RICOH

R3152N-Y Series

42 V Input Window Voltage Detector for Industrial Applications

No. EY-405-200904

OVERVIEW

The R3152N is a window voltage detector suited for achieving the functional safety. This device monitors over- and under- voltage of the output voltage from the power supply IC for a microprocessor and a sensor, and can prevent malfunction of system caused by abnormal voltage. This is a high-reliability semiconductor device for industrial applications (-Y) that has passed both the screening at high temperature and the reliability test with extended hours. This line of products operate in a wide temperature range from low temperature to high temperature to support harsh environment applications.

KEY BENEFITS

- A stable voltage with supplying the battery voltage can provide the power supply and the voltage supervising separately.
- High-accuracy detection enables with Overvoltage/Undervoltage Detection Accuracy of -1.25% to 0.75% and Hysteresis of 1.5%.
- Small package of SOT-23-6 is adopted, and a safe and secure pin assignment with considering a short among adjacent pins.

KEY SPECIFICATIONS

- Operating Voltage Range (Max. Rating): 3.0 V to 42.0 V (50.0 V)
- Operating Temperature Range: −50°C to 125°C
- Supply Current: Typ. 1.5 µA
- Overvoltage Detection: 1.1 V to 5.9 V (0.01 V step)
- Undervoltage Detection:1.0 V to 4.8 V (0.01 V step)
- Detection Release Hysteresis: A, Typ. 1.0% with hysteresis
  B, No hysteresis
- Detection Voltage Accuracy: ±0.5% (Ta = 25°C)
  -1.25% to 0.75% (−50°C to 125°C)
- Release Delay Time: Typ. 4 ms (C_D = 0.01 µF)
- Output Type: Nch. Open Drain

SELECTION GUIDE

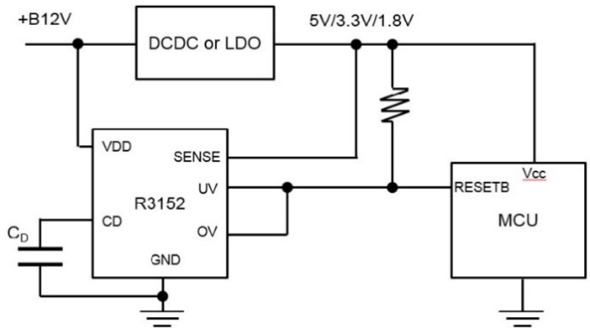
Product Name	Package	Quantity per Reel
R3152Nxxx$-TR-YE	SOT-23-6	3,000 pcs

xxx: The combination of an overvoltage detection setting voltage (V_{OVSET}) and an undervoltage detection setting voltage (V_{UVSET})
Refer to *Product-specific Electrical Characteristics* for more details.

$: Hysteresis

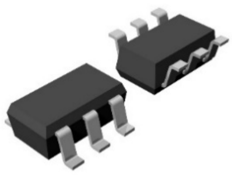
$	Hysteresis
A	Yes
B	No

TYPICAL APPLICATIONS



C_D: a capacitor set according to the release delay times

PACKAGE



SOT-23-6
2.9 x 2.8 x 1.1 (mm)

APPLICATIONS

- Factory Automation Equipment, Smart meters
- High Temperature Devices: Surveillance Cameras and Vending Machines
- Self-heating Devices: Motors and Lightings

No. EY-405-200904

SELECTION GUIDE

The overvoltage detection setting voltage (V_{OVSET}) and the undervoltage detection setting voltage (V_{UVSET}) are user-selectable options.

Selection Guide

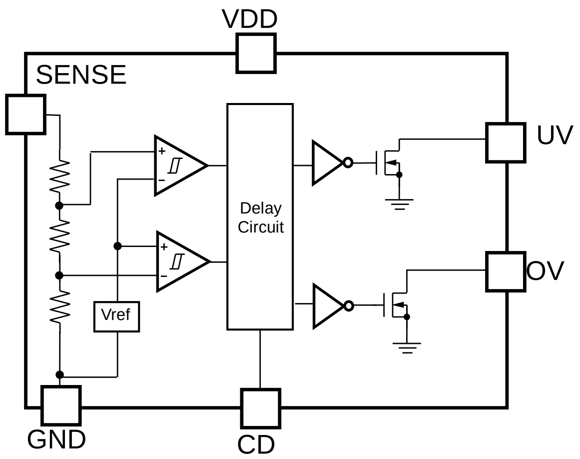
Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
R3152Nxxx$-TR-YE	SOT-23-6	3,000 pcs	Yes	Yes

xxx: The combination of an overvoltage detection setting voltage (V_{OVSET}) and an undervoltage detection setting voltage (V_{UVSET}).
Refer to *Product-specific Electrical Characteristics* for more details.

$: Hysteresis

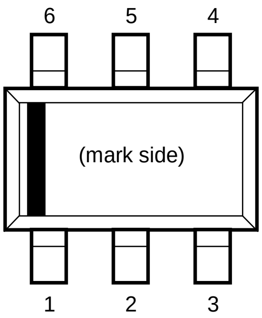
$	Hysteresis
A	Yes
B	No

BLOCK DIAGRAM



R3152N Block Diagram

PIN DESCRIPTIONS



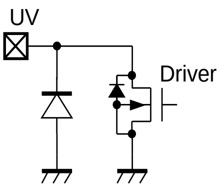
SOT-23-6 Pin Configuration

Pin Description

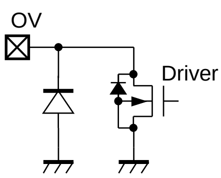
Pin No.	Symbol	Description
1	VDD	Supply Voltage Pin
2	CD	VD Release Delay Time Set Pin (for connecting with external capacitor for delay)
3	UV	Undervoltage Detection Output Pin (“Low” at detection)
4	OV	Overvoltage Detection Output Pin (“Low” at detection)
5	GND	GND Pin
6	SENSE	SENSE Pin

Internal Equivalent Circuit for Each Pin

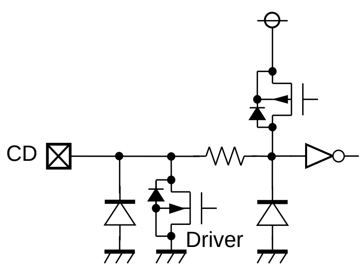
UV Pin



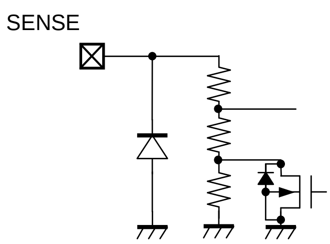
OV Pin



CD Pin



SENSE Pin



ABSOLUTE MAXIMUM RATINGS

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{DD}	Supply Voltage	−0.3 to 50.0	V
	Peak Voltage(1)	60	V
V_{CD}	CD Pin Output Voltage	−0.3 to 50.0	V
V_{UVOUT}	UV Pin Output Voltage	−0.3 to 7.0	V
V_{OVOUT}	OV Pin Output Voltage	−0.3 to 7.0	V
V_{SENSE}	SENSE Pin Input Voltage	−0.3 to 7.0	V
I_{UVOUT}	UV Pin Output Current	30	mA
I_{OVOUT}	OV Pin Output Current	30	mA
P_D	Power Dissipation(2) (SOT-23-6, JEDEC STD.51-7)	830	mW
Tj	Junction Temperature Range	−50 to 150	°C
Tstg	Storage Temperature Range	−55 to 150	°C

ABSOLUTE MAXIMUM RATINGS
Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause permanent damage 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 are not assured.

RECCOMENDED OPERATING CONDITIONS

Recommended Operating Conditions

Symbol	Parameter	Rating	Unit
V_{DD}	Operating Voltage	3.0 to 42	V
V_{SENSE}	SENSE Pin Input Voltage	0 to 6.0	V
Ta	Operating Temperature Range	−50 to 125	°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 they are used over such ratings 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) Duration Time: 200 ms
(2) Refer to *POWER DISSIPATION* for detailed information.

