

R×5VT SERIES

OUTLINE

The R×5VT Series are voltage detector ICs with high detector threshold accuracy and ultra-low supply current by CMOS process, which can be operated at an extremely low voltage and is used, for instance, for system reset.

Each of these ICs consists of a voltage reference unit, a comparator, resistors for voltage detection, an output driver and a hysteresis circuit. The detector threshold is fixed with high accuracy.

The R×5VT Series are operable by a lower voltage than that for the R×5VL Series, and can be driven by a single battery.

Two output types, Nch open drain type and CMOS type, are available. Three types of packages, TO-92, SOT-89 (Mini-power Mold), SOT-23-5 (Mini-mold), are available.

FEATURES

- Ultra-low Supply CurrentTYP. 0.8 μ A ($V_{DD}=1.5V$)
- Broad Operating Voltage Range 0.7V to 10.0V ($T_{opt}=25^{\circ}C$)
- Detector ThresholdStepwise setting with a step of 0.1V in the range of 0.9V to 6.0V
is possible (refer to Selection Guide).
- High Accuracy Detector Threshold $\pm 2.5\%$
- Low Temperature-Drift Coefficient of Detector ThresholdTYP. $\pm 100ppm/^{\circ}C$
- Two Output TypesNch Open Drain and CMOS
- Three Types of PackagesTO-92, SOT-89 (Mini-power Mold), SOT-23-5 (Mini-mold)

APPLICATIONS

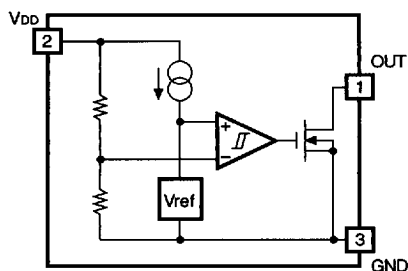
- CPU & Logic Circuit Reset
- Battery Checker
- Window Comparator
- Wave Shaping Circuit
- Battery Back-Up Circuit
- Power Failure Detector

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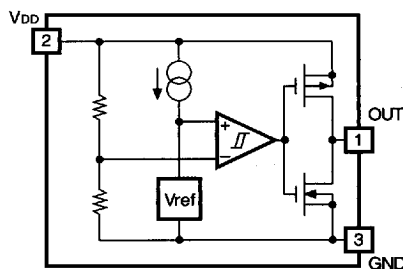
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BLOCK DIAGRAMS

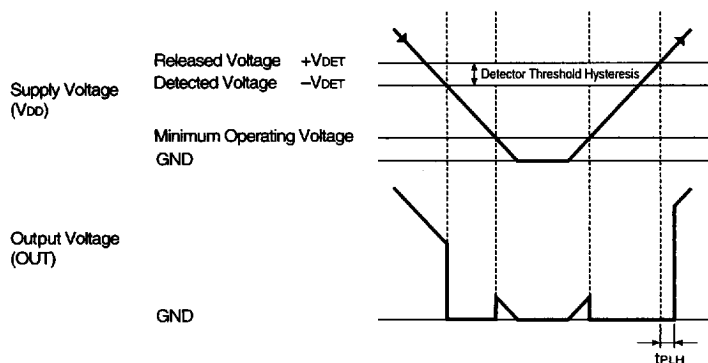
• Nch Open Drain Output (R×5VT××A)



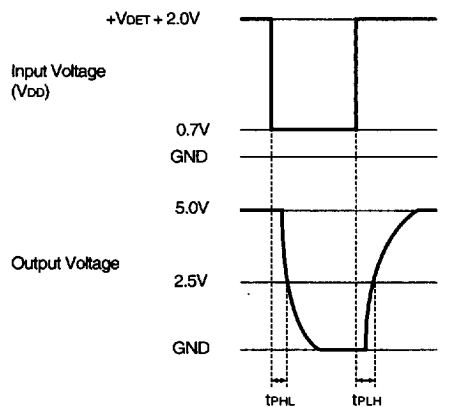
• CMOS Output (R×5VT××C)



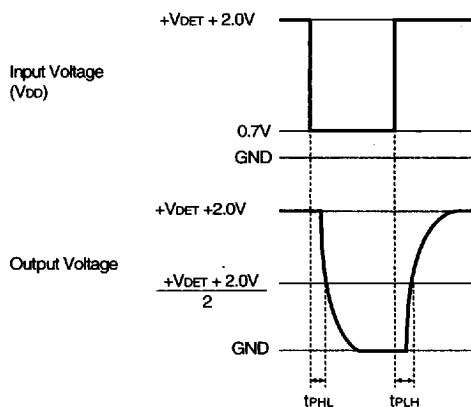
TIME CHART



DEFINITION OF OUTPUT DELAY TIME t_{PLH}



Nch Open Drain Output



CMOS Output

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

1. In the case of Nch Open Drain Output:

When the time at which a pulse voltage which increases from 0.7V to $+V_{DET}+2.0V$ is applied to V_{DD} is Time A, and the time at which the output voltage reaches 2.5V under the conditions that the output pin (OUT) is pulled up to 5V by a resistor of 470k Ω is Time B, the time period from Time A through Time B.

2. In the case of CMOS Output:

When the time at which a pulse voltage which increases from 0.7V to $+V_{DET}+2.0V$ is applied to V_{DD} is Time A, and the time at which the output voltage reaches the voltage of $(+V_{DET}+2.0V)/2$ is Time B, the time period from Time A through Time B.

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SELECTION GUIDE

The package type, the detector threshold, the output type, the packing type, and the taping type of R×5VT series can be designating at the user's request by specifying the part number as follows:

R×5VT××××-×× ← Part Number
 ↑ ↑ ↑ ↑ ↑
 a b c d e

Code	Contents
a	Designation of Package Type: E: TO-92 H: SOT-89 (Mini-power Mold) N: SOT-23-5 (Mini-mold)
b	Setting Detector Threshold (-VDET): Stepwise setting with a step of 0.1V in the range of 0.9V to 6.0V is possible.
c	Designation of Output Type: A: Nch Open Drain C: CMOS
d	Designation of Packing Type: A: Taping C: Antistatic bag for TO-92 and samples
e	Designation of Taping Type: Ex. TO-92: RF, RR, TZ SOT-89: T1, T2 SOT-23-5: TR, TL (refer to Taping Specifications) "TZ", "T1" and "TR" are prescribed as a standard

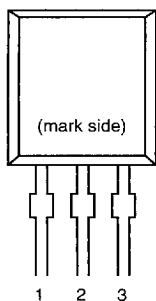
For example, the product with Package Type SOT-89, Detector Threshold 3.5V, Output Type Nch Open Drain and Taping Type T1, is designated by Part Number RH5VT35AA-T1.

