

**R3111xxxxA/C SERIES**

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**OUTLINE**

The R3111 series are CMOS-based voltage detector ICs with high detector threshold accuracy and ultra-low supply current, which can be operated at an extremely low voltage and is used for system reset as an example.

Each of these ICs consists of a voltage reference unit, a comparator, resistors for detector threshold setting, an output driver and a hysteresis circuit. The detector threshold is fixed with high accuracy internally and does not require any adjustment.

Two output types, Nch open drain type and CMOS type are available.

The R3111 Series are operable at a lower voltage than that for the RX5VL series, and can be driven by a single battery.

Six types of packages, TO-92, SOT-89, SOT-23-3, SOT-23-5, SC-82AB, and SON1612-6(Under Development) are available.

**FEATURES**

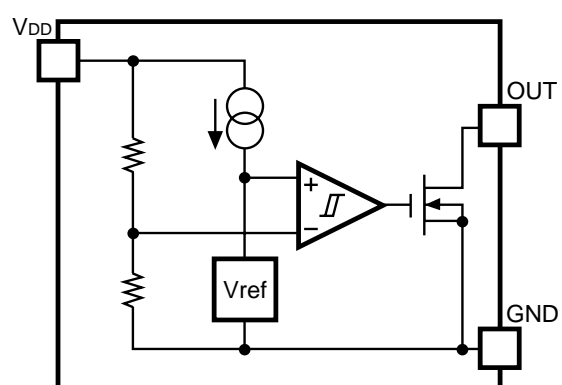
- Ultra-low Supply Current .....Typ. 0.8 $\mu$ A ( $V_{DD}=1.5V$ )
- Wide Range of Operating Voltage .....0.7V to 10.0V ( $T_{opt}=25^{\circ}C$ )
- Detector Threshold.....Stepwise setting with a step of 0.1V in the range of 0.9V to 6.0V is possible.
- High Accuracy Detector Threshold..... $\pm 2.0\%$
- Low Temperature-Drift Coefficient of Detector Threshold   Typ.  $\pm 100ppm/^{\circ}C$
- Two Output Types.....Nch Open Drain and CMOS
- Four Types of Packages .....TO-92, SOT-89(Mini-power Mold), SOT-23-3, SOT-23-5 (Mini-mold), SC-82AB, SON1612-6(Under development)

**APPLICATIONS**

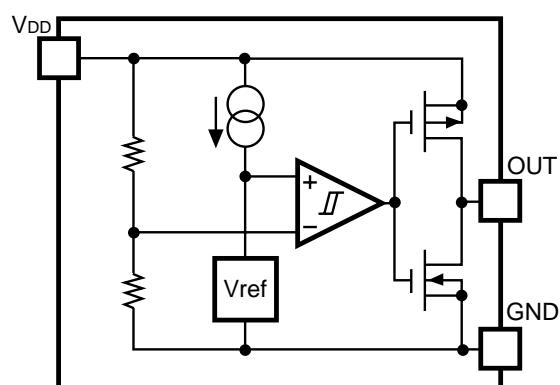
- CPU and Logic Circuit Reset
- Battery Checker
- Window Comparator
- Wave Shaping Circuit
- Battery Back-up Circuit
- Power Failure Detector

## BLOCK DIAGRAMS

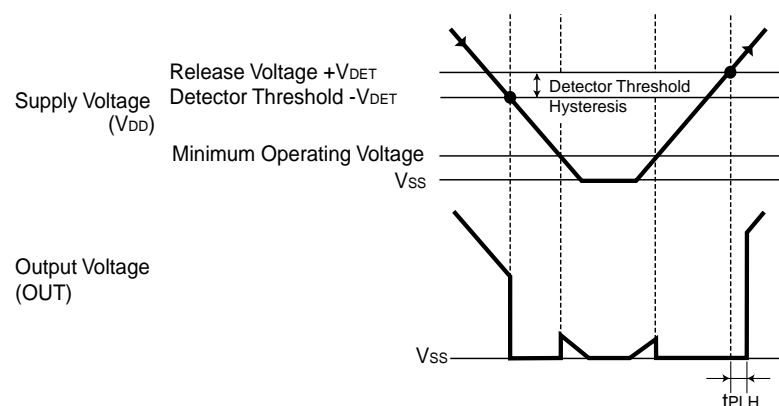
R3111xxxxA



R3111xxxxC



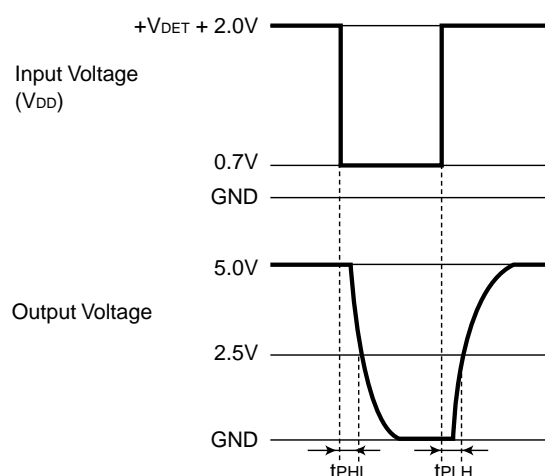
## TIMING CHART



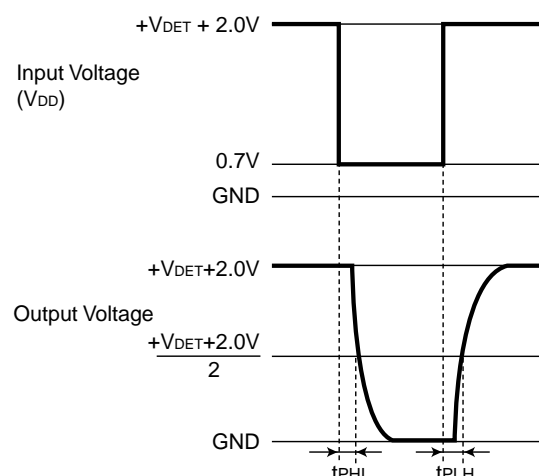
## DEFINITION OF OUTPUT DELAY TIME

Output Delay Time  $t_{PLH}$  is defined as follows:

1. In the case of Nch Open Drain Output:  
Under the condition of the output pin (OUT) is pulled up through a resistor of 470kΩ to 5V, the time interval between the rising edge of VDD pulse from 0.7V to (+VDET)+ 2.0V and becoming of the output voltage to 2.5V.
2. In the case of CMOS Output:  
The time interval between the rising edge of VDD pulse from 0.7V to (+VDET)+ 2.0V and becoming of the output voltage to (VDD/2) V.



Nch Open Drain Output



CMOS Output

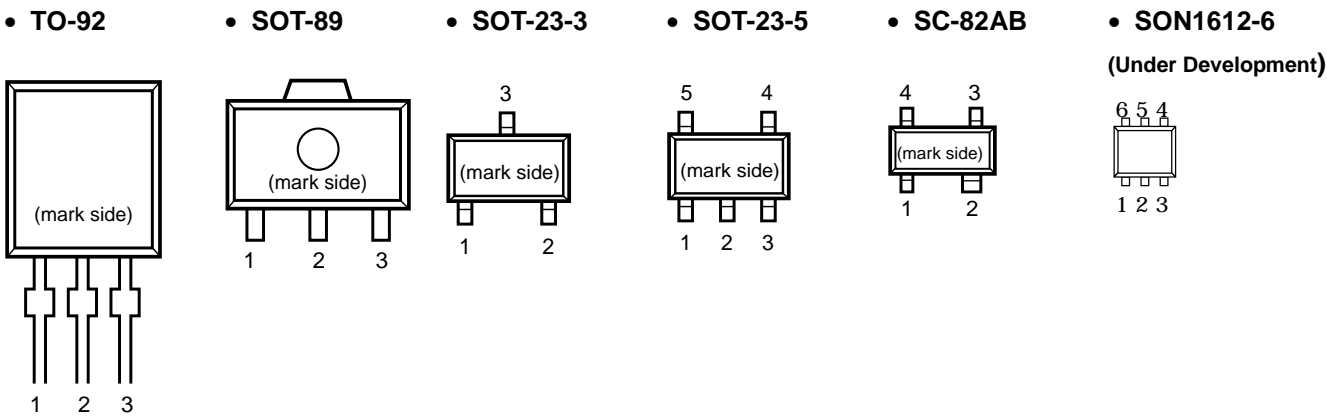
## SELECTION GUIDE

The package type, the detector threshold, the output type and the taping type of R3111 Series can be designated at the users' request by specifying the part number as follows;