ELECTRICAL CHARACTERISTICS

V_{DD} = 14 V, C_D = 0.01 µF, pulled-up to 5 V with 100 kΩ, unless otherwise specified.

The specifications surrounded by [ ] are guaranteed by design engineering at -50°C ≤ Ta ≤ 125°C.

R3152N (-YE) Electrical Characteristics (Ta= 25°C)

Symbol	Parameter	Test Conditions/Comments	Min.	Typ.	Max.	Unit
V_{OVDET}	Overvoltage (OV) Detector Threshold	Ta = 25°C	x0.995		x1.005	V
		–50°C ≤ Ta ≤ 125°C	$\boxed{x0.9875}$		$\boxed{x1.0075}$	V
V_{UVDET}	Undervoltage (UV) Detector Threshold	Ta = 25°C	x0.995		x1.005	V
		–50°C ≤ Ta ≤ 125°C	$\boxed{x0.9875}$		$\boxed{x1.0075}$	V
V_{OVHYS}	Overvoltage (OV) Threshold Hysteresis	With Hysteresis	$\boxed{V_{OVDET} \times 0.005}$	$V_{OVDET} \times 0.01$	$\boxed{V_{OVDET} \times 0.015}$	V
		No Hysteresis	$\boxed{0}$		$\boxed{10}$	mV
V_{UVHYS}	Undervoltage (UV) Threshold Hysteresis	With Hysteresis	$\boxed{V_{UVDET} \times 0.005}$	$V_{UVDET} \times 0.01$	$\boxed{V_{UVDET} \times 0.015}$	V
		No Hysteresis	$\boxed{0}$		$\boxed{10}$	mV
I_{SS}	Consumption Current	V_{UVDET} < SENSE < V_{OVDET}		1.5	$\boxed{3.2}$	µA
R_{SENSE}	SENSE Pin Resistance		$\boxed{7}$	14	$\boxed{28}$	MΩ
V_{UVLO}	UVLO Detector Threshold			1.8	$\boxed{2.8}$	V
$V_{UVLOHYS}$	UVLO Threshold Hysteresis			0.1	$\boxed{0.2}$	V
V_{OVOUT}	Overvoltage (OV) pulled-up output voltage				$\boxed{6.0}$	V
V_{UVOUT}	Undervoltage (UV) pulled-up output voltage				$\boxed{6.0}$	V
V_{DDLOV}	Overvoltage (OV) Low-operating Voltage(1)				$\boxed{1.7}$	V
V_{DDLUV}	Undervoltage (UV) Low-operating Voltage(1)				$\boxed{1.7}$	V
I_{OUT}	OV Pin Nch. Driver Output Current	V_{DD} = 3.0, V_{DS} = 0.1 V	$\boxed{0.8}$	1.8		mA
	UV Pin Nch. Driver Output Current	V_{DD} = 3.0, V_{DS} = 0.1 V	$\boxed{0.8}$	1.8		mA
I_{LEAK}	OV Pin Nch.Driver Leak Current	V_{OVOUT} = 5.5 V			$\boxed{0.3}$	µA
	UV Pin Nch Driver Leak Current	V_{UVOUT} = 5.5 V			$\boxed{0.3}$	µA
t_{DELAY}	Release Delay Time		$\boxed{2.5}$	4	$\boxed{8}$	ms

All test items listed under Electrical Characteristics are done under the pulse load condition (Tj ≈ Ta = 25°C).

(1) Minimum value of power supply voltage when an output voltage will become less than 0.1 V at detection. (Pulled-up resistance: 100 kΩ, Pulled-up voltage: 5 V)

V_{DD} = 14 V, C_D = 0.01 µF, pulled-up to 5 V with 100 kΩ, unless otherwise specfied.
The specifications surrounded by $\boxed{}$ are guaranteed by design engineering at −50°C ≤ Ta ≤ 125°C.

R3152N (-YE) Product-specific Electrical Characteristics **(Ta = 25°C)**

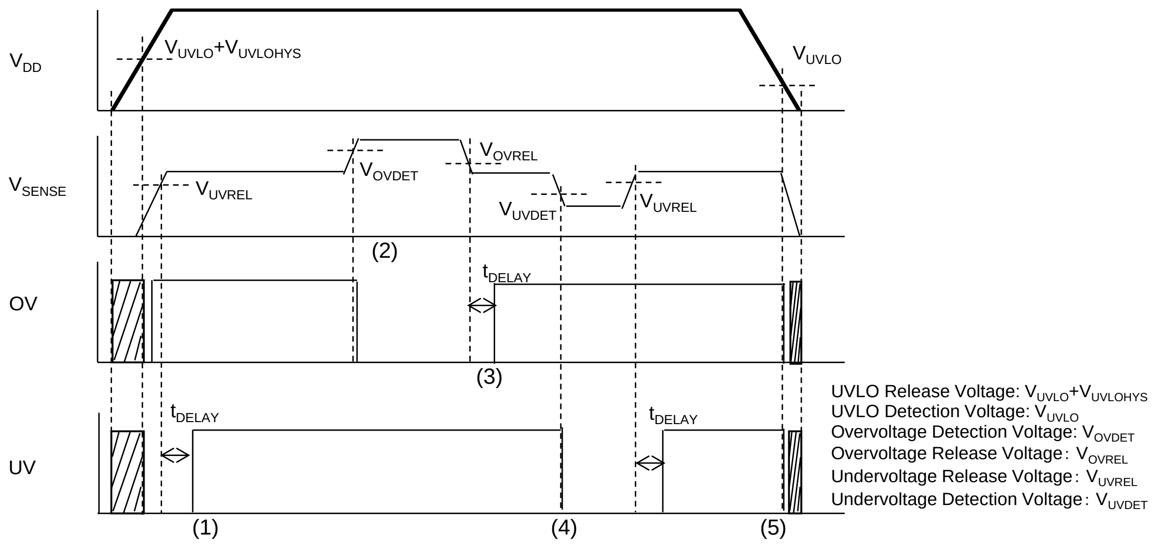
Product name	V_{OVDET} (V)			V_{UVDET} (V)			V_{OVHYS} (V)			V_{UVHYS} (V)		
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.
R3152N001A	5.27350	5.30	5.32650	4.67650	4.70	4.72350	0.02650	0.05300	0.07950	0.02350	0.04700	0.07050
R3152N002A	3.52230	3.54	3.55770	3.03475	3.05	3.06525	0.01770	0.03540	0.05310	0.01525	0.03050	0.04575
R3152N003B	3.55215	3.57	3.58785	2.48750	2.50	2.51250	0	-	0.01000	0	-	0.01000
R3152N004A	1.86065	1.87	1.87935	1.73130	1.74	1.74870	0.00935	0.01870	0.02805	0.00870	0.01740	0.02610
R3152N005A	3.41285	3.43	3.44715	3.17405	3.19	3.20595	0.01715	0.03430	0.05145	0.01595	0.03190	0.04785
R3152N013A	1.32335	1.33	1.33665	1.16415	1.17	1.17585	0.00665	0.01330	0.01995	0.00585	0.01170	0.01755
R3152N014A	1.16415	1.17	1.17585	1.06963	1.075	1.08037	0.00585	0.01170	0.01755	0.00538	0.01075	0.01613
R3152N015A	1.28355	1.29	1.29645	1.15420	1.16	1.16580	0.00645	0.01290	0.01935	0.00580	0.01160	0.01740
R3152N017A	3.55215	3.57	3.58785	2.72630	2.74	2.75370	0.01785	0.03570	0.05355	0.01370	0.02740	0.04110
R3152N020A	1.24375	1.25	1.25625	1.11440	1.12	1.12560	0.00625	0.01250	0.01875	0.00560	0.01120	0.01680
R3152N201B	1.23380	1.24	1.24620	1.16415	1.17	1.17585	0	-	0.01000	0	-	0.01000
R3152N101B	2.58700	2.60	2.61300	2.39795	2.41	2.42205	0	-	0.01000	0	-	0.01000
R3152N102B	3.41285	3.43	3.44715	3.16410	3.18	3.19590	0	-	0.01000	0	-	0.01000
R3152N203A	1.39300	1.40	1.40700	0.99500	1.00	1.00500	0.00700	0.01400	0.02100	0.00500	0.01000	0.01500
R3152N204A	1.62185	1.63	1.63815	1.40295	1.41	1.41705	0.00815	0.01630	0.02445	0.00705	0.01410	0.02115
R3152N103A	5.77100	5.80	5.82900	4.75610	4.78	4.80390	0.02900	0.05800	0.08700	0.02390	0.04780	0.07170
R3152N104A	3.38300	3.40	3.41700	1.59200	1.60	1.60800	0.01700	0.03400	0.05100	0.00800	0.01600	0.02400

V_{DD} = 14 V, C_D = 0.01 µF, pulled-up to 5 V with 100 kΩ, unless otherwise specfied.
The specifications surrounded by $\boxed{}$ are guaranteed by design engineering at −50°C ≤ Ta ≤ 125°C.