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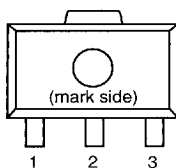
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PIN CONFIGURATION

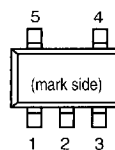
• TO-92



• SOT-89



• SOT-23-5



PIN DESCRIPTION

• TO-92

Pin No.	Symbol
1	OUT
2	V _{DD}
3	GND

• SOT-89

Pin No.	Symbol
1	OUT
2	V _{DD}
3	GND

• SOT-23-5

Pin No.	Symbol
1	OUT
2	V _{DD}
3	GND
4	NC
5	NC

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ABSOLUTE MAXIMUM RATINGS

T_{opt}=25°C

Symbol	Item	Rating		Unit
V _{DD}	Supply Voltage	12		V
V _{OUT}	Output Voltage	CMOS	V _{SS} -0.3 to V _{DD} +0.3	V
		Nch	V _{SS} -0.3 to 12	
I _{OUT}	Output Current	70		mA
P _{D1}	Power Dissipation 1 (NOTE1)	300		mW
P _{D2}	Power Dissipation 2 (NOTE2)	150		mW
T _{opt}	Operating Temperature Range	-30 to +80		°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

(NOTE 2) applied to SOT-23-5

ABSOLUTE MAXIMUM RATINGS

Absolute Maximum ratings are threshold limit values that must not be exceeded even for an instant under any conditions. Moreover, such values for any two items must not be reached simultaneously. Operation above these absolute maximum ratings may cause degradation or permanent damage to the device. These are stress ratings only and do not necessarily imply functional operation below these limits.

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ELECTRICAL CHARACTERISTICS

• R×5VT09A/C

T_{opt}=25°C

Symbol	Item	Conditions	MIN.	TYP.	MAX.	Unit	Note
-V _{DET}	Detector Threshold		0.878	0.900	0.922	V	
V _{HYS}	Detector Threshold Hysteresis		0.027	0.045	0.063	V	
I _{SS}	Supply Current	V _{DD} =0.80V		0.8	2.4	μA	
		V _{DD} =2.90V		0.9	2.7		
V _{DDH}	Maximum Operating Voltage				10	V	
V _{DDL}	Minimum Operating Voltage	T _{opt} =25°C		0.55	0.70	V	Note 1
		-30°C≤T _{opt} ≤80°C		0.65	0.80		
I _{OUT}	Output Current	Nch V _{DS} =0.05V, V _{DD} =0.70V	0.01	0.05		mA	
		V _{DS} =0.50V, V _{DD} =0.85V	0.05	0.50			
		Pch V _{DS} =-2.1V, V _{DD} =4.5V	1.0	2.0		mA	
t _{PLH}	Output Delay Time				100	μs	Note 2
$\frac{\Delta-V_{DET}}{\Delta T_{opt}}$	Detector Threshold Temperature Coefficient	-30°C≤T _{opt} ≤80°C		±100		ppm/°C	

• R×5VT18A/C

T_{opt}=25°C

Symbol	Item	Conditions	MIN.	TYP.	MAX.	Unit	Note
-V _{DET}	Detector Threshold		1.755	1.800	1.845	V	
V _{HYS}	Detector Threshold Hysteresis		0.054	0.090	0.126	V	
I _{SS}	Supply Current	V _{DD} =1.70V		0.8	2.4	μA	
		V _{DD} =3.80V		1.0	3.0		
V _{DDH}	Maximum Operating Voltage				10	V	
V _{DDL}	Minimum Operating Voltage	T _{opt} =25°C		0.55	0.70	V	Note 1
		-30°C≤T _{opt} ≤80°C		0.65	0.80		
I _{OUT}	Output Current	Nch V _{DS} =0.05V, V _{DD} =0.70V	0.01	0.05		mA	
		V _{DS} =0.50V, V _{DD} =1.50V	1.00	2.00			
		Pch V _{DS} =-2.1V, V _{DD} =4.5V	1.0	2.0		mA	
t _{PLH}	Output Delay Time				100	μs	Note 2
$\frac{\Delta-V_{DET}}{\Delta T_{opt}}$	Detector Threshold Temperature Coefficient	-30°C≤T _{opt} ≤80°C		±100		ppm/°C	

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• R×5VT27A/C
 $T_{opt}=25^{\circ}\text{C}$

Symbol	Item	Conditions	MIN.	TYP.	MAX.	Unit	Note
-VDET	Detector Threshold		2.633	2.700	2.767	V	
VHYS	Detector Threshold Hysteresis		0.081	0.135	0.189	V	
ISS	Supply Current	VDD=2.60V		0.9	2.7	μA	
		VDD=4.70V		1.1	3.3		
VDDH	Maximum Operating Voltage				10	V	
VDDL	Minimum Operating Voltage	$T_{opt}=25^{\circ}\text{C}$		0.55	0.70	V	Note 1
		$-30^{\circ}\text{C}\leq T_{opt}\leq 80^{\circ}\text{C}$		0.65	0.80		
IOUT	Output Current	Nch VDS=0.05V, VDD=0.70V	0.01	0.05		mA	
		VDS=0.50V, VDD=1.50V	1.00	2.00			
		Pch VDS=-2.1V, VDD=4.5V	1.0	2.0		mA	
tPLH	Output Delay Time				100	μs	Note 2
$\frac{\Delta-V_{DET}}{\Delta T_{opt}}$	Detector Threshold Temperature Coefficient	$-30^{\circ}\text{C}\leq T_{opt}\leq 80^{\circ}\text{C}$		± 100		ppm/ $^{\circ}\text{C}$	

• R×5VT36A/C
 $T_{opt}=25^{\circ}\text{C}$

Symbol	Item	Conditions	MIN.	TYP.	MAX.	Unit	Note
-VDET	Detector Threshold		3.510	3.600	3.690	V	
VHYS	Detector Threshold Hysteresis		0.108	0.180	0.252	V	
ISS	Supply Current	VDD=3.47V		1.0	3.0	μA	
		VDD=5.60V		1.2	3.6		
VDDH	Maximum Operating Voltage				10	V	
VDDL	Minimum Operating Voltage	$T_{opt}=25^{\circ}\text{C}$		0.55	0.70	V	Note 1
		$-30^{\circ}\text{C}\leq T_{opt}\leq 80^{\circ}\text{C}$		0.65	0.80		
IOUT	Output Current	Nch VDS=0.05V, VDD=0.70V	0.01	0.05		mA	
		VDS=0.50V, VDD=1.50V	1.00	2.00			
		Pch VDS=-2.1V, VDD=4.5V	1.0	2.0		mA	
tPLH	Output Delay Time				100	μs	Note 2
$\frac{\Delta-V_{DET}}{\Delta T_{opt}}$	Detector Threshold Temperature Coefficient	$-30^{\circ}\text{C}\leq T_{opt}\leq 80^{\circ}\text{C}$		± 100		ppm/ $^{\circ}\text{C}$	