R3111xxxx-xx ←Part Number  
 ↑↑↑↑↑  
 a b c d e

Code	Contents
a	Designation of Package Type; E: TO-92      Q: SC-82AB H: SOT-89   N: SOT-23-5 / SOT-23-3   D: SON1612-6(Under Development)
b	Setting Detector Threshold ( $-V_{DET}$ ); Stepwise setting with a step of 0.1V in the range of 0.9V to 6.0V is possible.
c	Designation of Package Type 1: except SOT-23-3    2: SOT-23-3
d	Designation of Output Type; A: Nch Open Drain C: CMOS
e	Designation of Packing or Taping Type ; Ex.TO-92: TZ, SOT-89: T1, SOT-23-3, SOT-23-5, SC-82AB, SON1612-6 ( Under Development ) : TR prescribed as standard directions. (Refer to Taping Specifications.) Antistatic bag for samples: C

PIN CONFIGURATION



PIN DESCRIPTION

• TO-92

Pin No.	Symbol
1	V <sub>DD</sub>
2	GND
3	OUT

• SOT-89

Pin No.	Symbol
1	OUT
2	V <sub>DD</sub>
3	GND

• SOT-23-3

Pin No.	Symbol
1	OUT
2	GND
3	V <sub>DD</sub>

• SOT-23-5

Pin No.	Symbol
1	OUT
2	V <sub>DD</sub>
3	GND
4	NC
5	NC

• SC-82AB

Pin No.	Symbol
1	OUT
2	V <sub>DD</sub>
3	NC
4	GND

• SON1612-6(Under Development)

Pin No.	
1	OUT
2	V <sub>DD</sub>
3	GND
4	NC
5	V <sub>DD</sub>
6	NC

## ABSOLUTE MAXIMUM RATINGS

Symbol	Item	Rating	Unit
$V_{DD}$	Supply Voltage	12	V
$V_{OUT1}$	Output Voltage (CMOS)	$V_{SS}-0.3$ to $V_{DD}+0.3$	V
$V_{OUT2}$	Output Voltage (Nch)	$V_{SS}-0.3$ to 12	V
$I_{OUT}$	Output Current	70	mA
$P_D$	Power Dissipation 1*Note1	300	mW
$P_D$	Power Dissipation 2*Note2	150	mW
$P_D$	Power Dissipation 3*Note3	500	mW
$T_{opt}$	Operating Temperature Range	-40 to 85	°C
$T_{stg}$	Storage Temperature Range	-55 to 125	°C
$T_{solder}$	Lead temperature (Soldering)	260°C, 10s	

\*Note 1: applied to SOT-89 and TO-92 Single suspended in the air

\*Note 2: applied to SOT-23-3, SOT-23-5 and SC-82AB Single suspended in the air

\*Note 3: applied to SON1612-6(Under Development) at mounted on board

PD depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

\*Measurement Conditions

Environment: Mounted on board (Wind velocity 0m/s)

Board Material: FR-4 (2-layer)

Board dimensions : 40mm x 40mm x t1.6mm

Copper Area : 50%

ELECTRICAL CHARACTERISTICS

• R3111x09xA/C Topt=25°C

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
-V <sub>DET</sub>	Detector Threshold		0.882	0.900	0.918	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.027	0.045	0.063	V
I <sub>SS</sub>	Supply Current	V <sub>DD</sub> =0.80V 2.90V		0.8 0.9	2.4 2.7	μA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage*Note1	Topt=25°C		0.55	0.70	V
		-40°C≤Topt≤85°C		0.65	0.80	
I <sub>OUT</sub>	Output Current (Driver Output Pin)	Nch V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.70V	0.01	0.05		mA
		V <sub>DS</sub> =0.50V, V <sub>DD</sub> =0.85V	0.05	0.50		
		Pch V <sub>DS</sub> =-2.1V, V <sub>DD</sub> =4.5V	1.0	2.0		mA
t <sub>PLH</sub>	Output Delay Time*Note2				100	μs
Δ-V <sub>DET</sub> /ΔT	Detector Threshold Temperature Coefficient	-40°C≤Topt≤85°C		±100		ppm/°C

• R3111x18xA/C Topt=25°C

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
-V <sub>DET</sub>	Detector Threshold		1.764	1.800	1.836	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.054	0.090	0.126	V
I <sub>SS</sub>	Supply Current	V <sub>DD</sub> =1.70V 3.80V		0.8 1.0	2.4 3.0	μA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage*Note1	Topt=25°C		0.55	0.70	V
		-40°C≤Topt≤85°C		0.65	0.80	
I <sub>OUT</sub>	Output Current (Driver Output Pin)	Nch V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.70V	0.01	0.05		mA
		V <sub>DS</sub> =0.50V, V <sub>DD</sub> =0.85V	1.00	2.00		
		Pch V <sub>DS</sub> =-2.1V, V <sub>DD</sub> =4.5V	1.0	2.0		mA
t <sub>PLH</sub>	Output Delay Time*Note2				100	μs
Δ-V <sub>DET</sub> /ΔT	Detector Threshold Temperature Coefficient	-40°C≤Topt≤85°C		±100		ppm/°C

## • R3111x27xA/C

T<sub>opt</sub>=25°C

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
-V <sub>DET</sub>	Detector Threshold		2.646	2.700	2.754	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.081	0.135	0.189	V
I <sub>SS</sub>	Supply Current	V <sub>DD</sub> =2.60V 4.70V		0.9 1.1	2.7 3.3	μA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage*Note1	T <sub>opt</sub> =25°C		0.55	0.70	V
		-40°C≤T <sub>opt</sub> ≤85°C		0.65	0.80	
I <sub>OUT</sub>	Output Current (Driver Output Pin)	Nch V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.70V V <sub>DS</sub> =0.50V, V <sub>DD</sub> =1.50V	0.01 1.00	0.05 2.00		mA
		Pch V <sub>DS</sub> =-2.1V, V <sub>DD</sub> =4.5V	1.0	2.0		mA
t <sub>PLH</sub>	Output Delay Time*Note2				100	μs
Δ-V <sub>DET</sub> /ΔT	Detector Threshold Temperature Coefficient	-40°C≤T <sub>opt</sub> ≤85°C		±100		ppm/°C

## • R3111x36xA/C

T<sub>opt</sub>=25°C

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
-V <sub>DET</sub>	Detector Threshold		3.528	3.600	3.672	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.108	0.180	0.252	V
I <sub>SS</sub>	Supply Current	V <sub>DD</sub> =3.47V 5.60V		1.0 1.2	3.0 3.6	μA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage*Note1	T <sub>opt</sub> =25°C		0.55	0.70	V
		-40°C≤T <sub>opt</sub> ≤85°C		0.65	0.80	
I <sub>OUT</sub>	Output Current (Driver Output Pin)	Nch V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.70V V <sub>DS</sub> =0.50V, V <sub>DD</sub> =1.50V	0.01 1.00	0.05 2.00		mA
		Pch V <sub>DS</sub> =-2.1V, V <sub>DD</sub> =4.5V	1.0	2.0		mA
T <sub>PLH</sub>	Output Delay Time*Note2				100	μs
Δ-V <sub>DET</sub> /ΔT	Detector Threshold Temperature Coefficient	-40°C≤T <sub>opt</sub> ≤85°C		±100		ppm/°C

## R3111xxxxA/C

### • R3111x45xA/C

T<sub>opt</sub>=25°C

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
-V <sub>DET</sub>	Detector Threshold		4.410	4.500	4.590	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.135	0.225	0.315	V
I <sub>SS</sub>	Supply Current	V <sub>DD</sub> =4.34V 6.50V		1.1 1.3	3.3 3.9	μA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage*Note1	T <sub>opt</sub> =25°C		0.55	0.70	V
		-40°C≤T <sub>opt</sub> ≤85°C		0.65	0.80	
I <sub>OUT</sub>	Output Current (Driver Output Pin)	Nch V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.70V V <sub>DS</sub> =0.50V, V <sub>DD</sub> =1.50V	0.01 1.00	0.05 2.00		mA
		Pch V <sub>DS</sub> =-2.1V, V <sub>DD</sub> =8.0V	1.5	3.0		mA
t <sub>PLH</sub>	Output Delay Time*Note2				100	μs
Δ-V <sub>DET</sub> /ΔT	Detector Threshold Temperature Coefficient	-40°C≤T <sub>opt</sub> ≤85°C		±100		ppm/°C

### • R3111x54xA/C

T<sub>opt</sub>=25°C

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
-V <sub>DET</sub>	Detector Threshold		5.292	5.400	5.508	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.162	0.270	0.378	V
I <sub>SS</sub>	Supply Current	V <sub>DD</sub> =5.20V 7.40V		1.2 1.4	3.6 4.2	μA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage*Note1	T <sub>opt</sub> =25°C		0.55	0.70	V
		-40°C≤T <sub>opt</sub> ≤85°C		0.65	0.80	
I <sub>OUT</sub>	Output Current (Driver Output Pin)	Nch V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.70V V <sub>DS</sub> =0.50V, V <sub>DD</sub> =1.50V	0.01 1.00	0.05 2.00		mA
		Pch V <sub>DS</sub> =-2.1V, V <sub>DD</sub> =8.0V	1.5	3.0		mA
t <sub>PLH</sub>	Output Delay Time*Note2				100	μs
Δ-V <sub>DET</sub> /ΔT	Detector Threshold Temperature Coefficient	-40°C≤T <sub>opt</sub> ≤85°C		±100		ppm/°C

\*Note1: Minimum operating voltage means the value of input voltage when output voltage maintains 0.1V or less. (In the case of Nch Open Drain Output type, the output pin is pulled up with a resistance of 470kΩ to 5.0V.)