R3152N (-YE) Product-specific Electrical Characteristics **(–50°C ≤ Ta ≤ 125°C)**

Product name	V_{OVDET} (V)			V_{UVDET} (V)			V_{OVHYS} (V)			V_{UVHYS} (V)		
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.
R3152N001A	5.23375	5.30	5.33975	4.64125	4.70	4.73525	0.02650	0.0530	0.07950	0.02350	0.04700	0.07050
R3152N002A	3.49575	3.54	3.56655	3.01188	3.05	3.07287	0.01770	0.0354	0.05310	0.01525	0.03050	0.04575
R3152N003B	3.52538	3.57	3.59678	2.46875	2.50	2.51875	0	-	0.01000	0	-	0.01000
R3152N004A	1.84663	1.87	1.88403	1.71825	1.74	1.75305	0.00935	0.01870	0.02805	0.00870	0.01740	0.02610
R3152N005A	3.38713	3.43	3.45573	3.15013	3.19	3.21392	0.01715	0.03430	0.05145	0.01595	0.0319	0.04785
R3152N013A	1.31338	1.33	1.33997	1.15538	1.17	1.17877	0.00665	0.01330	0.01995	0.00585	0.01170	0.01755
R3152N014A	1.15537	1.17	1.17878	1.06156	1.075	1.08307	0.00585	0.01170	0.01755	0.00538	0.01075	0.01613
R3152N015A	1.27387	1.29	1.29968	1.14550	1.16	1.16870	0.00645	0.01290	0.01935	0.00580	0.01160	0.01740
R3152N017A	3.52537	3.57	3.59678	2.70575	2.74	2.76055	0.01785	0.03570	0.05355	0.01370	0.02740	0.04110
R3152N020A	1.23438	1.25	1.25937	1.10600	1.12	1.12840	0.00625	0.01250	0.01875	0.00560	0.01120	0.01680
R3152N201B	1.22450	1.24	1.24930	1.15538	1.17	1.17877	0	-	0.01000	0	-	0.01000
R3152N101B	2.56750	2.60	2.61950	2.37988	2.41	2.42807	0	-	0.01000	0	-	0.01000
R3152N102B	3.38713	3.43	3.45572	3.14025	3.18	3.20385	0	-	0.01000	0	-	0.01000
R3152N203A	1.38250	1.40	1.41050	0.98750	1.00	1.00750	0.00700	0.01400	0.02100	0.00500	0.01000	0.01500
R3152N204A	1.60963	1.63	1.64222	1.39238	1.41	1.42057	0.00815	0.01630	0.02445	0.00705	0.01410	0.02115
R3152N103A	5.72750	5.80	5.84350	4.72025	4.78	4.81585	0.02900	0.05800	0.08700	0.02390	0.04780	0.07170
R3152N104A	3.35750	3.40	3.42550	1.58000	1.60	1.61200	0.01700	0.03400	0.05100	0.00800	0.01600	0.02400

THEORY OF OPERATION



R3152N Timing Chart

(1) When the SENSE pin voltage (V_{SENSE}) exceed the undervoltage release voltage (V_{UVREL}), the UV pin output becomes “High” after the release delay time (t_{DELAY}).

(2) When V_{SENSE} exceed the overvoltage detection voltage ($V_{OV\,DET}$) by increasing in voltage, the OV pin output becomes “Low” after the detection delay time (Typ.10 µs) and enters the overvoltage detecting state.

(3) When V_{SENSE} decreases less than the overvoltage release voltage (V_{OVREL}), the OV pin output becomes “High” after the release delay time (t_{DELAY}).

(4) When V_{SENSE} decreases less than the undervoltage detection voltage ($V_{UV\,DET}$), the UV pin output becomes “Low” after the detection delay time (Typ.10 µs).

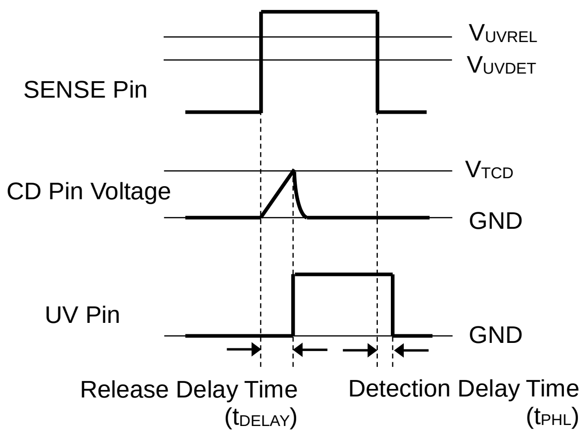
(5) When the VDD pin voltage (V_{DD}) decreases less than the UVLO detection voltage (V_{UVLO}), the OV and UV pins output become “Low”.

Note: A certain tilting angle of power supply voltage of the R3152NxxxB may cause chattering at detection or at release. To prevent the occurrence of chattering, connect a 10-nF or more capacitor to the CD pin.

Delay in Operation and Delay Time (t_{DELAY})

At Undervoltage Detection

When supplying a voltage higher than the undervoltage release voltage (V_{UVREL}) to the SENSE pin, a charging to an external capacitor starts and the CD pin voltage (V_{CD}) increases. The UV pin voltage (V_{UV}) maintains "Low" until V_{CD} reaches the CD pin threshold voltage (V_{TCD}). When V_{CD} exceeds V_{TCD}, V_{UV} is inverted from "Low" to "High". The release delay time (t_{DELAY}) is the period from the SENSE pin voltage (V_{SENSE}) exceeds V_{UVREL} to a rising edge of V_{UV}. When the output voltage turns from "Low" to "High", a charge carrier of the external capacitor starts discharging. When the voltage lower than V_{UV} is supplied to the SENSE pin, the detection delay time (t_{PHL}), which is the period that V_{UV} is inverted from "High" to "Low", remains constant independent of the external capacitor.



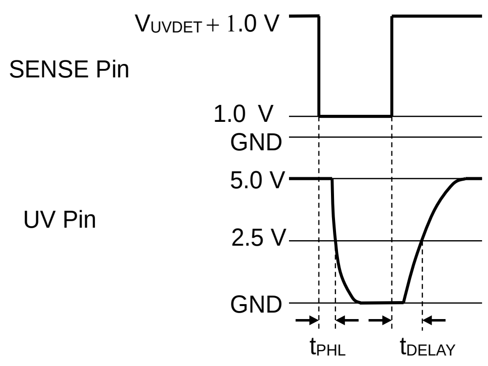
Undervoltage Release Delay Timing Diagram

Calculation of Release Delay Time (t_{DELAY})

The following equation can calculate a typical value of the release delay time (t_{DELAY}) with using the external capacitor (C_D).

