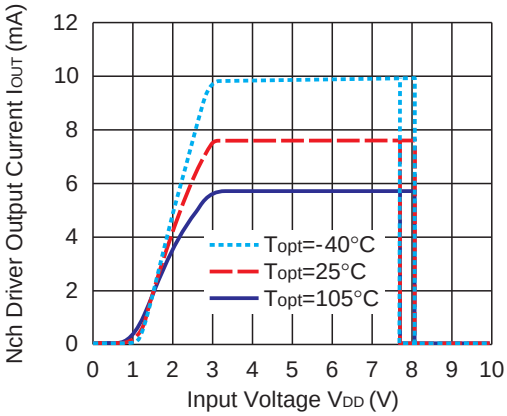


4) Nch. Driver Output Current vs. Input Voltage

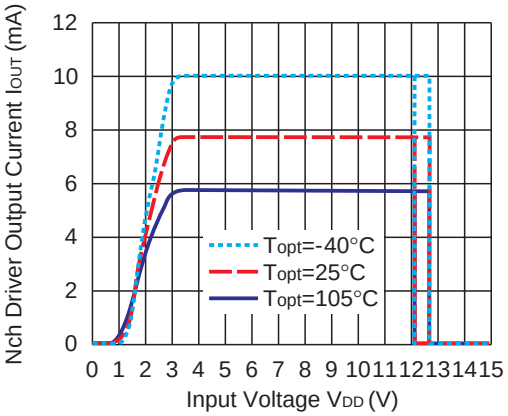
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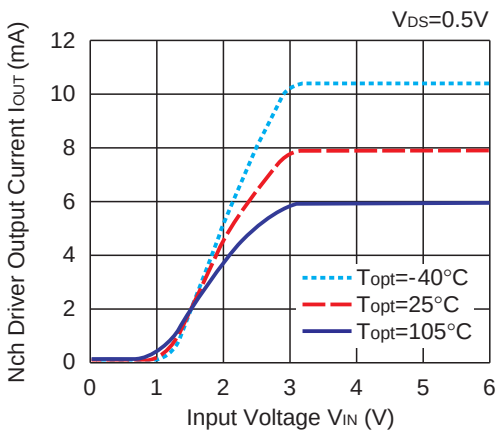
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R3119N120A

