

*Torex...Powerfully Small!*

**125°C Operation Voltage Detector  
with Delay Function, SENSE Pin(76V/Max)  
XC6138 series Product Overview**

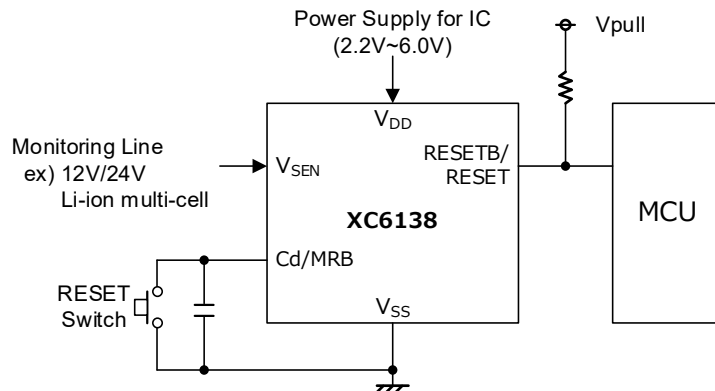
July 2024  
TOREX SEMICONDUCTOR LTD.  
Rev.2.0

$V_{SEN}$  voltage range up-to 76V / Ultra-Low  $I_q$  / Detect and Release voltage can be specified separately

## FEATURES

- Operating Voltage : 2.2V ~ 6.0V (Abs Max : 6.6V)
- $V_{SEN}$  Voltage Range : 0V ~ 76.0V (Surge Voltage: 90.0V,  $\leq 400ms$ )
- Detect Voltage Range : 2.3V ~ 20.0V
- Release Voltage Range : 2.5V ~ 24.0V
- Hysteresis Width : 5% ~ 50% of the detect voltage
- Supply Current :  $V_{DD}$  : 0.5 $\mu A$   
 $V_{SEN}$  : 0.15 $\mu A @ V_{SEN}=12V$
- Detect Voltage Accuracy :  $\pm 1.5\%$  ( $T_a=25^\circ C$ ),  $\pm 3.0\%$  ( $T_a=-40^\circ C \sim 125^\circ C$ )
- Release Voltage Accuracy :  $\pm 1.5\%$  ( $T_a=25^\circ C$ )
- Temperature Characteristics :  $\pm 50ppm/^\circ C$
- Output Type : CMOS, Nch open drain
- Output Logic : "H" level or "L" level at detection
- Delay Time : 10.0ms ( $C_d=0.01\mu F$ )  
 ✕ Selectable delay time ratio
- Packages : SOT-25, DFN1515-6A
- Operating Ambient Temp :  $-40^\circ C \sim 125^\circ C$  ( $T_{jmax}=150^\circ C$ )

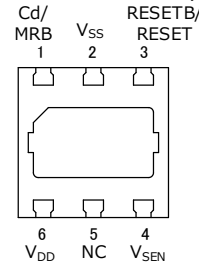
## TYPICAL APPLICATION



## PACKAGE

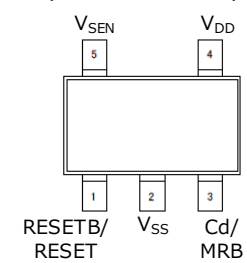
DFN1515-6A

(1.5x1.5x0.38mm)



SOT-25

(2.8x2.9x1.3mm)