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• R×5VT45A/C

T_{opt}=25°C

Symbol	Item	Conditions	MIN.	TYP.	MAX.	Unit	Note
-V _{DET}	Detector Threshold		4.388	4.500	4.612	V	
V _{HYS}	Detector Threshold Hysteresis		0.135	0.225	0.315	V	
I _{SS}	Supply Current	V _{DD} =4.34V		1.1	3.3	μA	
		V _{DD} =6.50V		1.3	3.9		
V _{DDH}	Maximum Operating Voltage				10	V	
V _{DDL}	Minimum Operating Voltage	T _{opt} =25°C		0.55	0.70	V	Note 1
		-30°C≤T _{opt} ≤80°C		0.65	0.80		
I _{OUT}	Output Current	Nch V _{DS} =0.05V, V _{DD} =0.70V	0.01	0.05		mA	
		V _{DS} =0.50V, V _{DD} =1.50V	1.00	2.00			
		Pch V _{DS} =-2.1V, V _{DD} =8.0V	1.5	3.0		mA	
t _{PLH}	Output Delay Time				100	μs	Note 2
$\frac{\Delta-V_{DET}}{\Delta T_{opt}}$	Detector Threshold Temperature Coefficient	-30°C≤T _{opt} ≤80°C		±100		ppm/°C	

• R×5VT54A/C

T_{opt}=25°C

Symbol	Item	Conditions	MIN.	TYP.	MAX.	Unit	Note
-V _{DET}	Detector Threshold		5.265	5.400	5.535	V	
V _{HYS}	Detector Threshold Hysteresis		0.162	0.270	0.378	V	
I _{SS}	Supply Current	V _{DD} =5.20V		1.2	3.6	μA	
		V _{DD} =7.40V		1.4	4.2		
V _{DDH}	Maximum Operating Voltage				10	V	
V _{DDL}	Minimum Operating Voltage	T _{opt} =25°C		0.55	0.70	V	Note 1
		-30°C≤T _{opt} ≤80°C		0.65	0.80		
I _{OUT}	Output Current	Nch V _{DS} =0.05V, V _{DD} =0.70V	0.01	0.05		mA	
		V _{DS} =0.50V, V _{DD} =1.50V	1.00	2.00			
		Pch V _{DS} =-2.1V, V _{DD} =8.0V	1.5	3.0		mA	
t _{PLH}	Output Delay Time				100	μs	Note 2
$\frac{\Delta-V_{DET}}{\Delta T_{opt}}$	Detector Threshold Temperature Coefficient	-30°C≤T _{opt} ≤80°C		±100		ppm/°C	

(Note 1) Minimum Operating Voltage means the value of input voltage when output voltage maintains 0.1V or less, provided that in the case of Nch Open Drain Type Products, the pull-up resistance is set at 470kΩ, and the pull-up voltage is set at 5.0V.

(Note 2) Refer to the previously defined "Output Delay Time t_{PLH}".

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ELECTRICAL CHARACTERISTICS BY DETECTOR THRESHOLD

• R×5VT09A/C to R×5VT39A/C

Part Number	Detector Threshold			Detector Threshold Hysteresis			Supply Current 1			Supply Current 2		
	-VDET(V)			VHYS(V)			ISS(μA)			ISS(μA)		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	Conditions	TYP.	MAX.	Conditions	TYP.	MAX.
RX5VT09A/C	0.878	0.900	0.922	0.027	0.045	0.063	VDD= (-VDET) -0.10V	0.8	2.4	VDD= (-VDET) +2.0V	0.9	2.7
RX5VT10A/C	0.975	1.000	1.025	0.030	0.050	0.070					1.0	3.0
RX5VT11A/C	1.073	1.100	1.127	0.033	0.055	0.077						
RX5VT12A/C	1.170	1.200	1.230	0.036	0.060	0.084						
RX5VT13A/C	1.268	1.300	1.332	0.039	0.065	0.091						
RX5VT14A/C	1.365	1.400	1.435	0.042	0.070	0.098						
RX5VT15A/C	1.463	1.500	1.537	0.045	0.075	0.105						
RX5VT16A/C	1.560	1.600	1.640	0.048	0.080	0.112						
RX5VT17A/C	1.658	1.700	1.742	0.051	0.085	0.119						
RX5VT18A/C	1.755	1.800	1.845	0.054	0.090	0.126						
RX5VT19A/C	1.853	1.900	1.947	0.057	0.095	0.133	VDD= (-VDET) -0.13V	0.9	2.7	1.1	3.3	
RX5VT20A/C	1.950	2.000	2.050	0.060	0.100	0.140						
RX5VT21A/C	2.048	2.100	2.152	0.063	0.105	0.147						
RX5VT22A/C	2.145	2.200	2.255	0.066	0.110	0.154						
RX5VT23A/C	2.243	2.300	2.357	0.069	0.115	0.161						
RX5VT24A/C	2.340	2.400	2.460	0.072	0.120	0.168						
RX5VT25A/C	2.438	2.500	2.562	0.075	0.125	0.175						
RX5VT26A/C	2.535	2.600	2.665	0.078	0.130	0.182						
RX5VT27A/C	2.633	2.700	2.767	0.081	0.135	0.189						
RX5VT28A/C	2.730	2.800	2.870	0.084	0.140	0.196						VDD= (-VDET) -0.13V
RX5VT29A/C	2.828	2.900	2.972	0.087	0.145	0.203						
RX5VT30A/C	2.925	3.000	3.075	0.090	0.150	0.210						
RX5VT31A/C	3.023	3.100	3.177	0.093	0.155	0.217						
RX5VT32A/C	3.120	3.200	3.280	0.096	0.160	0.224						
RX5VT33A/C	3.218	3.300	3.382	0.099	0.165	0.231						
RX5VT34A/C	3.315	3.400	3.485	0.102	0.170	0.238						
RX5VT35A/C	3.413	3.500	3.587	0.105	0.175	0.245						
RX5VT36A/C	3.510	3.600	3.690	0.108	0.180	0.252						
RX5VT37A/C	3.608	3.700	3.792	0.111	0.185	0.259						
RX5VT38A/C	3.705	3.800	3.895	0.114	0.190	0.266						
RX5VT39A/C	3.803	3.900	3.997	0.117	0.195	0.273						

(Note 1) Refer to the previously defined "Output Delay Time t_{PH}".