\*Note2: In the case of CMOS Output type: The time interval between the rising edge of  $V_{DD}$  input pulse from 0.7V to  $(+V_{DET})+2.0V$  and output voltage level becoming to  $V_{DD}/2$ .  
In the case of Nch Open Drain Output type: the output pin is pulled up with a resistance of 470k $\Omega$  to 5.0V, The time interval between the rising edge of  $V_{DD}$  input pulse from 0.7V to  $(+V_{DET})+2.0V$  and output voltage level becoming to 2.5V.

## ELECTRICAL CHARACTERISTICS BY DETECTOR THRESHOLD

## • R3111x09x to R3111x60x

Part Number	Detector Threshold			Detector Threshold Hysteresis			Supply Current 1			Supply Current 2		
	-V <sub>DET</sub> [V]			V <sub>HYS</sub> [V]			I <sub>SS1</sub> [μA]			I <sub>SS2</sub> [μA]		
	Min.	Typ.	Max.	Min.	Typ.	Max.	Condition	Typ.	Max.	Condition	Typ.	Max.
R3111x09x	0.882	0.900	0.918	0.027	0.045	0.063	V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.10V	0.8	2.4	V <sub>DD</sub> = (-V <sub>DET</sub> ) +2.0V	0.9	2.7
R3111x10x	0.980	1.000	1.020	0.030	0.050	0.070					1.0	3.0
R3111x11x	1.078	1.100	1.122	0.033	0.055	0.077						
R3111x12x	1.176	1.200	1.224	0.036	0.060	0.084						
R3111x13x	1.274	1.300	1.326	0.039	0.065	0.091						
R3111x14x	1.372	1.400	1.428	0.042	0.070	0.098						
R3111x15x	1.470	1.500	1.530	0.045	0.075	0.105						
R3111x16x	1.568	1.600	1.632	0.048	0.080	0.112						
R3111x17x	1.666	1.700	1.734	0.051	0.085	0.119						
R3111x18x	1.764	1.800	1.836	0.054	0.090	0.126						
R3111x19x	1.862	1.900	1.938	0.057	0.095	0.133						
R3111x20x	1.960	2.000	2.040	0.060	0.100	0.140						
R3111x21x	2.058	2.100	2.142	0.063	0.105	0.147						
R3111x22x	2.156	2.200	2.244	0.066	0.110	0.154						
R3111x23x	2.254	2.300	2.346	0.069	0.115	0.161						
R3111x24x	2.352	2.400	2.448	0.072	0.120	0.168						
R3111x25x	2.450	2.500	2.550	0.075	0.125	0.175						
R3111x26x	2.548	2.600	2.652	0.078	0.130	0.182						
R3111x27x	2.646	2.700	2.754	0.081	0.135	0.189						
R3111x28x	2.744	2.800	2.856	0.084	0.140	0.196						
R3111x29x	2.842	2.900	2.958	0.087	0.145	0.203						
R3111x30x	2.940	3.000	3.060	0.090	0.150	0.210						
R3111x31x	3.038	3.100	3.162	0.093	0.155	0.217						
R3111x32x	3.136	3.200	3.264	0.096	0.160	0.224						
R3111x33x	3.234	3.300	3.366	0.099	0.165	0.231						
R3111x34x	3.332	3.400	3.468	0.102	0.170	0.238						
R3111x35x	3.430	3.500	3.570	0.105	0.175	0.245						
R3111x36x	3.528	3.600	3.672	0.108	0.180	0.252						
R3111x37x	3.626	3.700	3.774	0.111	0.185	0.259						
R3111x38x	3.724	3.800	3.876	0.114	0.190	0.266						
R3111x39x	3.822	3.900	3.978	0.117	0.195	0.273						
R3111x40x	3.920	4.000	4.080	0.120	0.200	0.280						
R3111x41x	4.018	4.100	4.182	0.123	0.205	0.287						
R3111x42x	4.116	4.200	4.284	0.126	0.210	0.294						
R3111x43x	4.214	4.300	4.386	0.129	0.215	0.301						
R3111x44x	4.312	4.400	4.488	0.132	0.220	0.308						
R3111x45x	4.410	4.500	4.590	0.135	0.225	0.315						
R3111x46x	4.508	4.600	4.692	0.138	0.230	0.322						
R3111x47x	4.606	4.700	4.794	0.141	0.235	0.329						
R3111x48x	4.704	4.800	4.896	0.144	0.240	0.336						
R3111x49x	4.802	4.900	4.998	0.147	0.245	0.343						
R3111x50x	4.900	5.000	5.100	0.150	0.250	0.350						
R3111x51x	4.998	5.100	5.202	0.153	0.255	0.357						
R3111x52x	5.096	5.200	5.304	0.156	0.260	0.364						
R3111x53x	5.194	5.300	5.406	0.159	0.265	0.371						
R3111x54x	5.292	5.400	5.508	0.162	0.270	0.378						
R3111x55x	5.390	5.500	5.610	0.165	0.275	0.385						
R3111x56x	5.488	5.600	5.712	0.168	0.280	0.392						
R3111x57x	5.586	5.700	5.814	0.171	0.285	0.399						
R3111x58x	5.684	5.800	5.916	0.174	0.290	0.406						
R3111x59x	5.782	5.900	6.018	0.177	0.295	0.413						
R3111x60x	5.880	6.000	6.120	0.180	0.300	0.420						

Note 1: In the case of CMOS output type; when the voltage is forced to V<sub>DD</sub> from 0.7V to (+V<sub>DET</sub>)+2.0V, time interval between the rising edge of V<sub>DD</sub> and the reaching point at 50% of Output Voltage. In the case of Nch open drain output type : The output pin is pulled up to 5V through 470kΩ, and when the voltage is forced to V<sub>DD</sub> from 0.7V to (+V<sub>DET</sub>)+2.0V, time interval between the rising edge of V<sub>DD</sub> and the reaching point at 50% of Output Voltage.

Note 2: V<sub>DD</sub> value when Output Voltage is equal or less than 0.1V. In the case of Nch open drain output type, the output pin is pulled up to 5V through 470kΩ resistor.

Condition 1: T<sub>opt</sub>=25°C

Condition 2: -40°C≤T<sub>opt</sub>≤85°C

Output Current 1			Output Current 2				Output Delay Time	Minimum Operating Voltage		Detector Threshold Temperature Coefficient	
I <sub>OUT1</sub> [mA]			I <sub>OUT2</sub> [mA]				t <sub>PLH</sub> [μs]	V <sub>DDL</sub> [V]		Δ-V <sub>DET</sub> /ΔT[ppm/°C]	
Condition	Min.	Typ.	Condition		Min.	Typ.	Max.	Typ.	Max.	Condition	Typ.
Nch V <sub>DS</sub> =0.05V V <sub>DD</sub> =0.7V	0.01	0.05	Nch V <sub>DS</sub> =0.5V	V <sub>DD</sub> =0.85V	0.05	0.5	Note 1 100	Note 2 Con- dition 1 0.55	Note 2 Con- dition 1 0.70	-40°C≤ T <sub>opt</sub> ≤85°C	±100
				V <sub>DD</sub> =1.0V	0.2	1.0					
				V <sub>DD</sub> =1.5V	1.0	2.0		Con- dition 2 0.65	Con- dition 2 0.80		