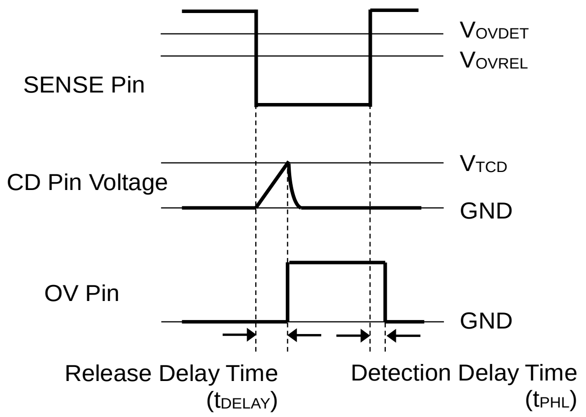
t_{DELAY} (s) = $0.73 \times C_D$ (F) / (1.5×10^{-6})

t_{DELAY} is the period from supplying a pulse voltage of 1.0 V → (V_{UVDET}) + 1.0 V to the SENSE pin to the UV pins reached 2.5 V.



At Overvoltage Detection

When supplying a voltage lower than the overvoltage release voltage (V_{OVREL}) to the SENSE pin, a charging to an external capacitor starts and the CD pin voltage (V_{CD}) increases. The OV pin voltage (V_{OV}) maintains "Low" until VCD reaches the CD pin threshold voltage (V_{TCD}). When V_{CD} exceeds V_{TCD}, V_{OV} is inverted from "Low" to "High". The release delay time (t_{DELAY}) is the period from the SENSE pin voltage (V_{SENSE}) falls below V_{OVREL} to a rising edge of V_{OV}. When the output voltage turns from "Low" to "High", a charge carrier of the external capacitor starts discharging. When the voltage higher than V_{OV} is supplied to the SENSE pin, the detection delay time (t_{PHL}), which is the period that V_{OV} is inverted from "High" to "Low", remains constant independent of the external capacitor.



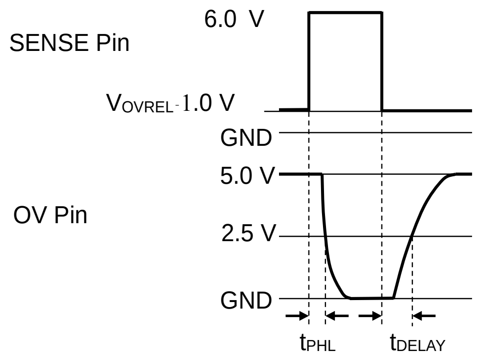
Overvoltage Release Delay Timing Diagram

Calculation of Release Delay Time (t_{DELAY})

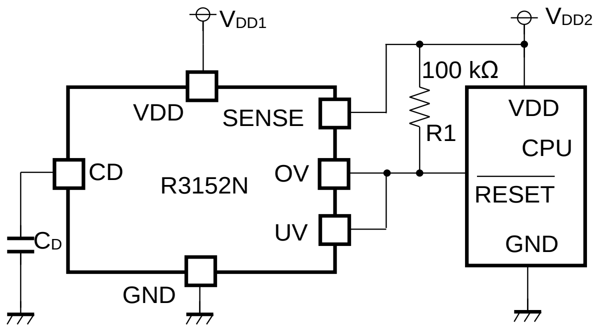
The following equation can calculate a typical value of the release delay time (t_{DELAY}) with using the external capacitor (C_D).

t_{DELAY} (s) = $0.73 \times C_D$ (F) / (1.5×10^{-6})

t_{DELAY} is the period from supplying a pulse voltage of 1.0 V → (V_{OVREL}) + 1.0 V to the SENSE pin to the OV pin reached 2.5 V after the OV pin is pulled up to 5V by connecting with a resistor of 100kΩ.



APPLICATION INFORMATION



R3152N Typical Application Circuit

Recommended External Components

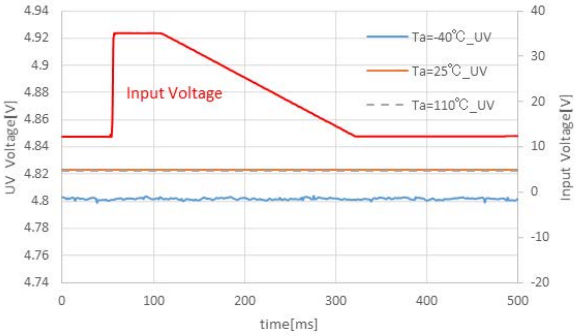
Symbol	Description
C_D	A capacitor corresponding to setting of Release Delay Time is required. Refer to *"Delay in Operation and Released Delay Time (t_{DELAY})"* in Operation Description for details.
R1	A resistor is required to set with consideration of the output current at Nch. driver's ON and the leakage current at Nch. driver's OFF. Refer to "Electrical Characteristic" for details – provided the evaluation result with using a resistor of 100 kΩ.

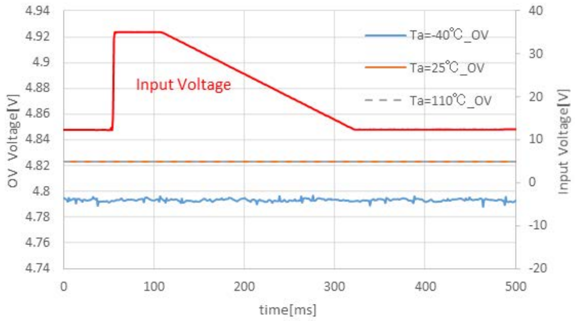
TYPICAL CHARACTERISTICS

Typical Characteristics are intended to be used as reference data, they are not guaranteed.

1) Load Dump

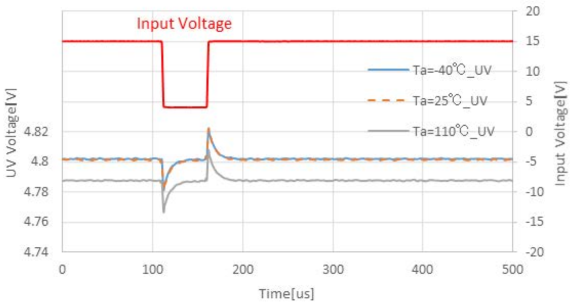
V_{UVSET} = 3.0 V, V_{OVSET} = 3.6 V, V_{SENSE} = 3.3 V, Pulled-up to 5.0 V

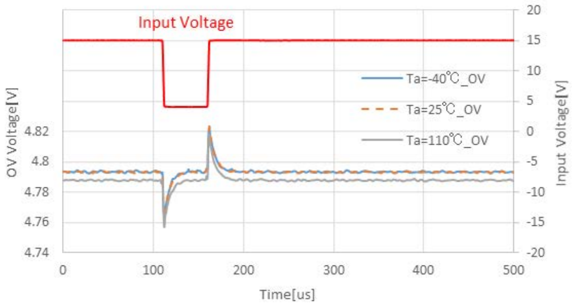




2) Cold Crank

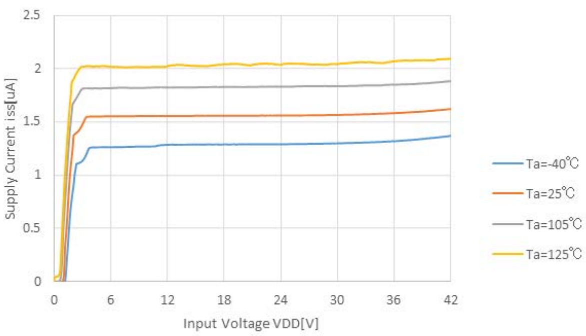
V_{UVSET} = 3.0 V, V_{OVSET} = 3.6 V, V_{SENSE} = 3.3 V, Pulled-up to 5.0 V