(Note 2) Refer to the previously defined "Minimum Operating Voltage".

Condition 1: T_{opt} = 25°CCondition 2: -30°C ≤ T_{opt} ≤ 80°C

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T_{opt}=25°C

Output Current 1			Output Current 2			Output Current 3			Output Delay Time	Minimum Operating Voltage		Detector Threshold Tempco.	
I _{out} (mA)			I _{out} (mA)			I _{out} (mA)			t _{PLH} (μs)	V _{DDL} (V)		Δ-V _{DET} /ΔT _{opt} (ppm/°C)	
Conditions	MIN.	TYP.	Conditions	MIN.	TYP.	Conditions	MIN.	TYP.	MAX.	TYP.	MAX.	Conditions	TYP.
Nch	0.01	0.05	V _{DD} =0.85V	0.05	0.50	Pch	1.0	2.0	Note 1 100	Condition 1 0.55	Condition 1 0.70	-30°C ≤ T _{opt} ≤ 80°C	±100
			V _{DD} =1.0V	0.2	1.0								
			V _{DD} =1.5V	1.0	2.0								
V _{DS} =0.05V			V _{DS} =0.50V			V _{DS} =-2.1V				Condition 2 0.65	Condition 2 0.80		
V _{DD} =0.7V						V _{DD} =4.5V							

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• R×5VT40A/C to R×5VT60A/C

Part Number	Detector Threshold			Detector Threshold Hysteresis			Supply Current 1			Supply Current 2		
	-VDET(V)			Vhys(V)			Iss(μA)			Iss(μA)		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	Conditions	TYP.	MAX.	Conditions	TYP.	MAX.
Rx5VT40A/C	3.900	4.000	4.100	0.120	0.200	0.280	VDD= (-VDET) -0.16V	1.1	3.3	VDD= (-VDET) +2.0V	1.3	3.9
Rx5VT41A/C	3.998	4.100	4.202	0.123	0.205	0.287						
Rx5VT42A/C	4.095	4.200	4.305	0.126	0.210	0.294						
Rx5VT43A/C	4.193	4.300	4.407	0.129	0.215	0.301						
Rx5VT44A/C	4.290	4.400	4.510	0.132	0.220	0.308						
Rx5VT45A/C	4.388	4.500	4.612	0.135	0.225	0.315						
Rx5VT46A/C	4.485	4.600	4.715	0.138	0.230	0.322						
Rx5VT47A/C	4.583	4.700	4.817	0.141	0.235	0.329						
Rx5VT48A/C	4.680	4.800	4.920	0.144	0.240	0.336						
Rx5VT49A/C	4.778	4.900	5.022	0.147	0.245	0.343	VDD= (-VDET) -0.20V	1.2	3.6	1.4	4.2	
Rx5VT50A/C	4.875	5.000	5.125	0.150	0.250	0.350						
Rx5VT51A/C	4.973	5.100	5.277	0.153	0.255	0.357						
Rx5VT52A/C	5.070	5.200	5.330	0.156	0.260	0.364						
Rx5VT53A/C	5.168	5.300	5.432	0.159	0.265	0.371						
Rx5VT54A/C	5.265	5.400	5.535	0.162	0.270	0.378						
Rx5VT55A/C	5.363	5.500	5.637	0.165	0.275	0.385						
Rx5VT56A/C	5.460	5.600	5.740	0.168	0.280	0.392						
Rx5VT57A/C	5.558	5.700	5.842	0.171	0.285	0.399						
Rx5VT58A/C	5.655	5.800	5.945	0.174	0.290	0.406						
Rx5VT59A/C	5.753	5.900	6.047	0.177	0.295	0.413						
Rx5VT60A/C	5.850	6.000	6.150	0.180	0.300	0.420						

(Note 1) Refer to the previously defined "Output Delay Time tPLH".

(Note 2) Refer to the previously defined "Minimum Operating Voltage".

Condition 1: T_{opt} = 25°C

Condition 2: -30°C ≤ T_{opt} ≤ 80°C

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T_{opt}=25°C

Output Current 1			Output Current 2				Output Current 3			Output Delay Time	Minimum Operating Voltage		Detector Threshold Tempco.	
I _{out} (mA)			I _{out} (mA)				I _{out} (mA)			t _{PLH} (μs)	V _{DDL} (V)		Δ-V _{DET} /ΔT _{opt} (ppm/°C)	
Conditions	MIN.	TYP.	Conditions		MIN.	TYP.	Conditions	MIN.	TYP.	MAX.	TYP.	MAX.	Conditions	TYP.
Nch							Pch				Note 2	Note 2		
V _{DS} = 0.05V	0.01	0.05	V _{DS} = 0.50V	V _{DD} = 1.5V	1.0	2.0	V _{DS} = -2.1V	1.5	3.0	Note 1 100	Condition 1 0.55	Condition 1 0.70	-30°C≤ T _{opt} ≤80°C	±100
V _{DD} = 0.7V							V _{DD} = 8.0V				Condition 2 0.65	Condition 2 0.80		

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OPERATION

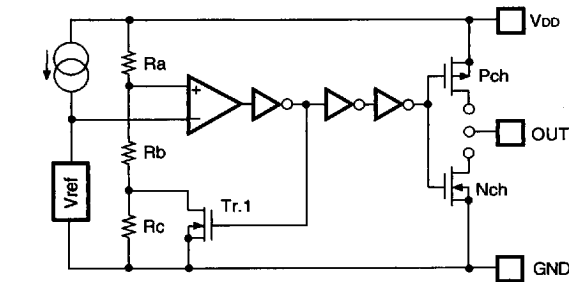


FIG. 1 Block Diagram

- In R×5VT××A, Nch Tr. drain is connected to OUT pin.
- In R×5VT××C, Nch Tr. drain and Pch Tr. drain are connected to OUT pin.