OPERATION

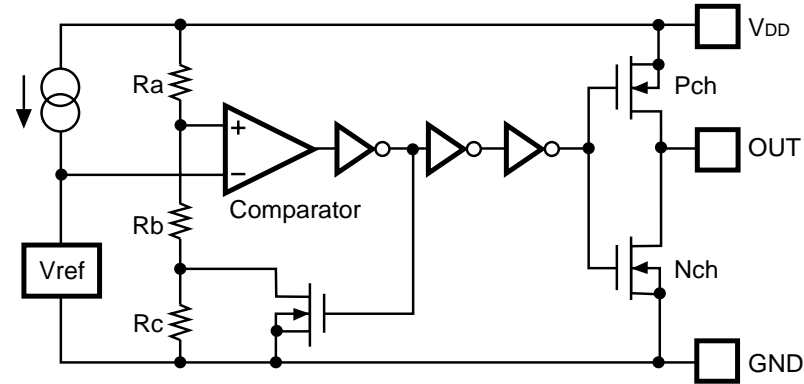


Figure 1. Block Diagram

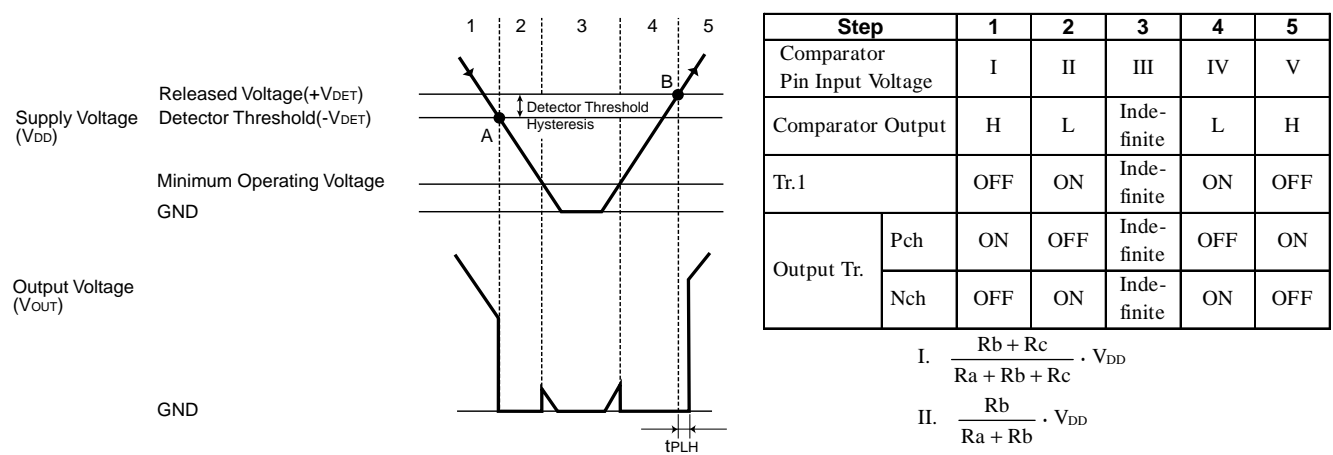
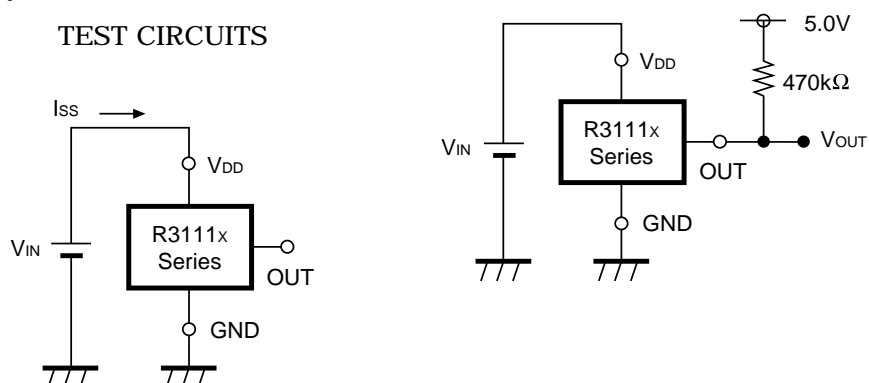


Figure 2. Operation Diagram

- Step 1. The output voltage is equal to the supply voltage ( $V_{DD}$ ).
- Step 2. At Point “A”,  $V_{ref} \geq V_{DD} \times (R_b + R_c) / (R_a + R_b + R_c)$  is true, as a result, the output of comparator is reverse, and output voltage becomes to GND level. The voltage level of Point A means detector threshold voltage, or ( $-V_{DET}$ ).
- Step 3. When the supply voltage is less than minimum operating voltage, the operation of output transistor becomes indefinite, and in the case that output is pulled up to  $V_{DD}$ , the output voltage equals to  $V_{DD}$  voltage.
- Step 4. The output voltage equals to GND level.
- Step 5. At Point “B”,  $V_{ref} \leq V_{DD} \times R_b / (R_a + R_b)$  is true, Output of the comparator is reverse, and output voltage is equal to the supply voltage, or ( $V_{DD}$ ). The voltage level of Point B means released voltage, or ( $+V_{DET}$ ).

\* The difference between released voltage and detector threshold voltage is the detector threshold hysteresis.

### TEST CIRCUITS



Pull-up circuit is not necessary for CMOS Output type, or R3111XXXXC.

Figure 3. Supply Current Test Circuit

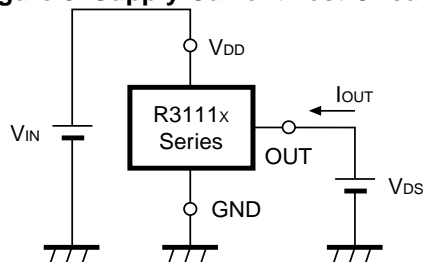
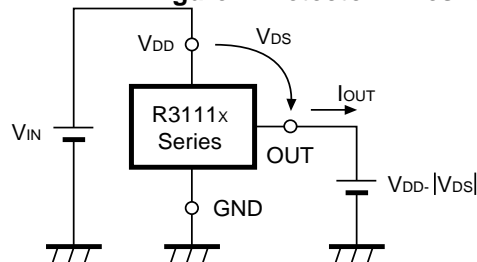


Figure 4. Detector Threshold Test Circuit



\*Apply to CMOS Output type only

Figure 5. Nch Driver Output Current Test Circuit

Figure 6. Pch Driver Output Current Test Circuit

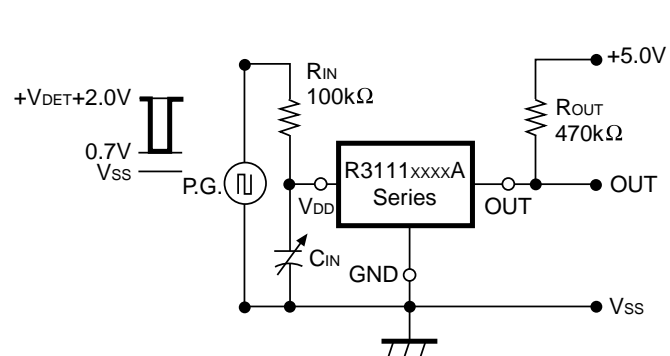
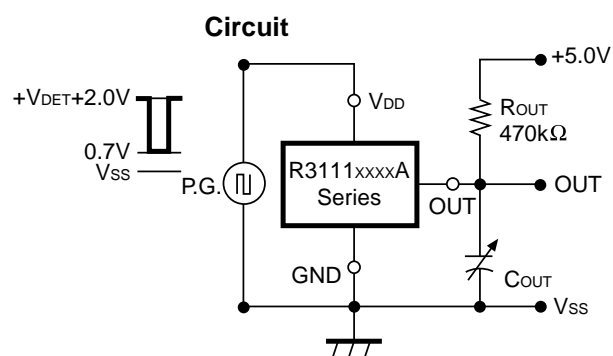
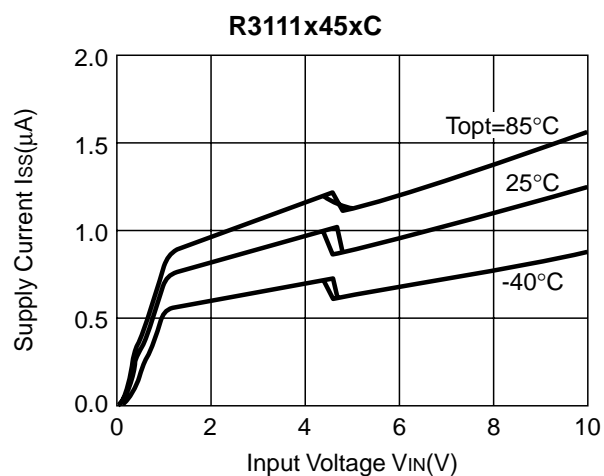
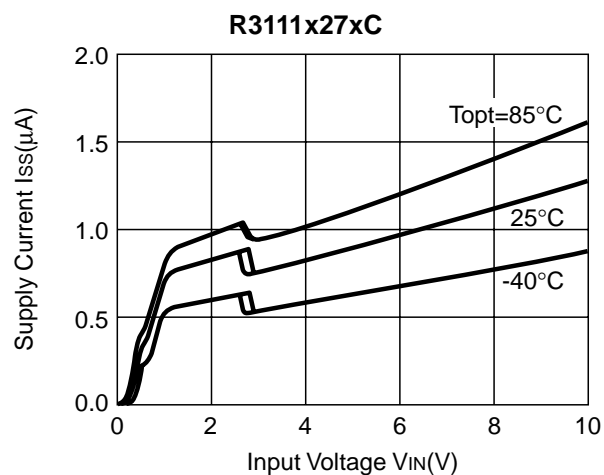
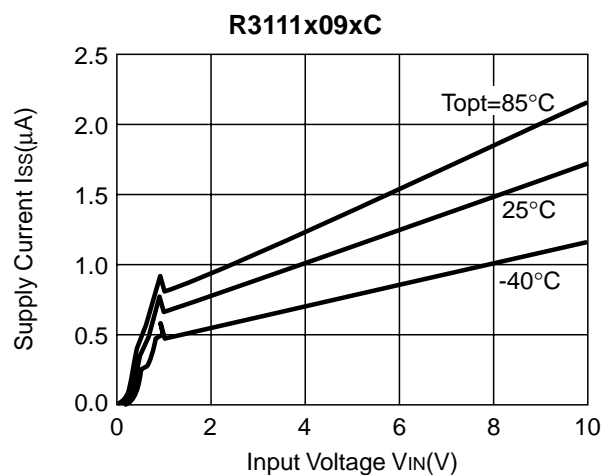