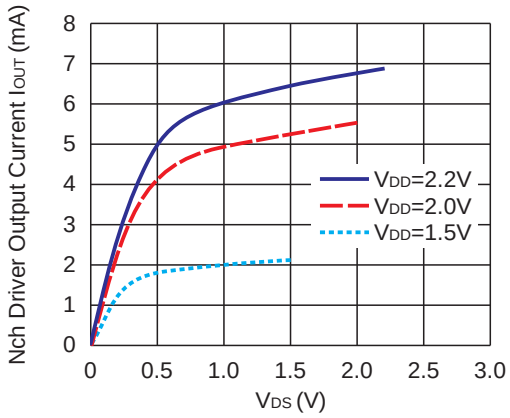


R3119NxxxE

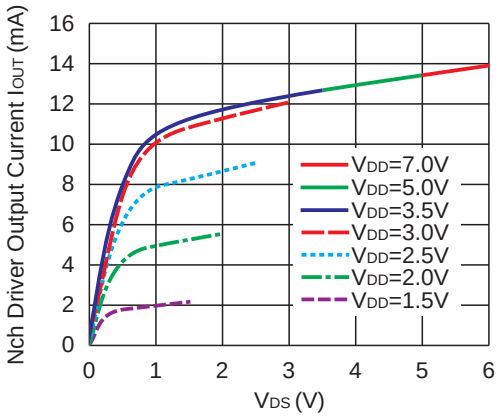


5) Nch. Driver Output Current vs. V_{DS}

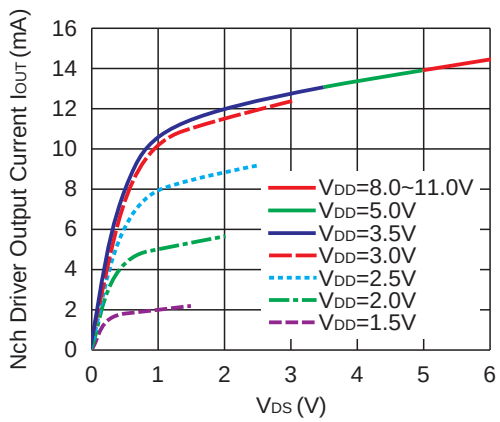
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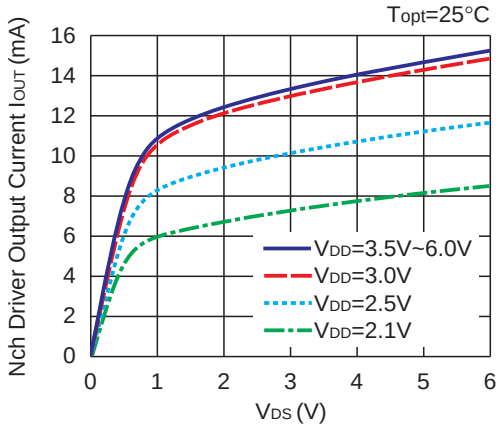
R3119N077A



R3119N120A

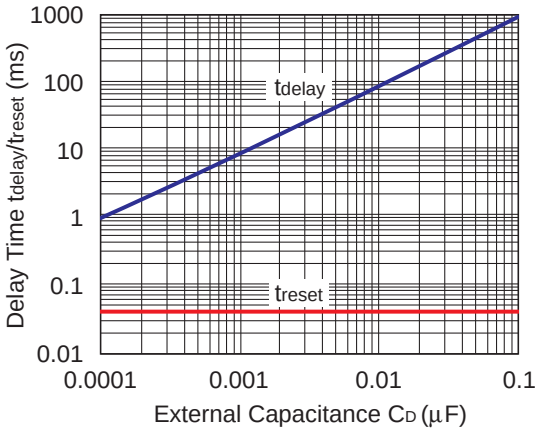


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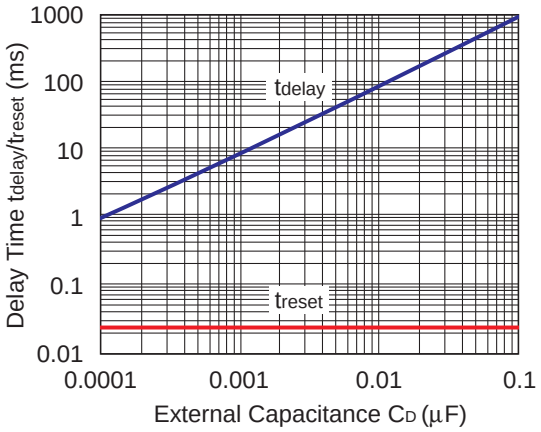


6) Delay Time vs. External Capacitor for C_D Pin (Ta = 25°C)

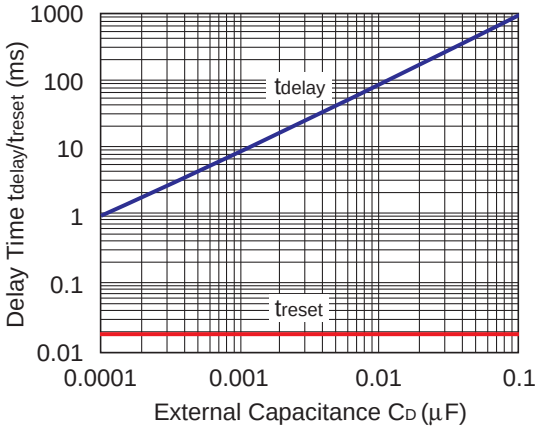
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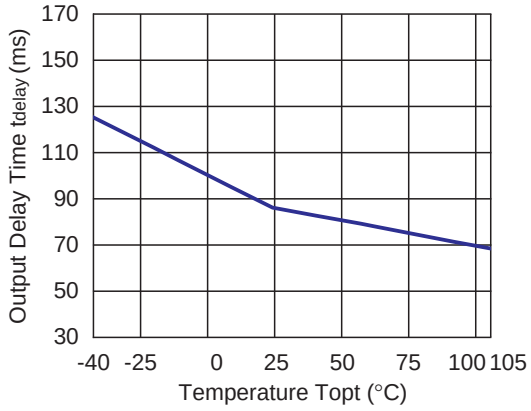