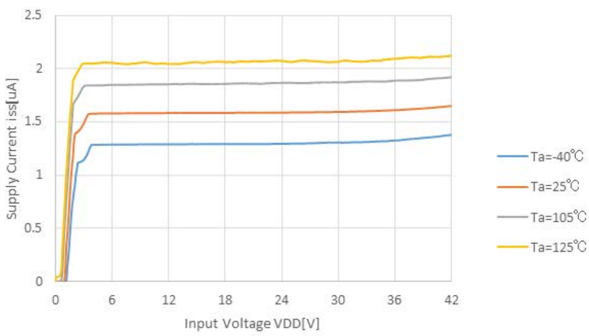


3) Supply Current vs. V_{DD}

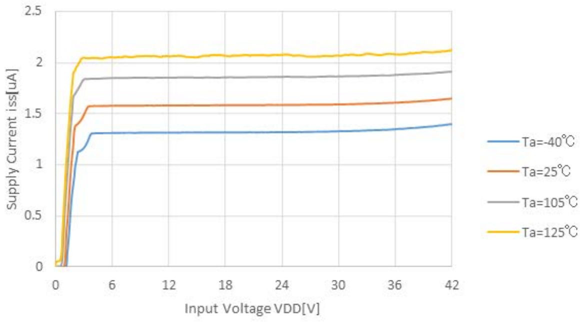
V_{UVSET} = 1.6 V, V_{OVSET} = 2.0 V



V_{UVSET} = 3.0 V, V_{OVSET} = 3.6 V

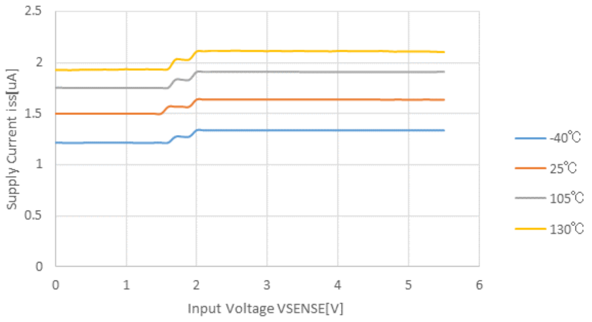


V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V

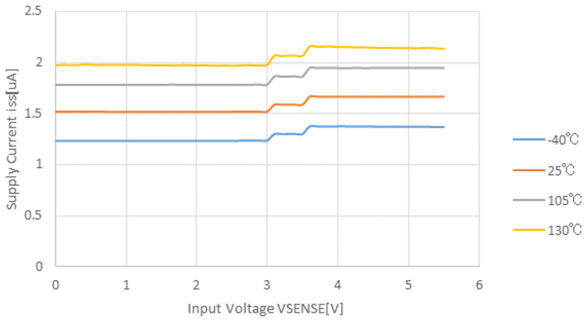


4) Supply Current vs. V_{SENSE}

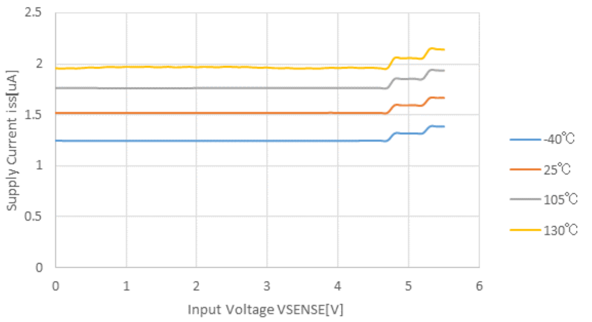
V_{UVSET} = 1.6 V, V_{OVSET} = 2.0 V



V_{UVSET} = 3.0 V, V_{OVSET} = 3.6 V

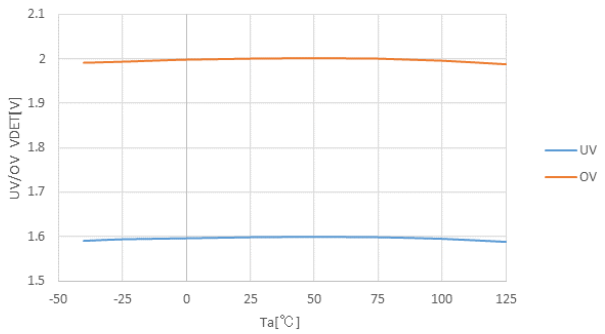


V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V

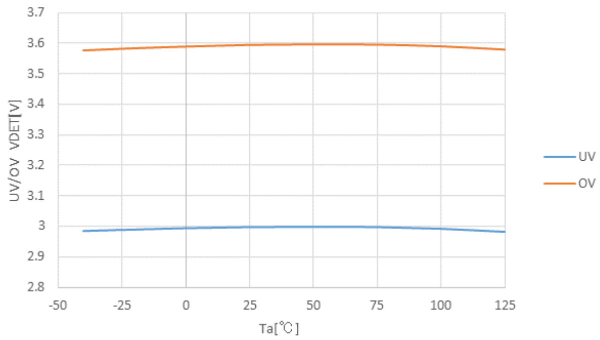


5) UV/OV Detection Voltage vs. Ambient Temperature

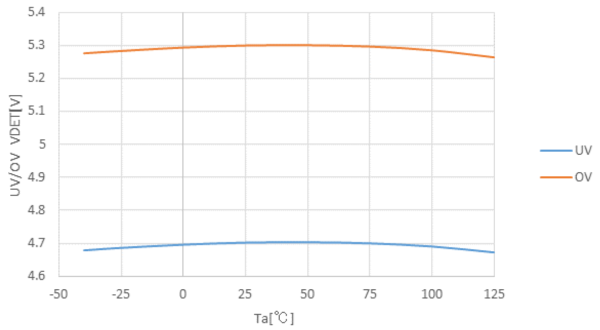
V_{UVSET} = 1.6 V, V_{OVSET} = 2.0 V



V_{UVSET} = 3.0 V, V_{OVSET} = 3.6 V

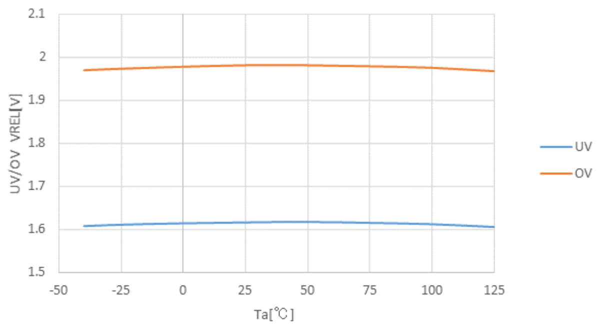


V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V

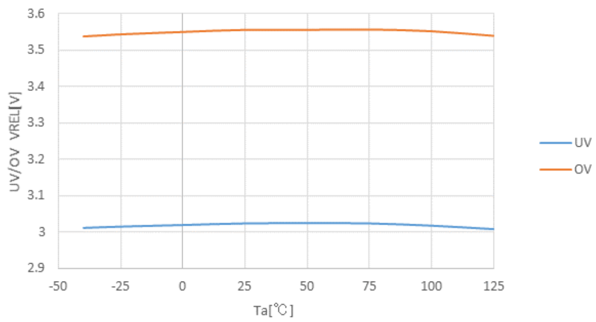


6) UV/OV Release Voltage vs. Ambient Temperature

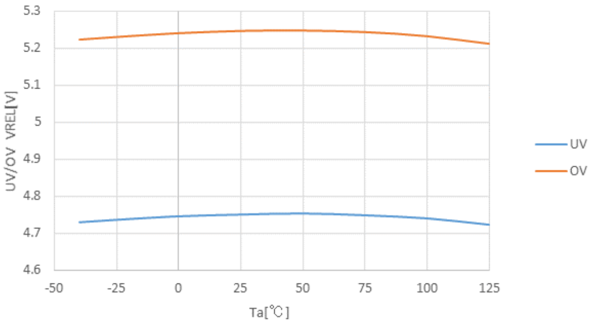