Figure 7. Output Delay Time Test Circuit (1)

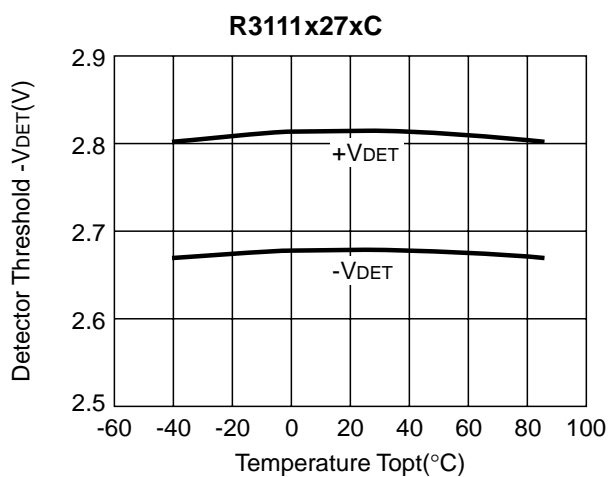
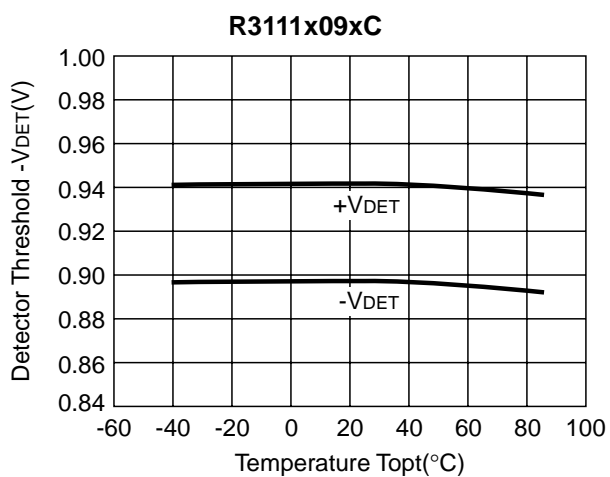
Figure 8. Output Delay Time Test Circuit (2)

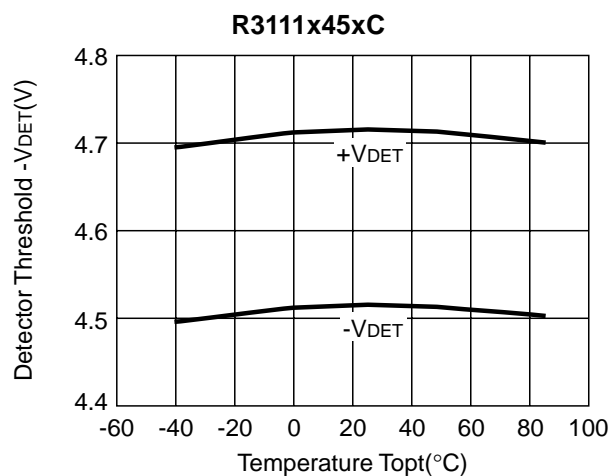
## TYPICAL CHARACTERISTICS

### 1) Supply Current vs. Input Voltage

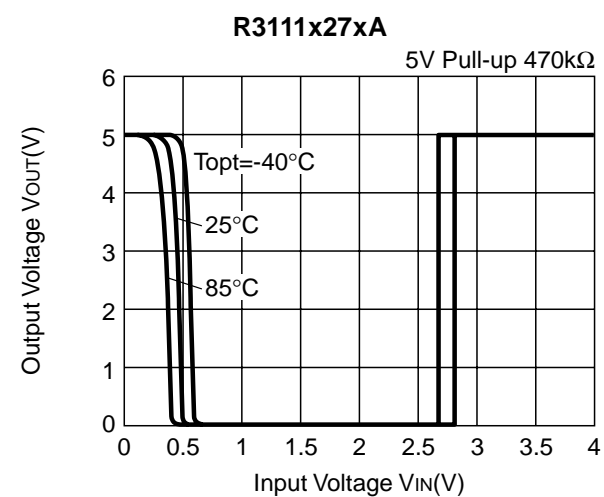
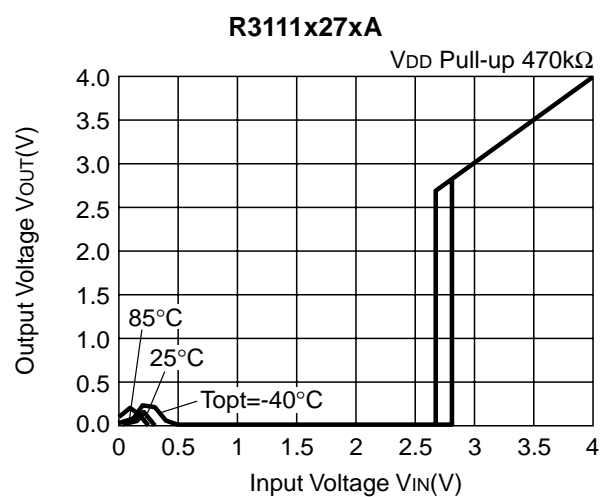
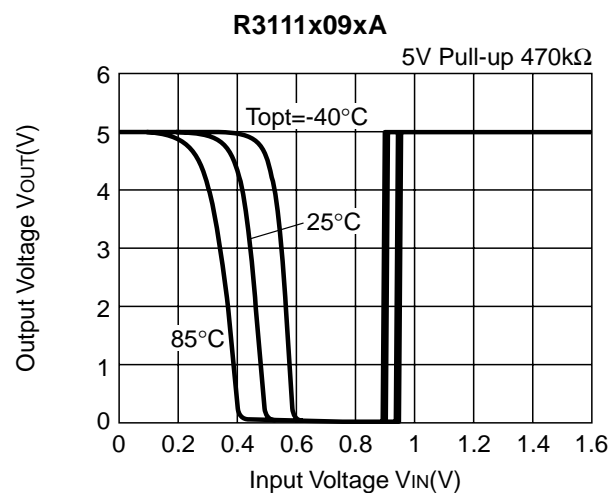
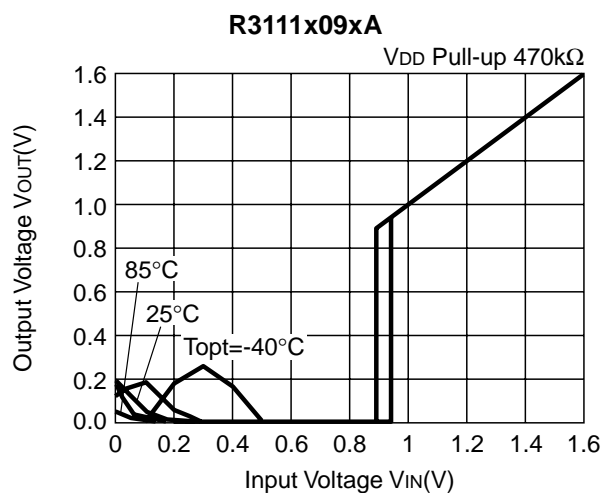


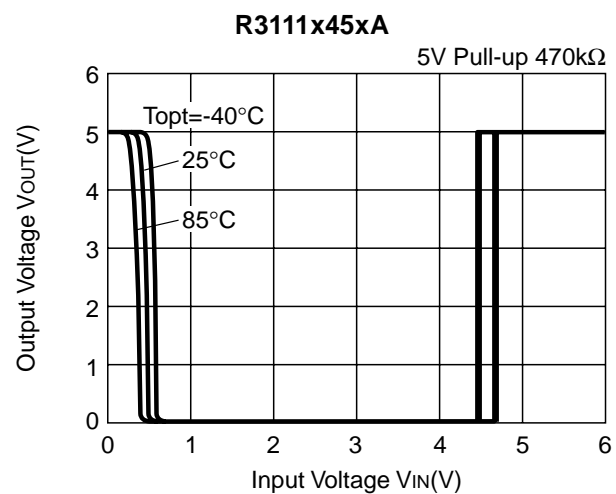
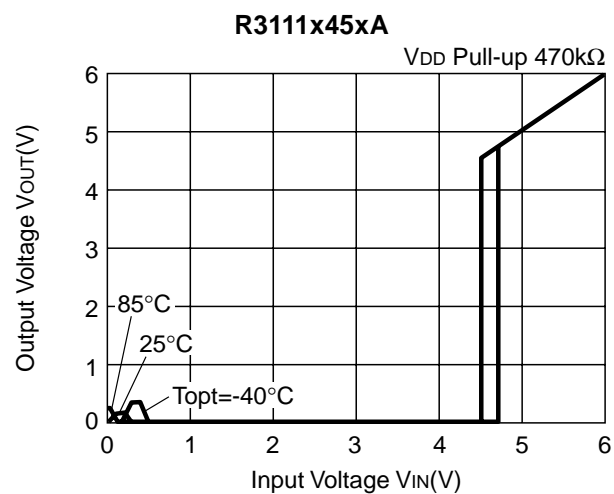
### 2) Detector Threshold Hysteresis vs. Temperature