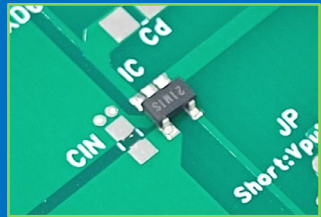
## PRODUCT CLASSIFICATION

Supposed monitored line	Product Number	Output Configuration	Output Logic	Delay Time Ratio (Release : Detect)	Detect Voltage	Release Voltage	Hysteresis		
USB / 5V	XC6138BH7D	CMOS output	Active High	0 : 1.000	5.5V	5.8V	5.5%		
	XC6138NA37	Nch open drain	Active Low	1 : 0.000	4.0V	4.2V	5.0%		
Li-ion 2cell	XC6138NA94	Nch open drain	Active Low	1 : 0.000	6.0V	6.3V	5.0%		
Li-ion 3cell	XC6138NAM1				9.0V	9.5V	5.6%		
Li-ion 4cell	XC6138NAP0				12.0V	13.0V	8.3%		
Li-ion 5cell	XC6138NAPP				15.0V	16.0V	6.7%		
	XC6138NANL				10.0V	10.5V	5.0%		
12V	XC6138NAN0	Nch open drain	Active Low	1 : 0.000	9.5V	10.0V	5.3%		
	XC6138NARJ				7.5V	9.7V	29.3%		
	XC6138NCN0				9.5V	10.0V	5.3%		
	XC6138NCRJ				7.5V	9.7V	29.3%		
	XC6138NAL6	CMOS output	Active Low	1 : 0.000	8.7V	9.2V	5.7%		
	XC6138CAN0				1 : 0.000	9.5V	10.0V	5.3%	
	XC6138CCN0					1 : 0.125	7.5V	9.7V	29.3%
	XC6138CARJ						7.5V	9.7V	29.3%
	XC6138CCRJ				1 : 0.000	7.5V	9.7V	29.3%	
					1 : 0.125	7.5V	9.7V	29.3%	
15V	XC6138NAP0	Nch open drain	Active Low	1 : 0.000	12.0V	13.0V	8.3%		
	XC6138NARZ				10.0V	13.0V	30.0%		
20V	XC6138NAPZ	Nch open drain	Active Low	1 : 0.000	16.0V	17.0V	6.3%		
	XC6138NAPN				14.5V	17.0V	17.2%		
24V	XC6138NAQZ	Nch open drain	Active Low	1 : 0.000	20.0V	21.0V	5.0%		
	XC6138NAQT				19.0V	20.0V	5.3%		
	XC6138NASY				15.5V	20.0V	29.0%		
	XC6138NAQE				17.5V	18.5V	5.7%		
					17.5V	18.5V	5.7%		

Regarding other voltage, please contact our sales representative.

- XC6138 can directly monitor a high supply voltage like 12V/24V lines or multi-cell packs

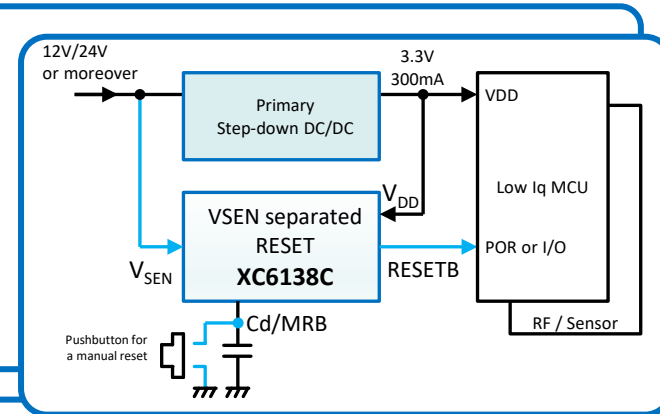
## Voltage Detector with Delay Function, SENSE Pin XC6138



No need for resistor divider circuit

①

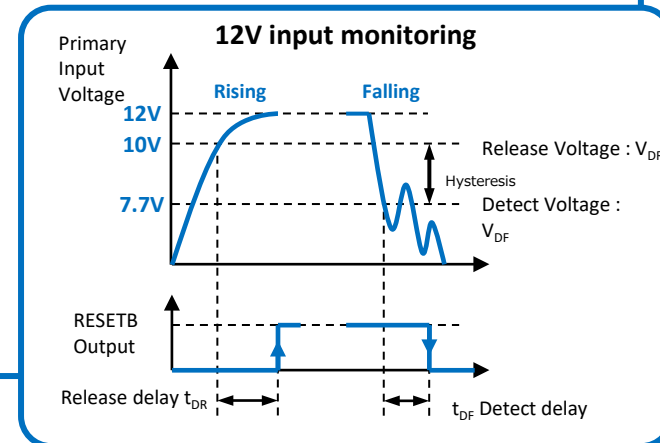
- ① High-voltage direct monitoring
- “No need for resistor divider circuit”**
- ✓ High accuracy
  - ✓ Suitable for general industrial equipment use.
  - ✓ Surge voltage : 90V@400ms