V_{UVSET} = 1.6 V, V_{OVSET} = 2.0 V



V_{UVSET} = 3.0 V, V_{OVSET} = 3.6 V

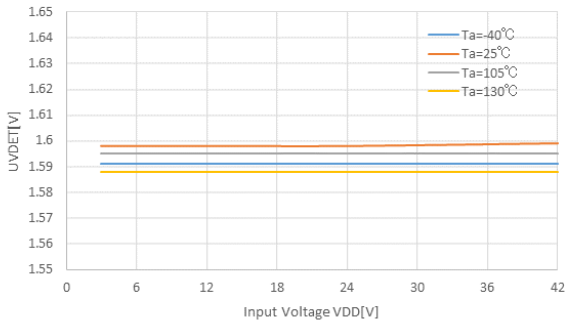


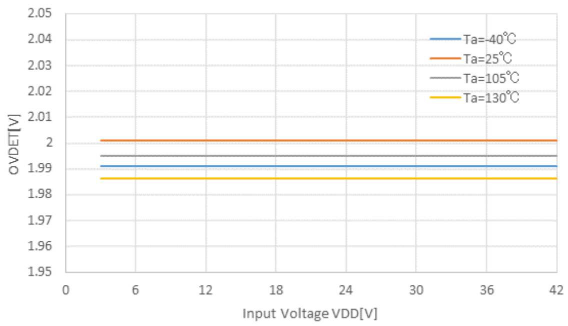
V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V



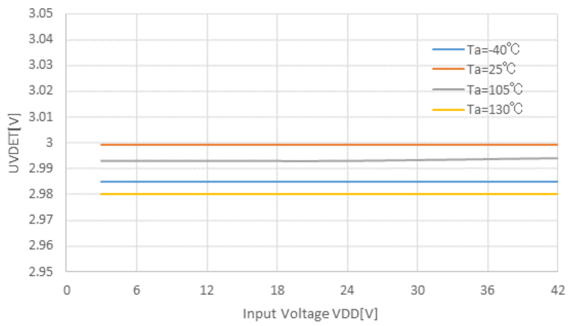
7) UV/OV Detection Voltage vs. V_{DD}

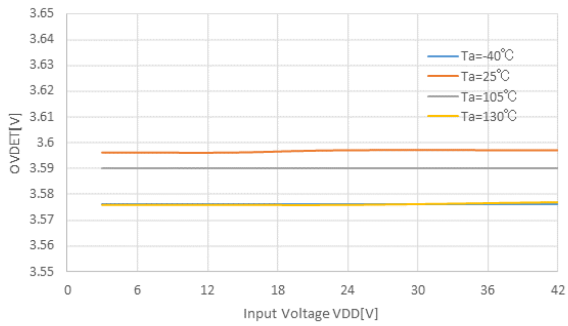
V_{UVSET} = 1.6 V, V_{OVSET} = 2.0 V



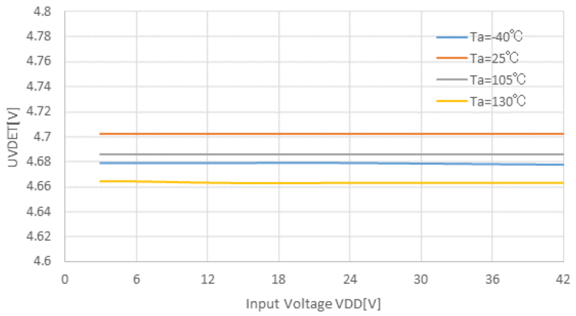


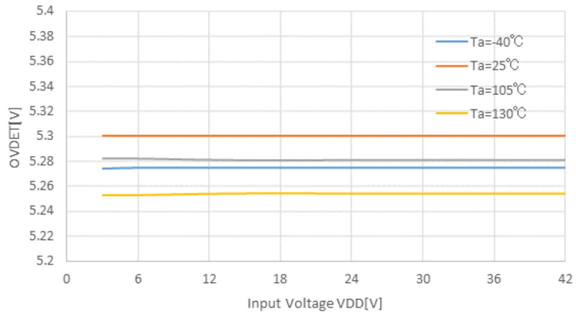
V_{UVSET} = 3.0 V, V_{OVSET} = 3.6 V





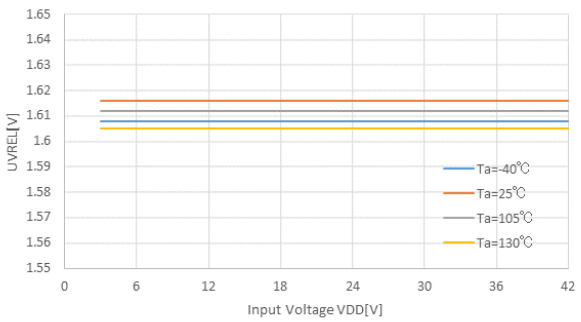
V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V

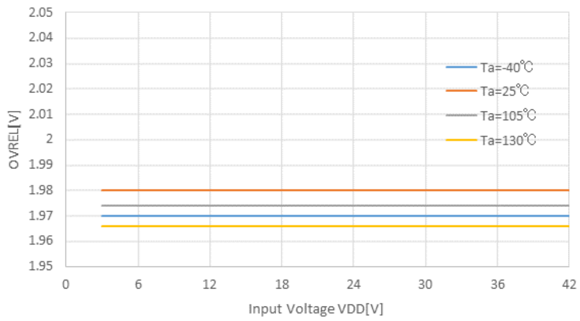




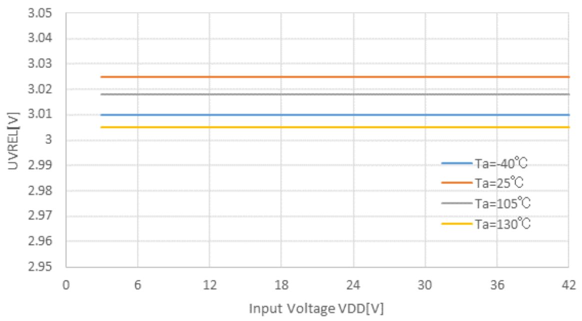
8) UV/OV Release Voltage vs. V_{DD}

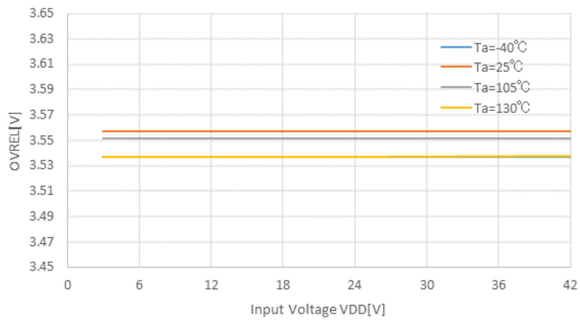
V_{UVSET} = 1.6 V, V_{OVSET} = 2.0 V



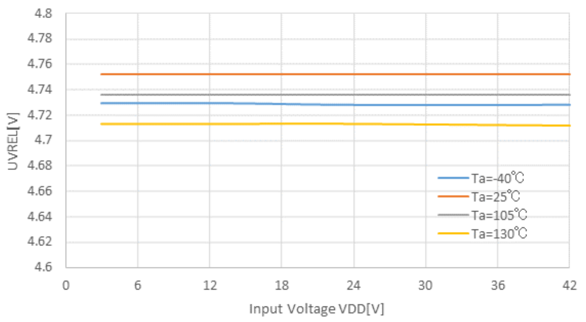


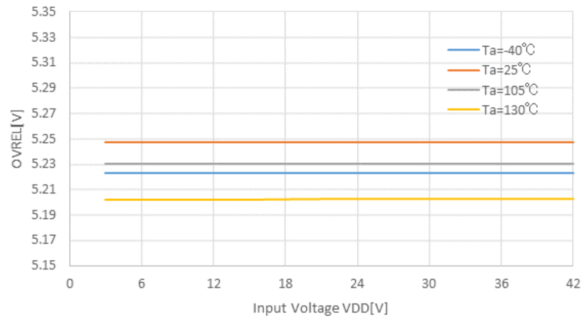
V_{UVSET} = 3.0V, V_{OVSET} = 3.6 V





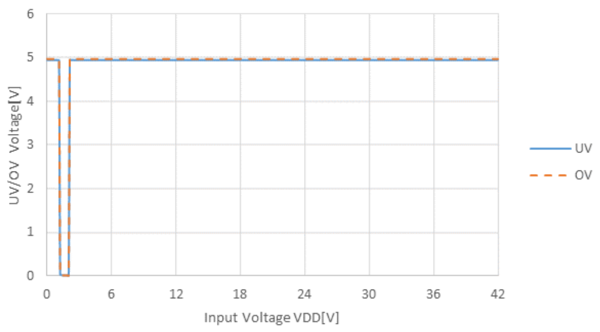
V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V