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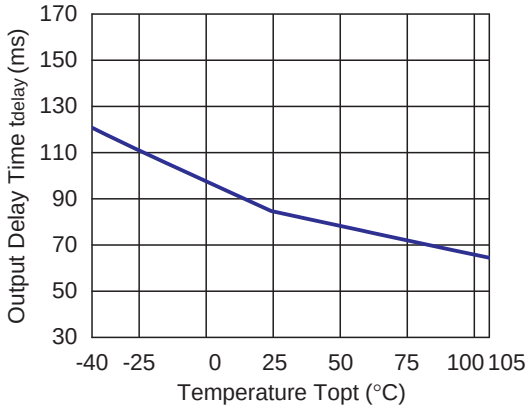


7）Release Output Delay Time vs. Temperature (C_D = 0.01∝F)

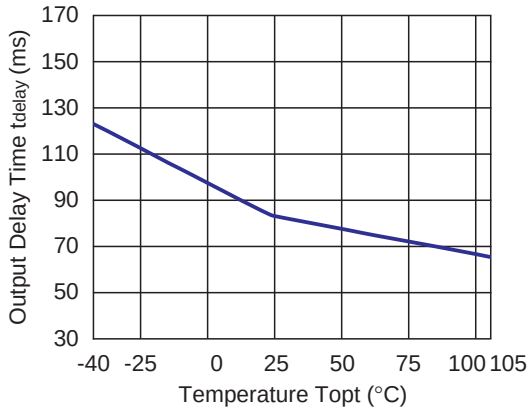
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R3119N077A

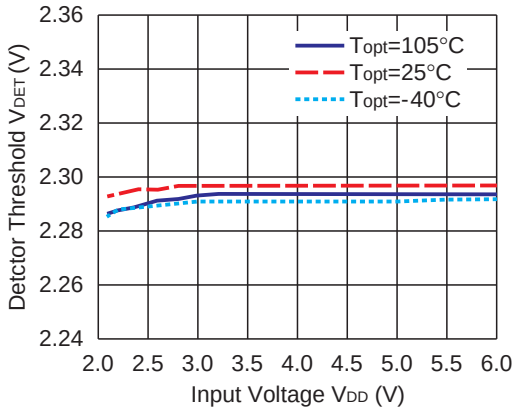


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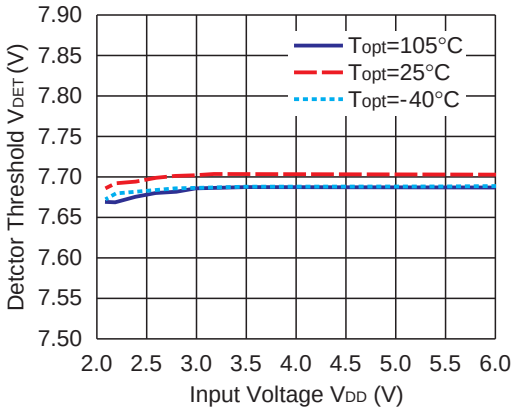


8）Detector Threshold vs. Input Voltage

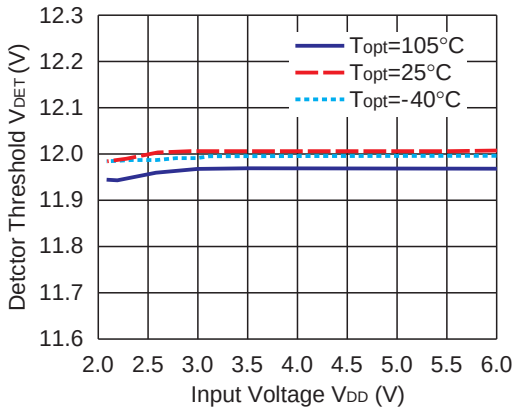
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R3119N077E

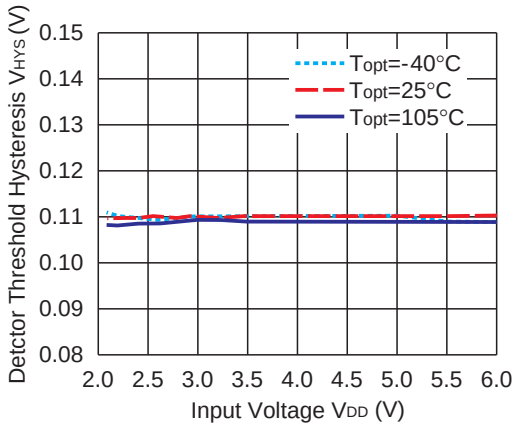


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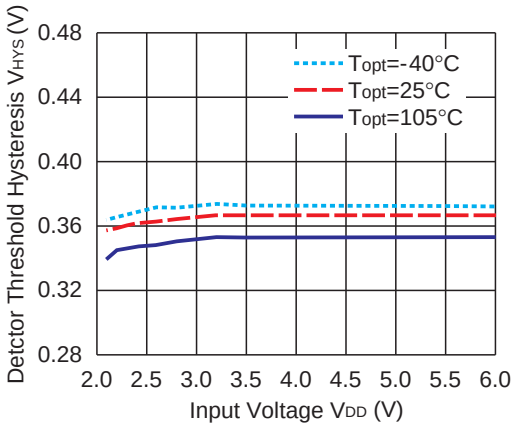