②

- ② Optimum detect/release voltage for each power source
- ✓ An abundant voltage lineup
  - ✓ Voltage combination according to power supply fluctuations.
  - ✓ Detect and Release delay can be specified separately

Combined detect/release voltage for FA/industrial equipment



125°C / 90V of Surge voltage In addition to High accuracy, ultra-low Iq, space saving

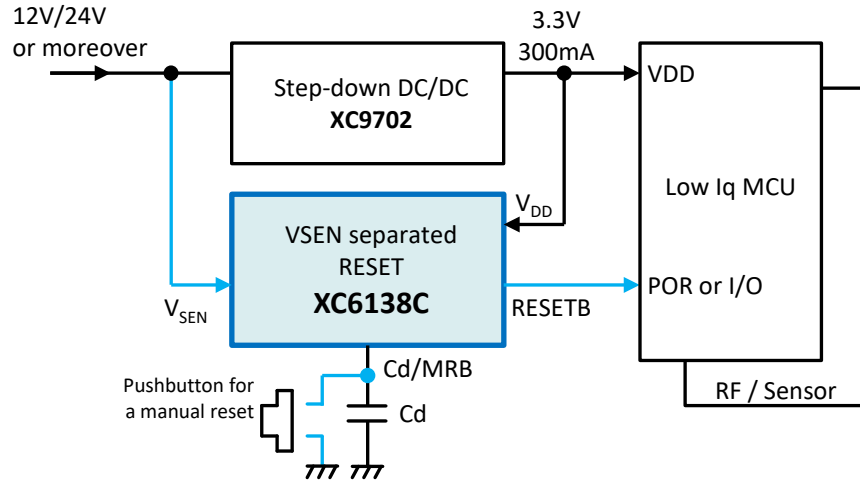
- Suitable for PLC, other FA equipment / sensor

**Wider hysteresis lineup**

- Suitable for Power supply lines with large voltage fluctuations

## ■ Various small products and modules operating at 12V/24V : Industrial Sensors / IoT

### ● XC6138 directly monitors



### Directly monitors without dividing resistor

- High accuracy and current consumption reduction
- Reduced number of external components  
= reduced failure rate, space saving

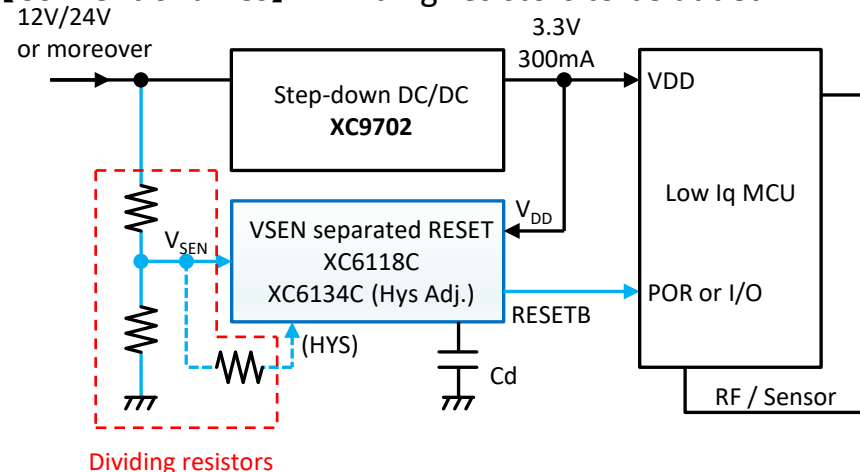
### Wider hysteresis

- Suitable for Power supply lines with large voltage fluctuations
- An abundant voltage lineup  
**(Standard voltage combination)**