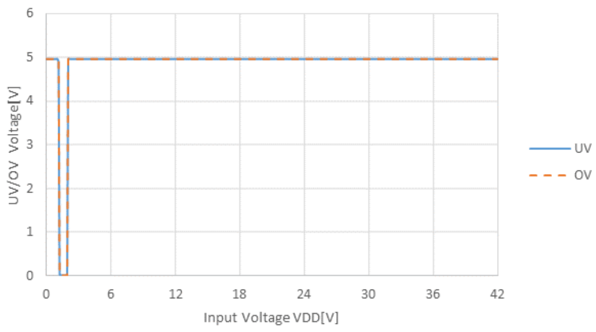


9) UV/OV Voltage vs. V_{DD} (Ta = 25°C)

V_{UVSET} = 1.6 V, V_{OVSET} = 2.0 V

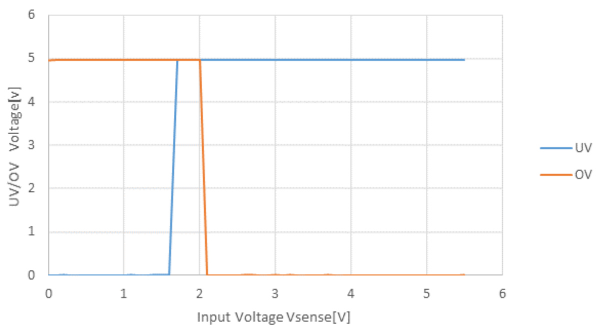


V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V

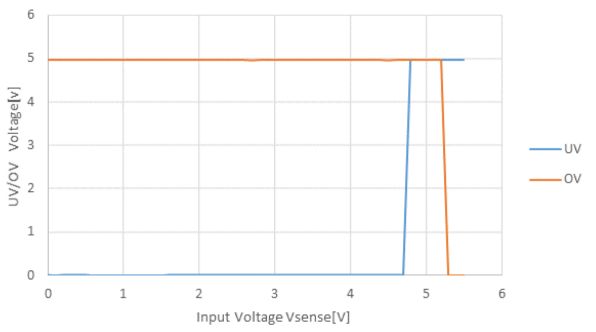


10) UV/OV Voltage vs. V_{SENSE} (Ta = 25°C)

V_{UVSET} = 1.6 V, V_{OVSET} = 2.0 V

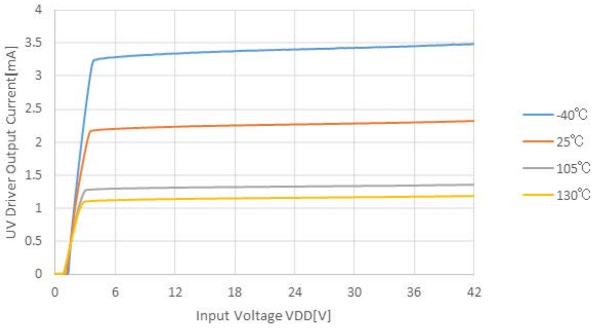


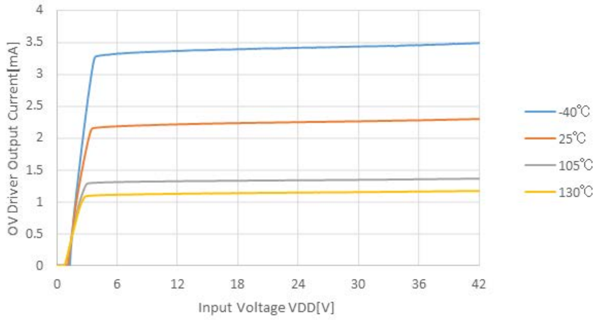
V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V



11) Driver Output Current vs. V_{DD}

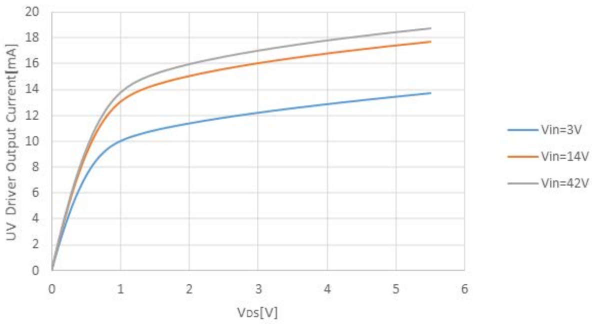
V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V

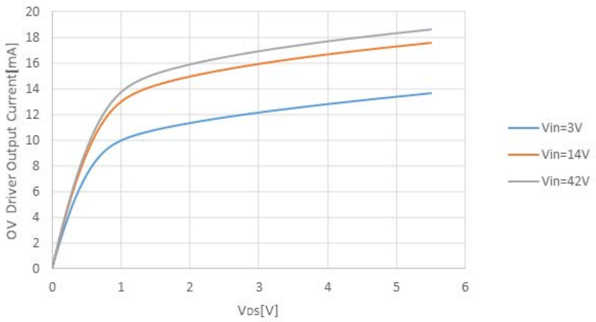




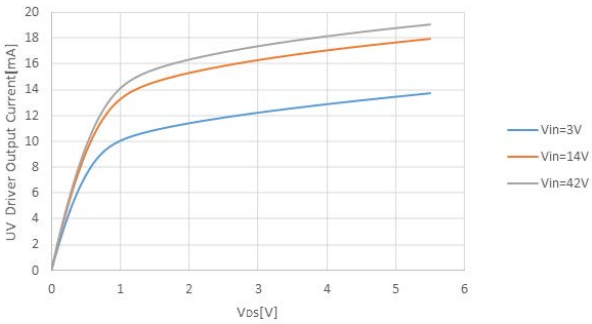
12) Driver Output Current vs. V_{DS} (Ta = 25°C)

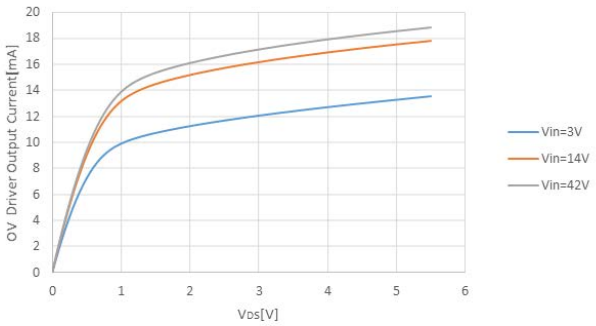
V_{UVSET} = 1.6 V, V_{OVSET} = 2.0 V





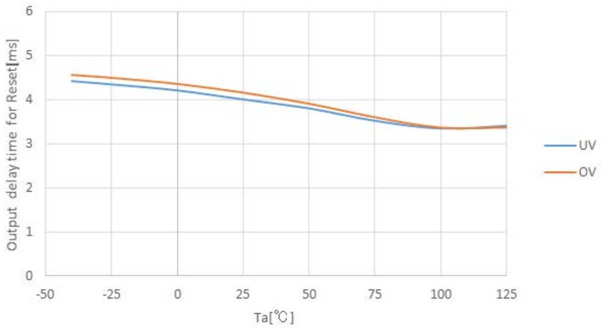
V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V