Operation Diagram

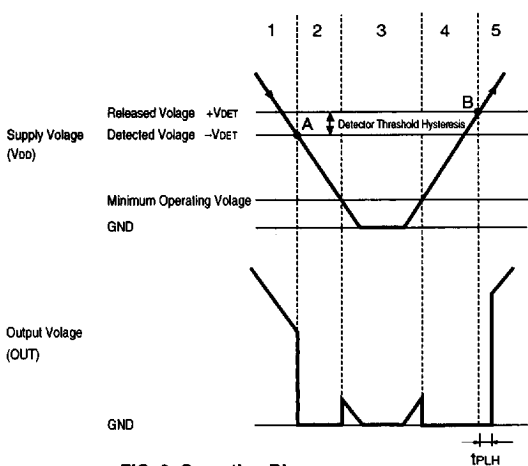


FIG. 2 Operation Diagram

Step	Step 1	Step 2	Step 3	Step 4	Step 5
Comparator(+) Pin Input Voltage	I	II	II	II	I
Comparator Output	H	L	Indefinite	L	H
Tr. 1	OFF	ON	Indefinite	ON	OFF
Output Tr.	Pch	ON	OFF	Indefinite	OFF
	Nch	OFF	ON	Indefinite	ON

I. $\frac{R_b + R_c}{R_a + R_b + R_c} \cdot V_{DD}$

II. $\frac{R_b}{R_a + R_b} \cdot V_{DD}$

- Step 1. Output Voltage is equal to Power Source Voltage (VDD).
- Step 2. When Input Voltage to Comparator reaches the state of $V_{ref} \geq V_{DD} \cdot (R_b + R_c) / (R_a + R_b + R_c)$ at Point A (Detected Voltage $-V_{DET}$), the output of Comparator is reserved, so that Output Voltage becomes GND.
- Step 3. In the case of CMOS Output, Output Voltage becomes unstable when Supply Voltage (VDD) is smaller than Minimum Operating Voltage. In the case of Nch Open Drain Output, a pulled-up voltage is output.
- Step 4. Output Voltage becomes equal to GND.
- Step 5. When Input Voltage to Comparator reaches the state of $V_{ref} \leq V_{DD} \cdot (R_b) / (R_a + R_b)$ at Point B (Released Voltage $+V_{DET}$), the output of Comparator is reversed, so that Output Voltage becomes equal to Supply Voltage (VDD).

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TEST CIRCUITS

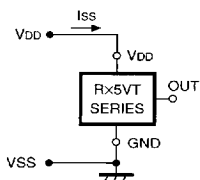


FIG. 3 Supply Current Test Circuit

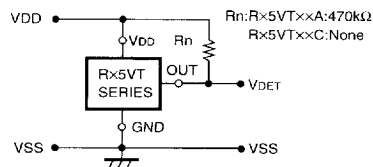


FIG. 4 Detector Threshold Test Circuit

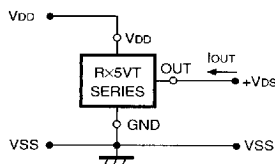


FIG. 5 Nch Driver Output Current Test Circuit

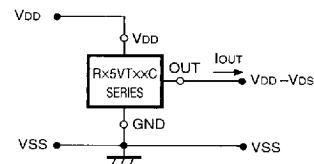


FIG. 6 Pch Driver Output Current Test Circuit

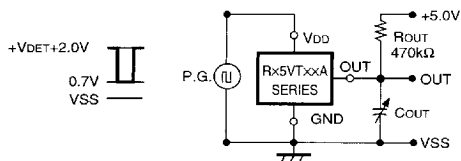


FIG. 7 Output Delay Time Test Circuit (1)

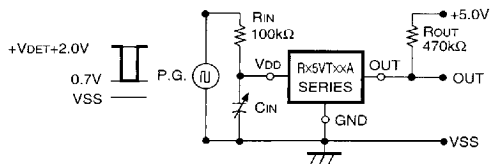
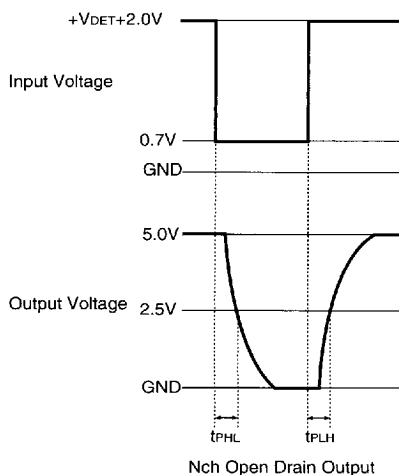
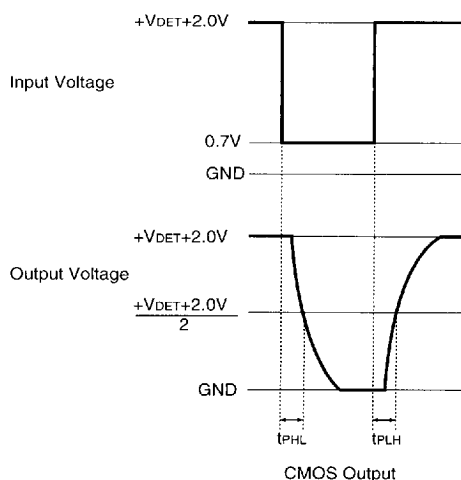


FIG. 8 Output Delay Time Test Circuit (2)

In Output Delay Time Test Circuits (1) and (2) in FIG. 7 and FIG. 8, their respective Output Voltage Fall Times (t_{PHL}) and Rise Times (t_{PLH}) are defined as shown below.



Nch Open Drain Output



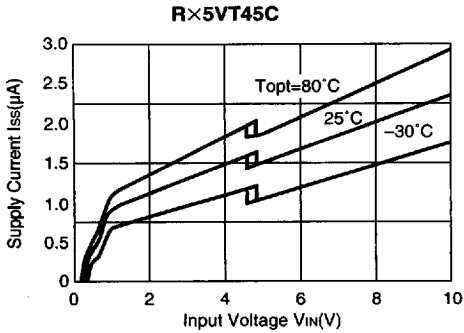
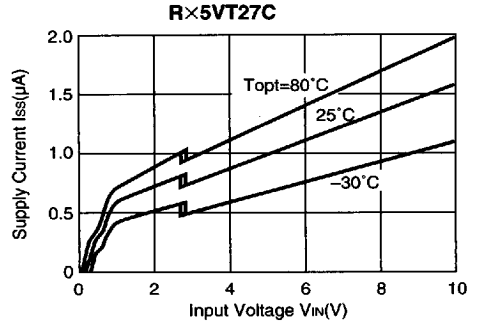
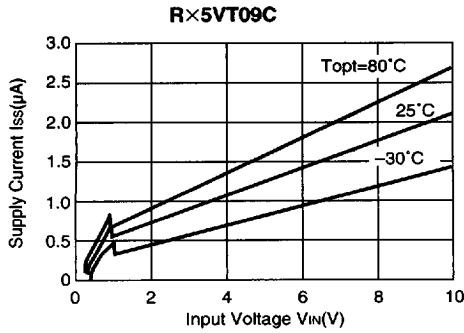
CMOS Output