9）Hysteresis Range vs. Input Voltage

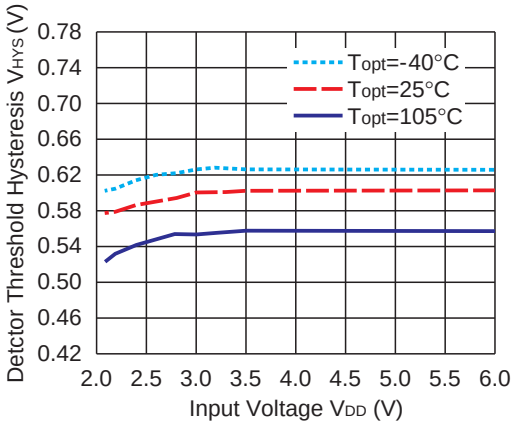
R3119N023E



R3119N077E

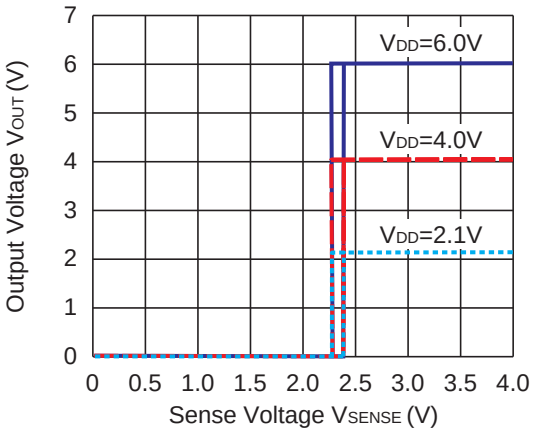


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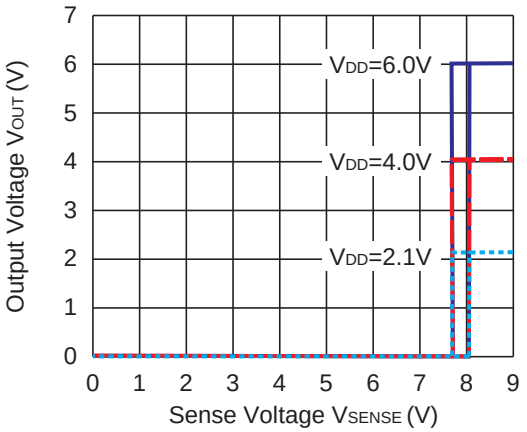


10）Output Voltage vs. SENSE Pin Input Voltage （Ta = 25°C, DOUT: pulled-up to VDD with 100 kΩ）