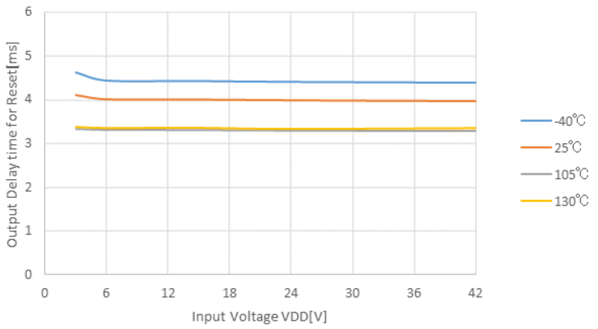
13) Release Delay Time vs. Ambient Temperature

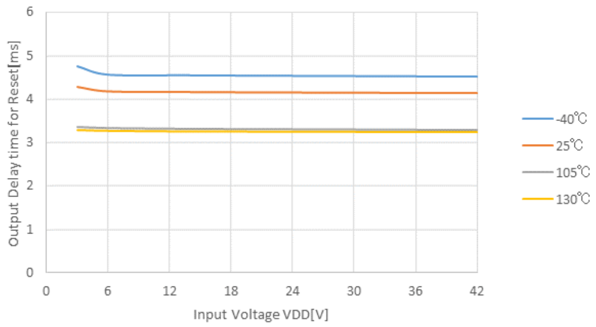
V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V



14) Release Delay Time vs. V_{DD}

V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V

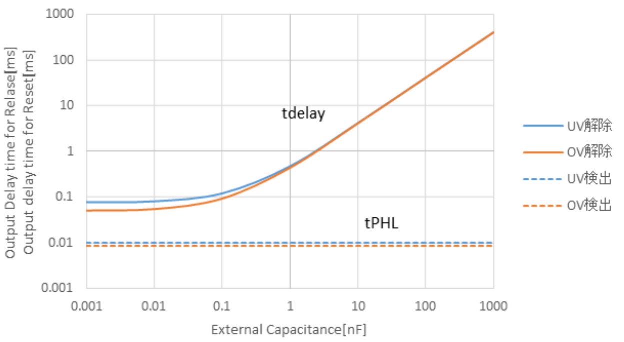




15) Detection / Release Delay Time vs. External Capacitor for CD Pin

(Ta = 25°C)

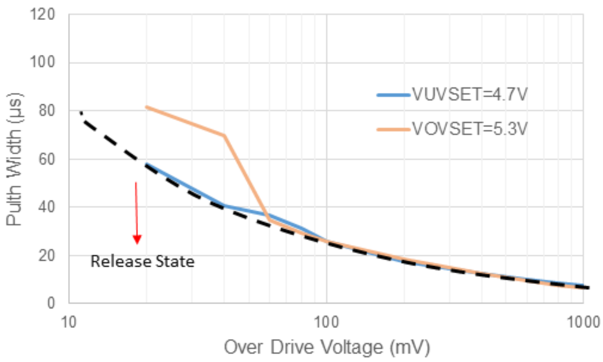
V_{UVSET} = 4.7 V, V_{OVSET} = 5.3 V



16) SENSE Pulse Width vs. Over Drive Voltage

(Ta = 25°C)

Release State Threshold Pulse



Ver. A

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following measurement conditions are based on JEDEC STD. 51-7.

Measurement Conditions

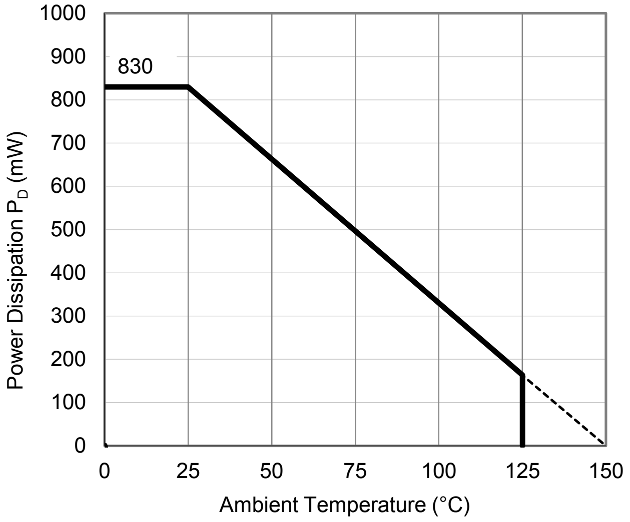
Item	Measurement Conditions
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-Layer Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm
Copper Ratio	Outer Layer (First Layer): Less than 95% of 50 mm Square Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square
Through-holes	ϕ 0.3 mm × 7 pcs

Measurement Result (Ta = 25°C, Tjmax = 150°C)

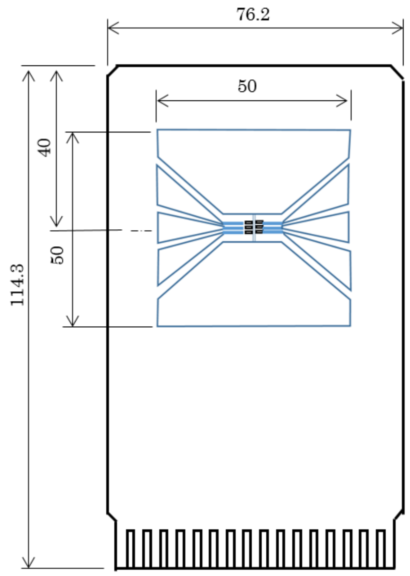
Item	Measurement Result
Power Dissipation	830 mW
Thermal Resistance (θja)	θja = 150°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 51°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



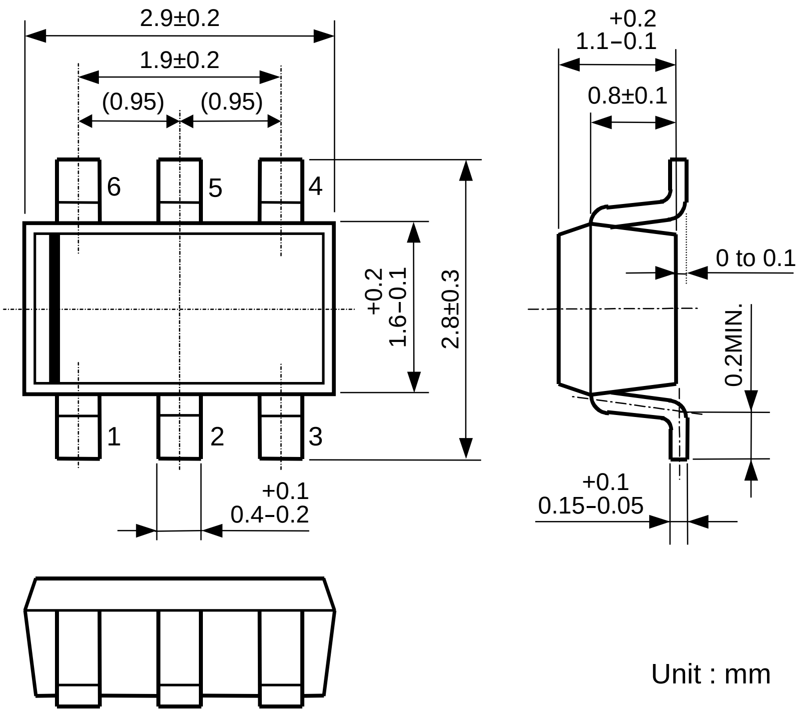
Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

RICOH

Ver. A



SOT-23-6 Package Dimensions

RICOH

RoHS Compliant
Halogen Free

Ricoh is committed to reducing the environmental loading materials in electrical devices with a view to contributing to the protection of human health and the environment.
Ricoh has been providing RoHS compliant products since April 1, 2006 and Halogen-free products since April 1, 2012.

RICOH ELECTRONIC DEVICES CO., LTD.

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