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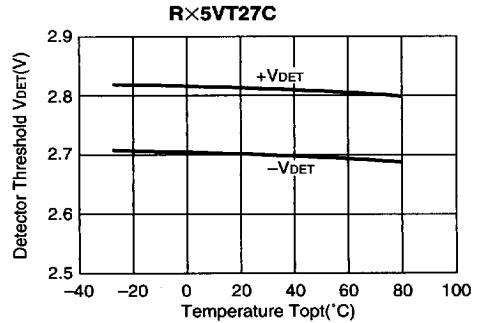
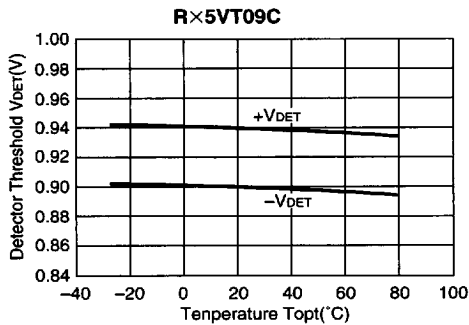
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TYPICAL CHARACTERISTICS

1) Supply Current vs. Input Voltage

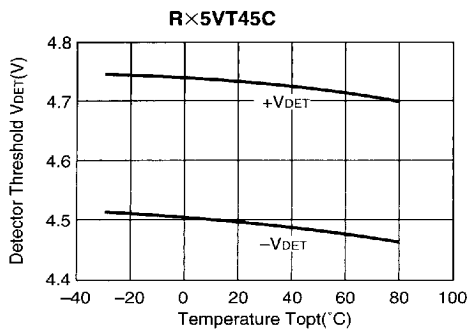


2) Detector Threshold vs. Temperature

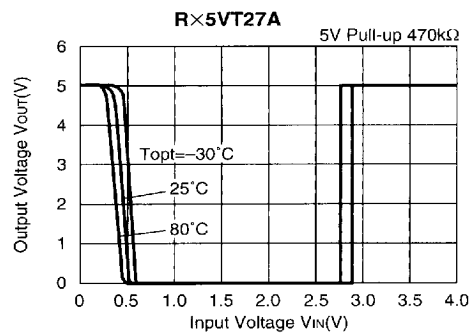
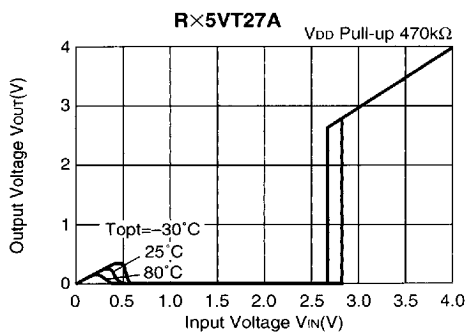
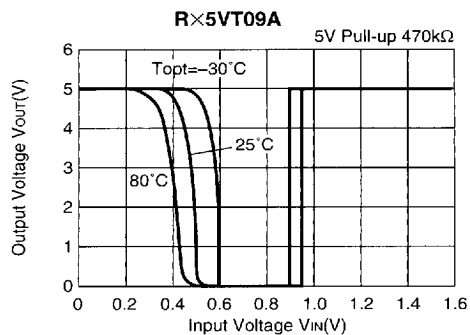
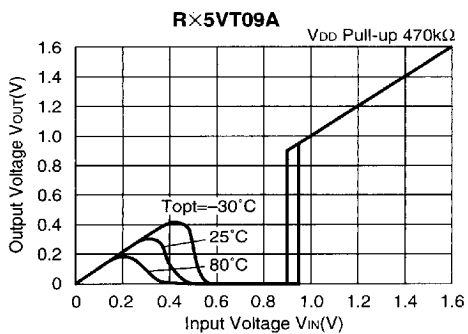


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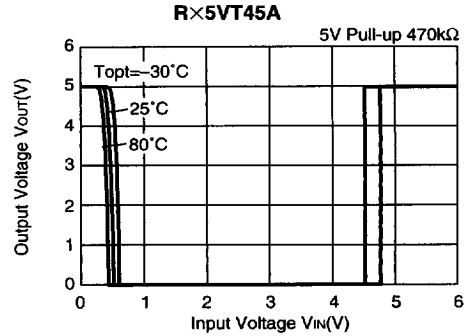
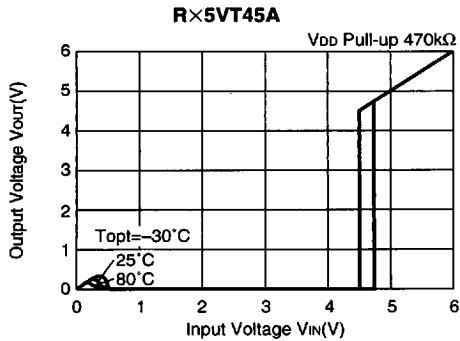


3) Output Voltage vs. Input Voltage

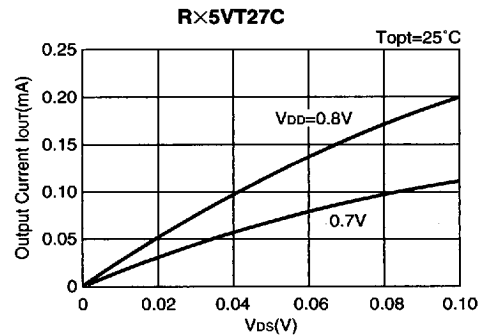
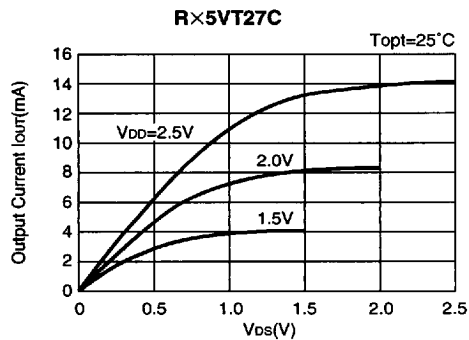
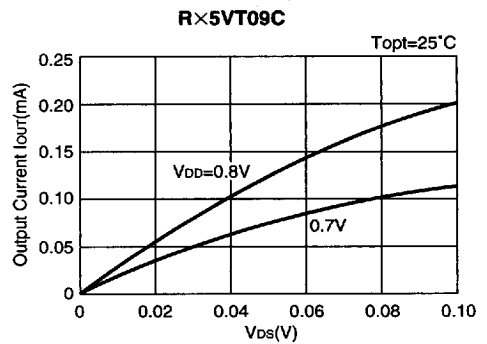
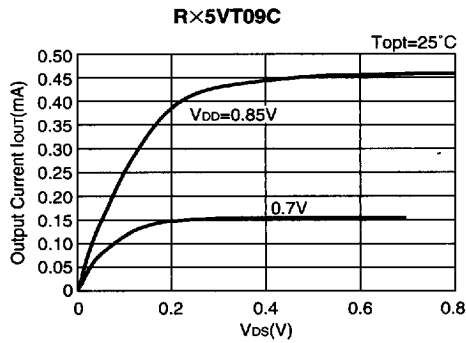