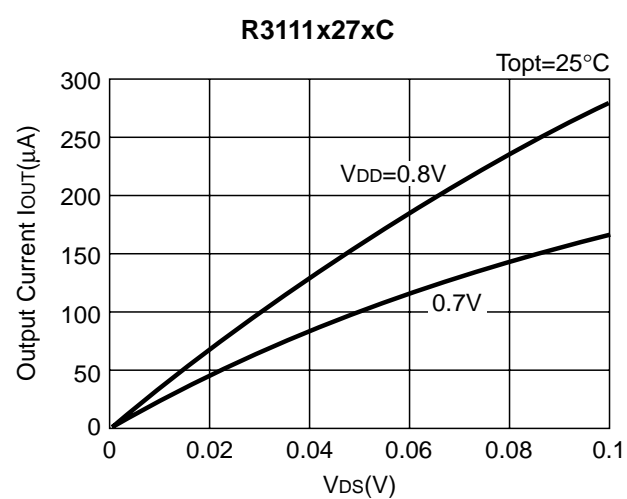
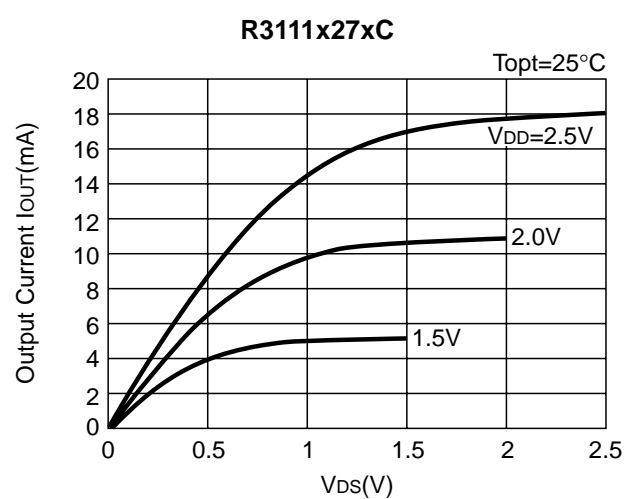
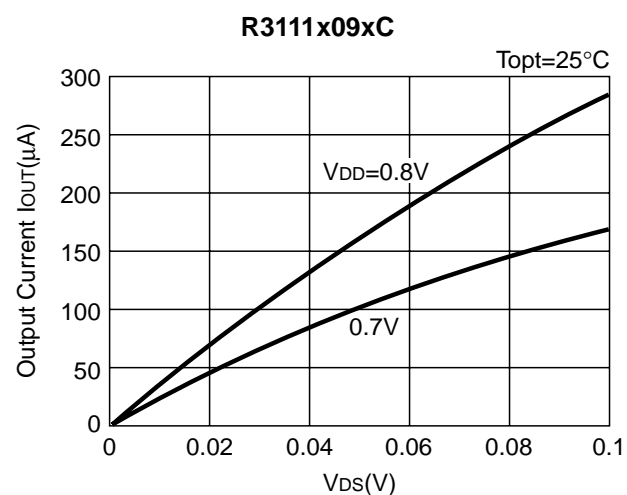
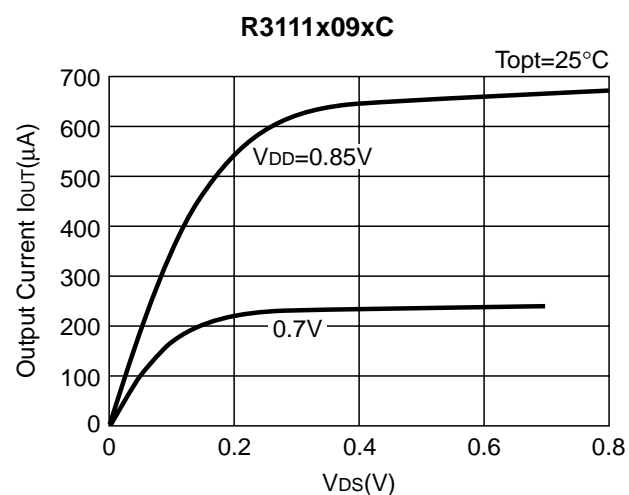


### 3) Output Voltage vs. Input Voltage

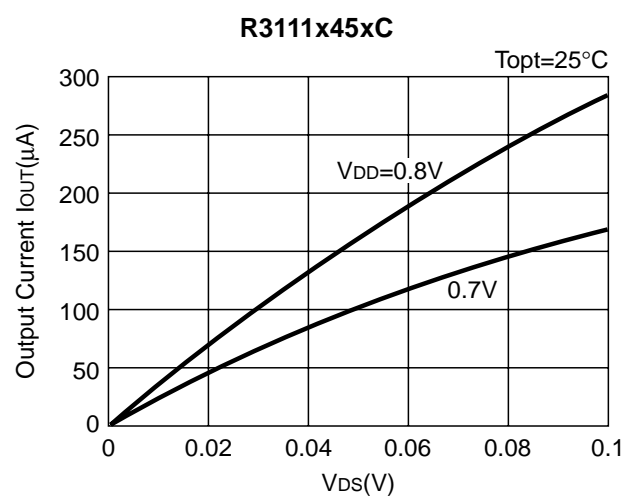
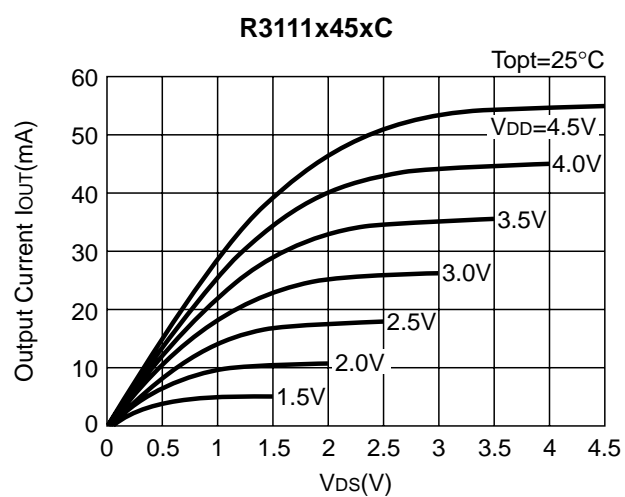




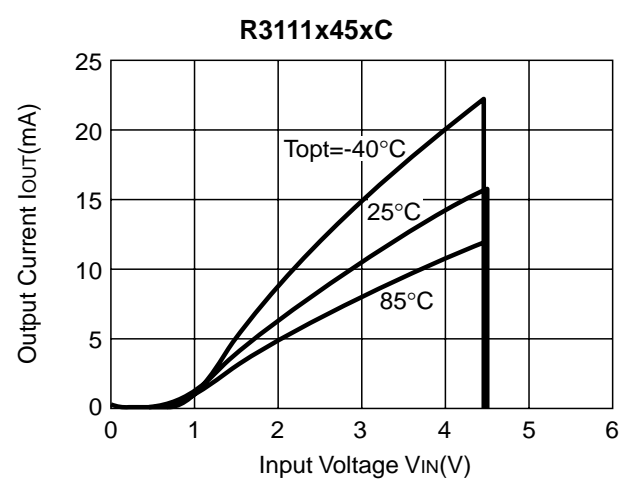
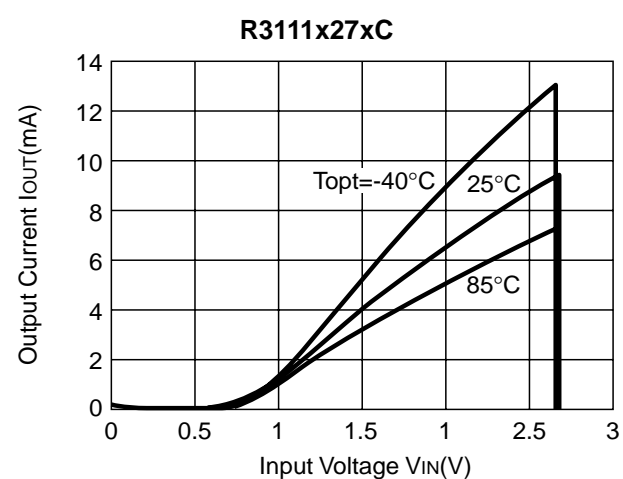
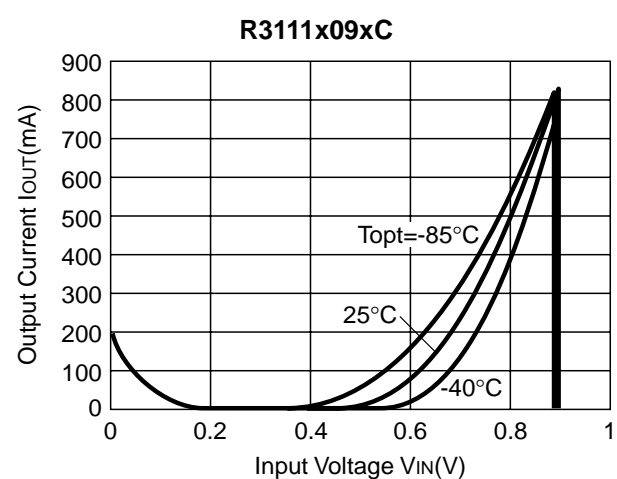
4) Nch Driver Output Current vs.  $V_{DS}$