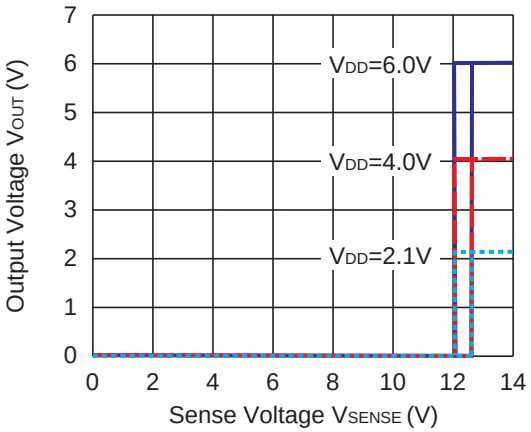
R3119N023E



R3119N077E



R3119N120E



Ver. A

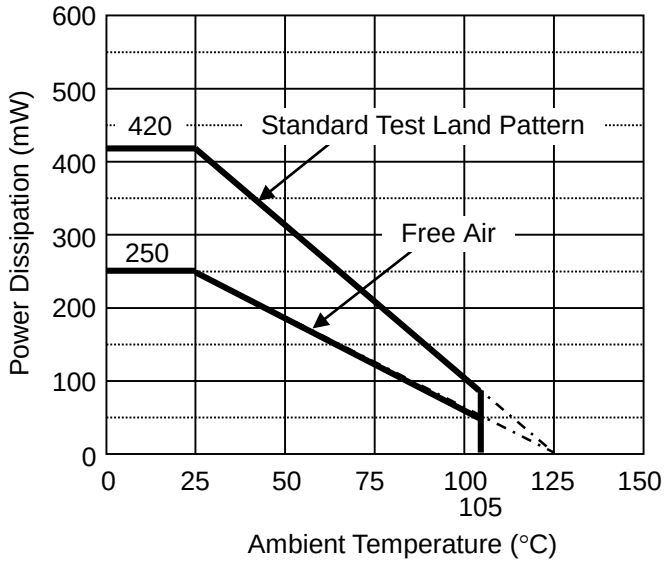
The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following conditions are used in this measurement.

Measurement Conditions

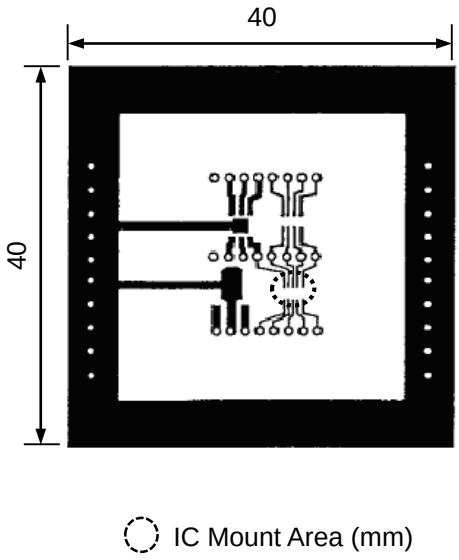
	Standard Test Land Pattern
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Double-sided Board)
Board Dimensions	40 mm × 40 mm × 1.6 mm
Copper Ratio	Top Side: Approx. 50% Bottom Side: Approx. 50%
Through-holes	ϕ 0.5 mm × 44 pcs

Measurement Result (Ta = 25°C, Tjmax = 125°C)

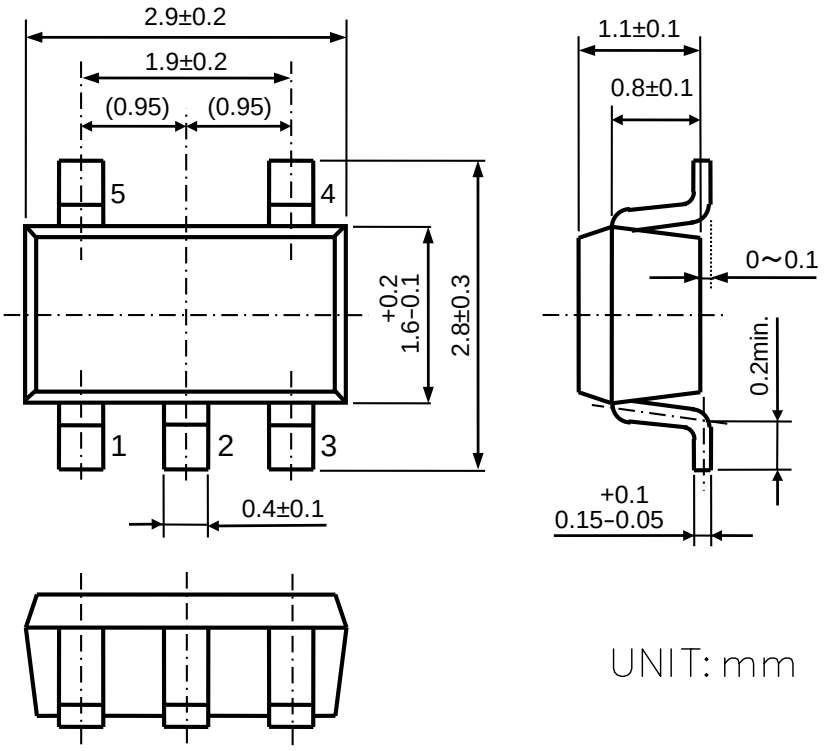
	Standard Test Land Pattern	**Free Air**
Power Dissipation	420 mW	250 mW
Thermal Resistance	θja = (125 − 25°C) / 0.42 W = 238°C/W	400°C/W



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern



SOT-23-5 Package Dimensions