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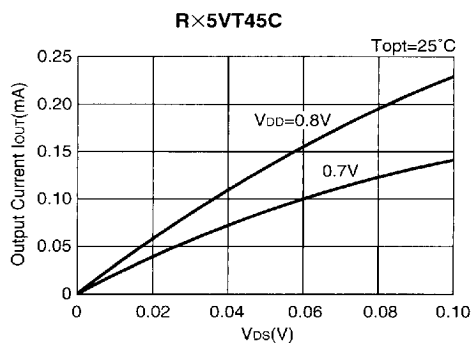
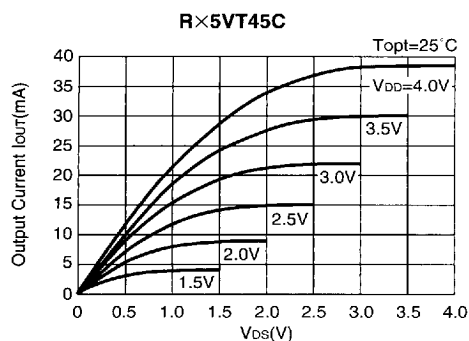


4) Nch Driver Output Current vs. V_{DS}

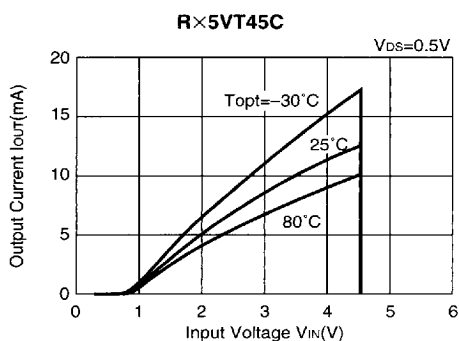
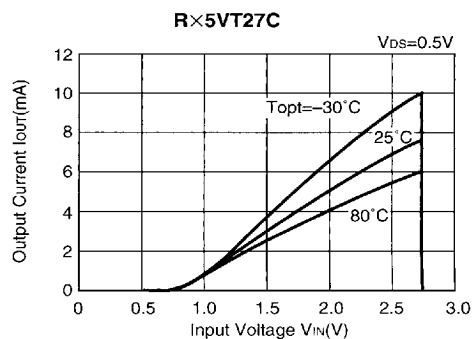
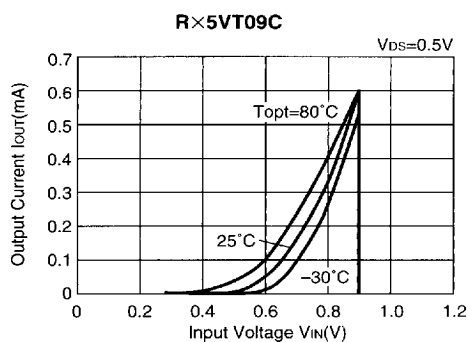


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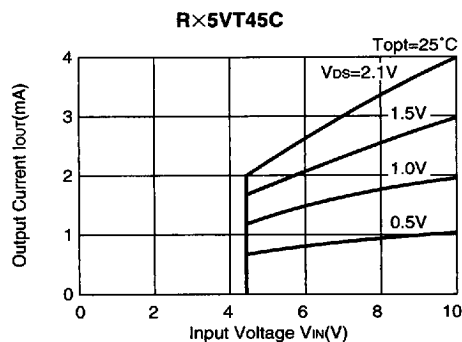
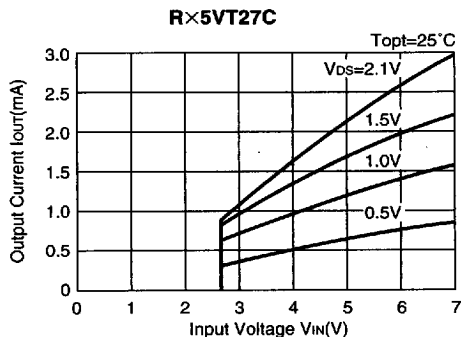
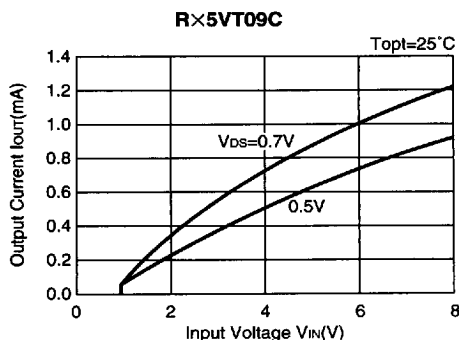
5) Nch Driver Output Current vs. Input Voltage



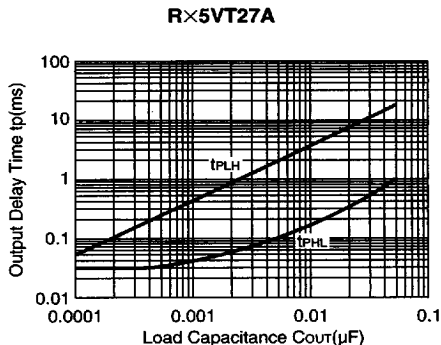
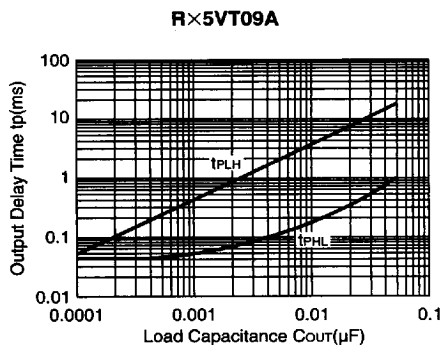
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6) Pch Driver Output Current vs. Input Voltage