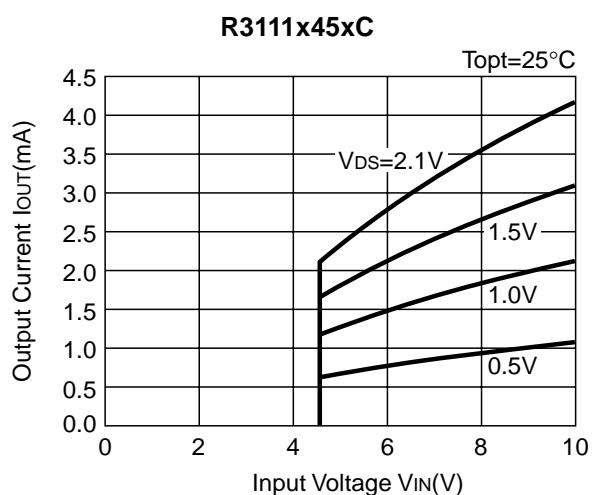
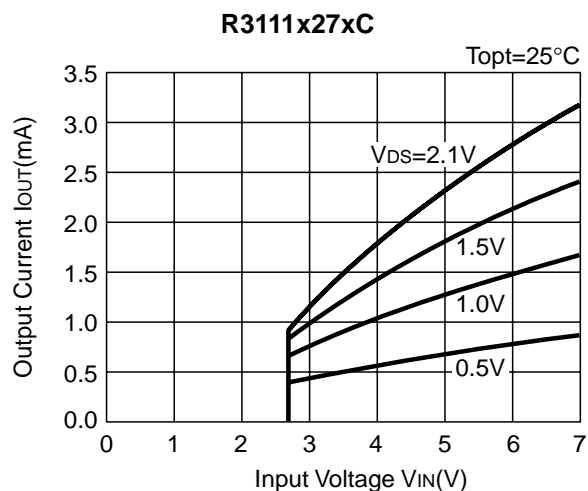
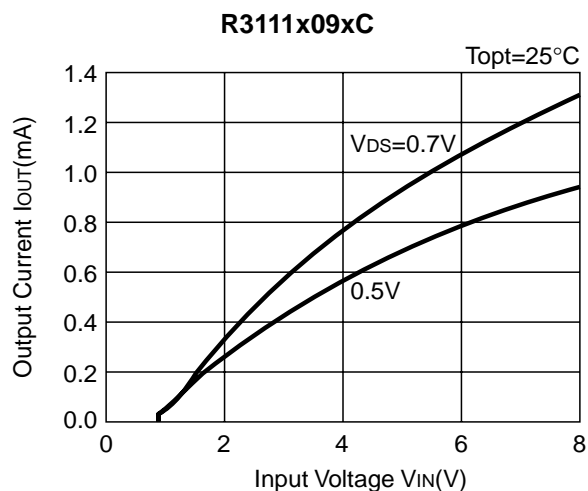




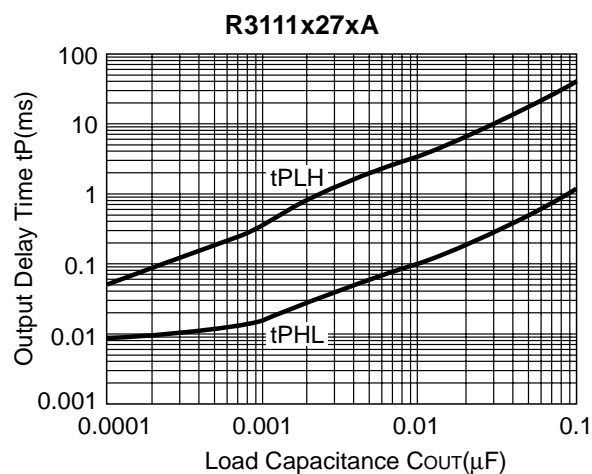
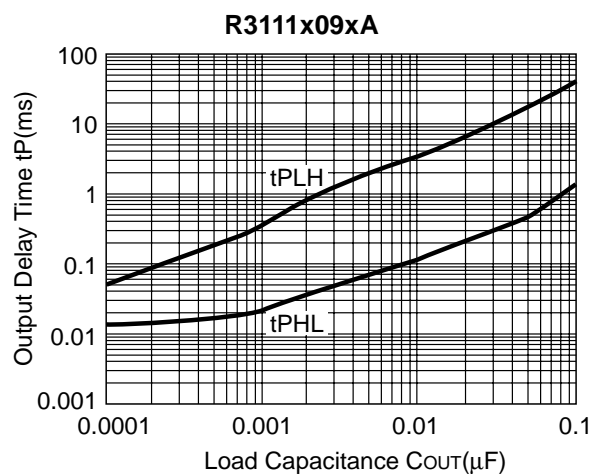
#### 5) Nch Driver Output Current vs. Input Voltage

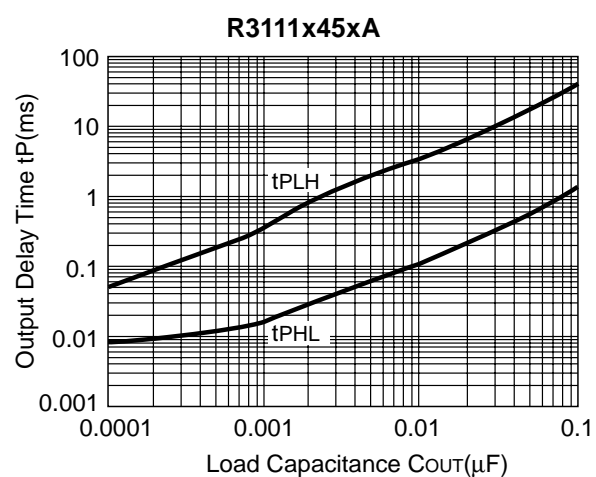


6) Pch Driver Output Current vs. Input Voltage

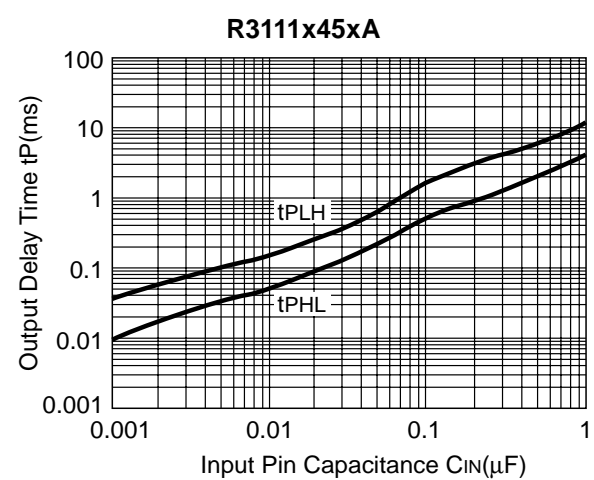
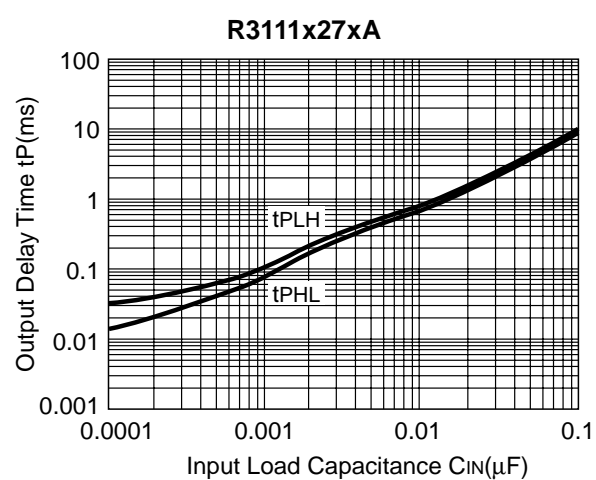
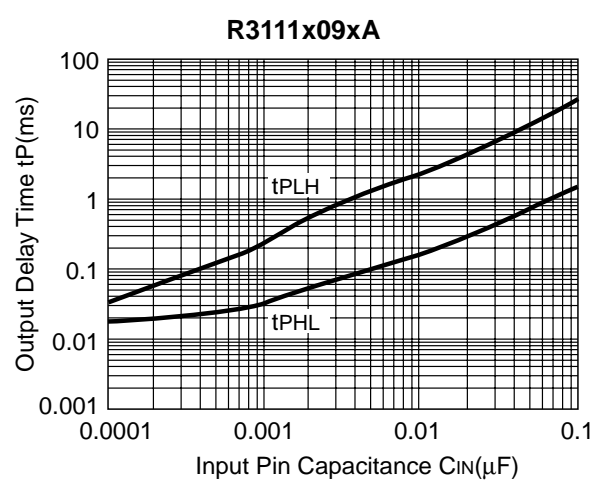