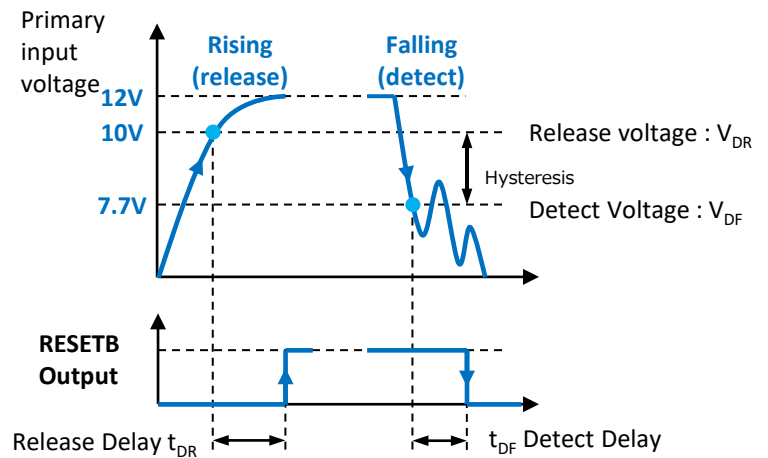
### Detect / Release delay and manual reset function

- Adjustable with an external capacitor to the Cd pin

### 【Conventional ICs】 Dividing resistors to be added



### 12V input monitoring



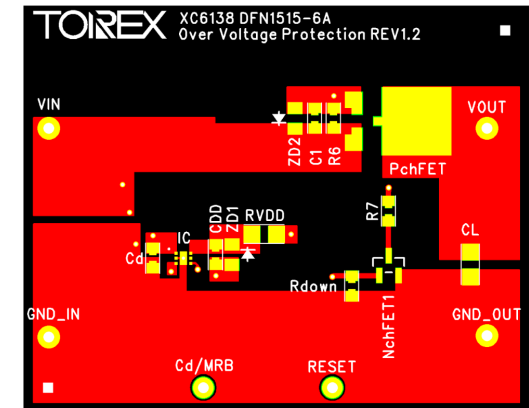
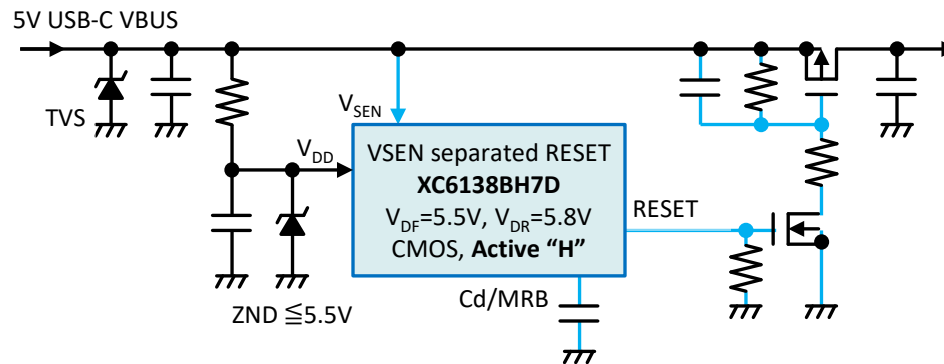
# Application circuit : USB 5V OVP(Overvoltage Protection)

For devices operating at 5V USB, simple protection circuits are provided against overshooting of low-cost USB power adapters and high voltages input of USB-PD.

## ■ USB overvoltage protection circuit

### ● OVP (Overvoltage Protection) circuit for 5V USB input

- ✓ 5V OFF at  $V_{IN}=5.8V$ , 5V ON at  $V_{IN}=5.5V$
- ✓ TVS and each FET are selected according to the maximum input voltage.