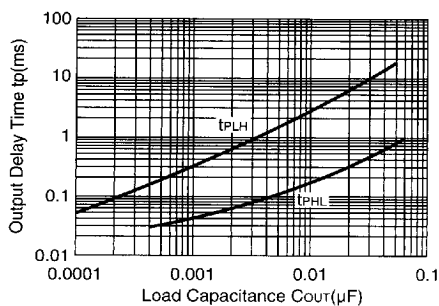
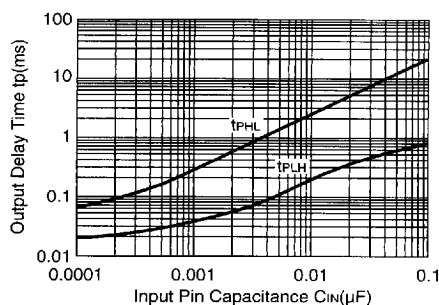
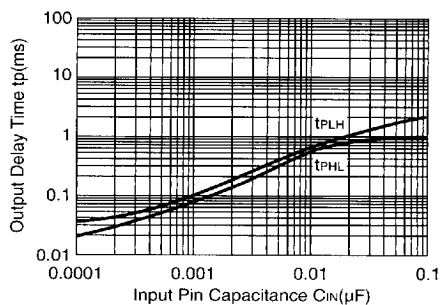
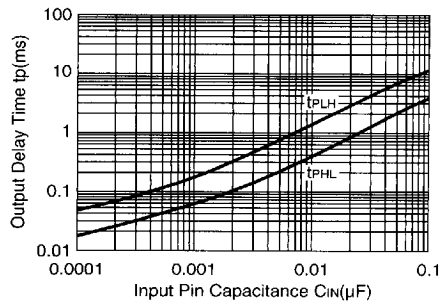


7) Output Delay Time vs. Load Capacitance



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R×5VT45A**8) Output Delay Time vs. Input Pin Capacitance****R×5VT09A****R×5VT27A****R×5VT45A**

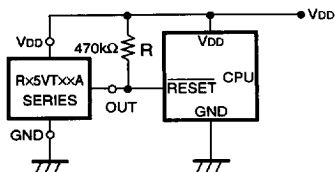
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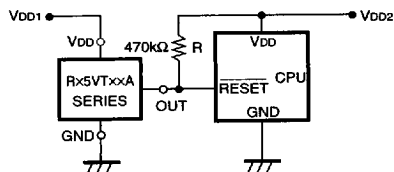
TYPICAL APPLICATIONS

• R×5VT××A CPU Reset Circuit (Nch Open Drain Output)

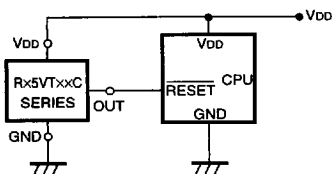
(1) Input Voltage to R×5VT××A is the same as the input voltage to CPU.



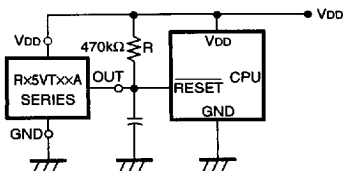
(2) Input Voltage to R×5VT××A is different from the input voltage to CPU.



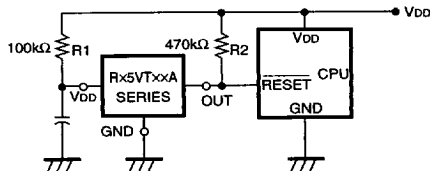
• R×5VT××C CPU Reset Circuit (CMOS Output)



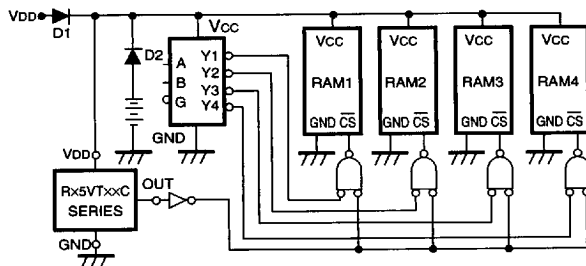
• R×5VT××A Output delay Time Circuit 1



• R×5VT××A Output delay Time Circuit 2



• Memory Back-up Circuit

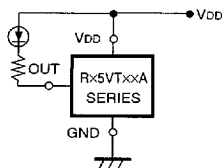


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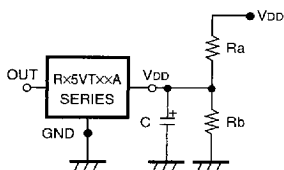
• Voltage Level Indicator Circuit (lighted when the power runs out)

(Nch Open Drain Output)



• Detector Threshold Changing Circuit

(Nch Open Drain Output)



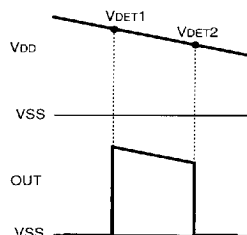
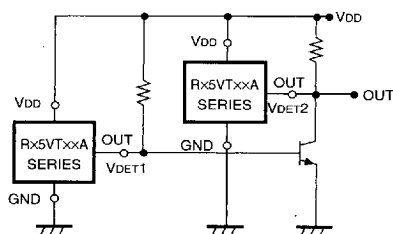
$$\text{Changed Detector Threshold} = \frac{R_a + R_b}{R_b} \cdot (-V_{DET})$$

$$\text{Hysteresis Voltage} = \frac{R_a + R_b}{R_b} \cdot V_{HYS}$$

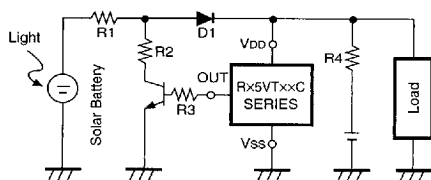
(Note) Please note that when the value of Ra becomes excessively large, the detector threshold detected may differ from the value calculated by use of the above formula.

• Window Comparator Circuit

(Nch Open Drain Output)



• Excessive Charge Preventing Circuit



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APPLICATION HINTS

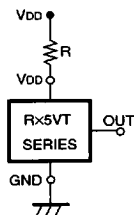


FIG. 9

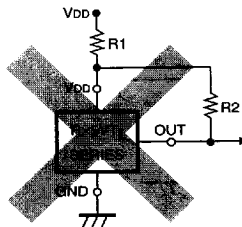


FIG. 10

1. When R×5VT××C (CMOS Output) is used in FIG. 9, this IC may oscillate by the through-type current at the detection when impedance is connected between Power Source VDD and R×5VT VDD Pin. When R×5VT××A (Nch Open Drain Output) is used in FIG. 9, and R becomes excessively large, Detector Threshold may be varied because of the voltage drop of the supply current in the IC itself.
2. The connection as shown in FIG. 10 may cause the oscillation in both R×5VT××C (CMOS Output) and R×5VT××A (Nch Open Drain Output).

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