7) Output Delay Time vs. Load Capacitance





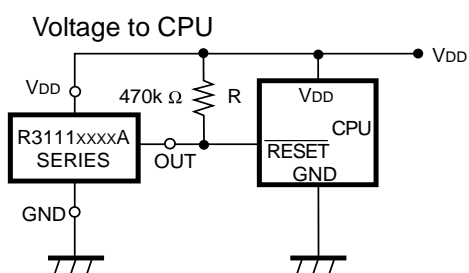
8) Output Delay Time vs. Input Pin Capacitance



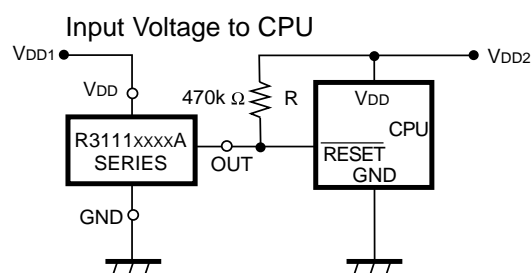
## TYPICAL APPLICATION

### • R3111xxxxA CPU Reset Circuit (Nch Open Drain Output)

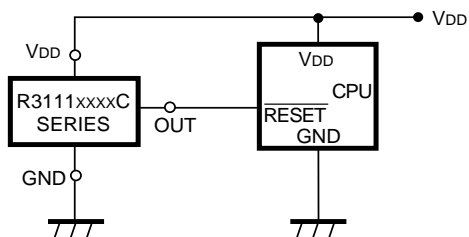
Case 1. Input Voltage to R3111xxxxA is equal to Input



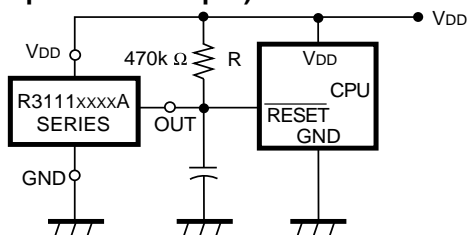
Case 2. Input Voltage to R3111xxxxA is unequal to



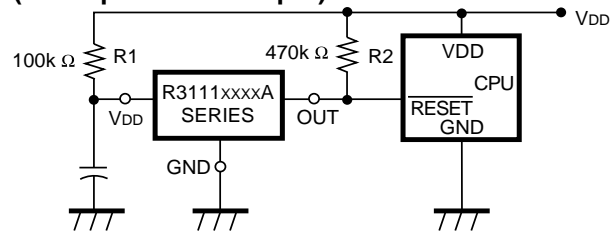
### • R3111xxxxA CPU Reset Circuit CMOS Output



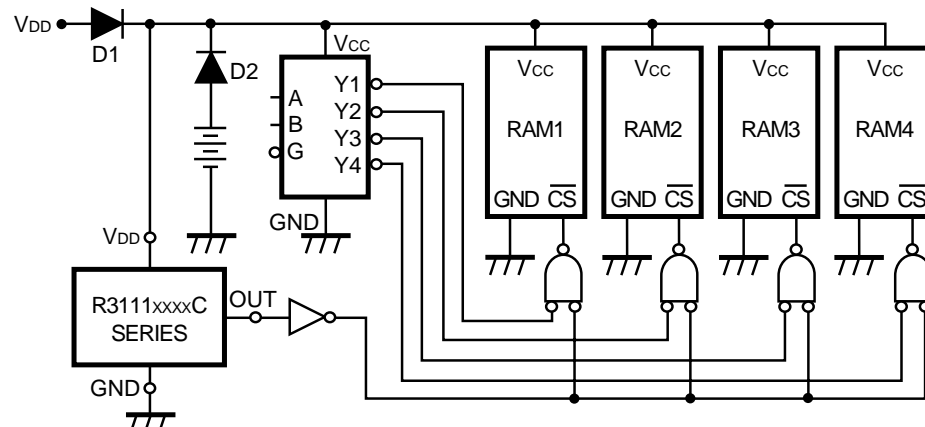
### • R3111xxxxA Output Delay Time Circuit 1 (Nch Open Drain Output)



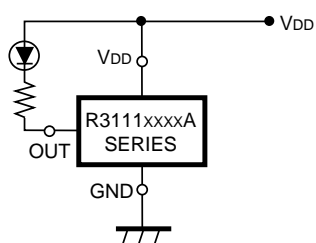
### • R3111xxxxA Output Delay Time Circuit 2 (Nch Open Drain Output)



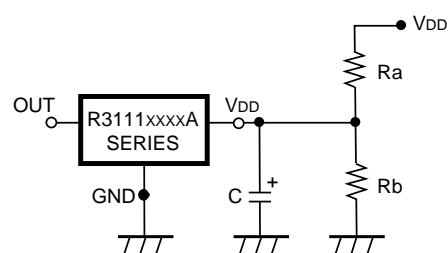
### • Memory Back-up Circuit



- **Voltage level Indicator Circuit (lighted when the power runs out)**  
(Nch Open Drain Output)



- **Detector Threshold Adjustable Circuit**  
(Nch Open Drain Output)



Adjusted Detector Threshold

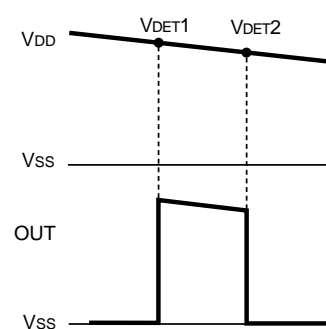
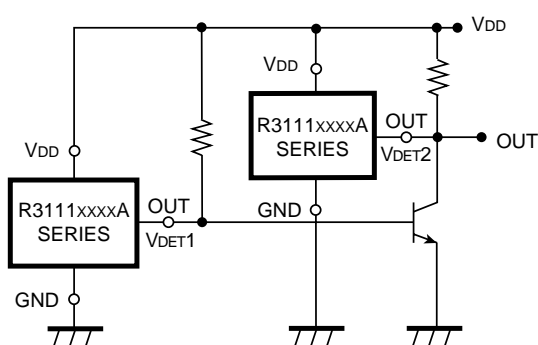
$$= (-V_{DET}) * (Ra + Rb) / Rb$$

Hysteresis Voltage

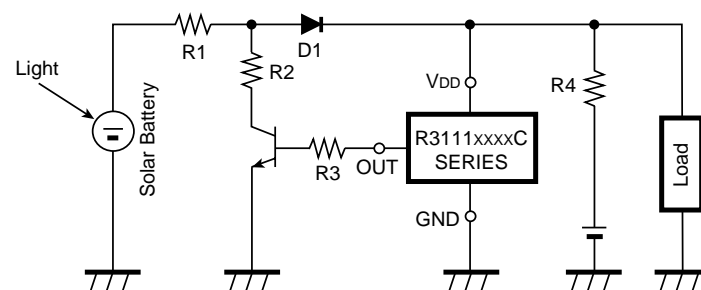
$$= (V_{HYS}) * (Ra + Rb) / Rb$$

\*) If the value of Ra is set excessively large, voltage drop may occur caused by the supply current of IC itself, and detector threshold may vary.

- **Window Comparator Circuit**  
(Nch Open Drain Output)



# • Over-charge Preventing Circuit



## TECHNICAL NOTES

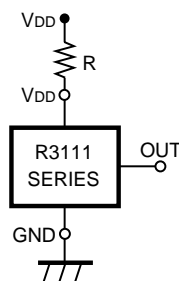


Figure 9

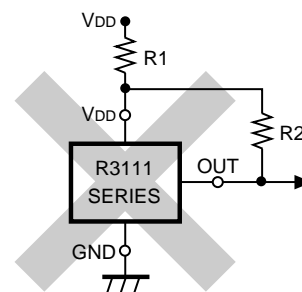


Figure 10

1. In Figure 9, When R3111xxxxC is used, and if an impedance is connected between Voltage Supplier and the V<sub>DD</sub> Pin of R3111xxxxC Series, the operation might be unstable by cross conduction current at detection.  
When R3111xxxxA is used in Figure 9, if the value of R is set excessively large, voltage drop may occur caused by supply crrent of IC itself and Detector threshold may vary.
2. Wiring as shown in Figure 10 may cause the oscillation in both output types of R3111 Series.