Block	Product	Features
RESET IC	<a href="#">XC6138</a>	High Voltage Sense pin: 76V, Ultra-low Iq $V_{DD}$ : 0.5 $\mu$ A $V_{SEN}$ : 0.15 $\mu$ A, Detect/Release Delay adj, Hysteresis: selectable
	<a href="#">XC6118</a> / <a href="#">XC6134</a>	Separated Sense pin, Delay adj. Hysteresis adj. (XC6134)

## List of function combinations for standard part numbers

Supposed monitored line	Part Number	Output Configuration	Output Logic	Delay Time Ratio ※1 (Release : Detect)	Detect Voltage	Release Voltage	Hysteresis	Note
USB / 5V	XC6138BH7D	CMOS output	Active High	0 : 1.000	5.5V	5.8V	5.5%	5V Over voltage protection (OVP)
	XC6138NA37	Nch open drain	Active Low	1 : 0.000	4.0V	4.2V	5.0%	5V voltage drop detection
Li-ion 2cell	XC6138NA94	Nch open drain	Active Low	1 : 0.000	6.0V	6.3V	5.0%	Li-ion 2cell lower limit detection (3.0V/cell)
Li-ion 3cell	XC6138NAM1				9.0V	9.5V	5.6%	Li-ion 3cell lower limit detection (3.0V/cell)
Li-ion 4cell	XC6138NAP0				12.0V	13.0V	8.3%	Li-ion 4cell lower limit detection (3.0V/cell)
Li-ion 5cell	XC6138NAPP				15.0V	16.0V	6.7%	Li-ion 5cell lower limit detection (3.0V/cell)
	XC6138NANL				10.0V	10.5V	5.0%	12V voltage drop detection
12V	XC6138NAN0	Nch open drain	Active Low	1 : 0.000	9.5V	10.0V	5.3%	12V voltage drop detection
	XC6138NARJ				7.5V	9.7V	29.3% ※2	Release at 12V × 80%, wide hysteresis
	XC6138NCN0				9.5V	10.0V	5.3%	12V voltage drop detection
	XC6138NCRJ	CMOS output	Active Low	1 : 0.125	7.5V	9.7V	29.3% ※2	Release at 12V × 80%, wide hysteresis
	XC6138NAL6			1 : 0.000	8.7V	9.2V	5.7%	Release at 12V × 77%
	XC6138CAN0			1 : 0.000	9.5V	10.0V	5.3%	12V voltage drop detection
	XC6138CCN0			1 : 0.125				
	XC6138CARJ			1 : 0.000	7.5V	9.7V	29.3% ※2	Release at 12V × 80%, wide hysteresis
	XC6138CCRJ			1 : 0.125				
15V	XC6138NAP0	Nch open drain	Active Low	1 : 0.000	12.0V	13.0V	8.3%	15V voltage drop detection
	XC6138NARZ				10.0V	13.0V	30.0% ※2	15V voltage drop detection, wide hysteresis
20V	XC6138NAPZ	Nch open drain	Active Low	1 : 0.000	16.0V	17.0V	6.3%	20V voltage drop detection
	XC6138NAPN				14.5V	17.0V	17.2% ※2	20V voltage drop detection, wide hysteresis
24V	XC6138NAQZ	Nch open drain	Active Low	1 : 0.000	20.0V	21.0V	5.0%	24V voltage drop detection
	XC6138NAQT				19.0V	20.0V	5.3%	24V voltage drop detection
	XC6138NASY				15.5V	20.0V	29.0% ※2	24V voltage drop detection, wide hysteresis
	XC6138NAQE				17.5V	18.5V	5.7%	Release at 24V × 77%

※1 This product provides a release/detect delay with a single external capacitance on Cd pin.  
The ratio shown is the ratio of release : detection delay time, and 0 means no delay.

※2 Part numbers with wide hysteresis are suitable when the impedance of the power supply line is large or when voltage fluctuations are large due to motor drive, etc.