◆ CMOS
◆ Highly Accurate : ±2%
◆ Low Power Consumption : 0.7μA (V IN = 1.5V)
◆ Ultra small SSOT-24 (SC-82) Package

■ Applications
● Microprocessor reset circuitry
● Memory battery back-up circuits
● Power-on reset circuits
● Power failure detection
● System battery life and charge voltage monitors

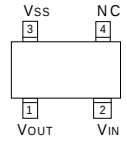
■ General Description

The XC61C series are highly precise, low power consumption voltage detectors, manufactured using CMOS and laser trimming technologies. Detect voltage is extremely accurate with minimal temperature drift.
Both CMOS and N channel open drain output configurations are available.

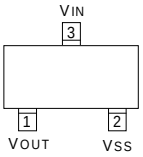
■ Features

Highly accurate : ±2%
Low power consumption : TYP 0.7μA [VIN=1.5V]
Detect voltage range : 1.6V to 6.0V in 0.1V increments
Operating voltage range : 0.7V to 10.0V
Detect voltage temperature characteristics : TYP± 100ppm/°C
Output configuration : N-channel open drain or CMOS
Ultra small package : SSOT-24 (150mW) super mini-mold
: SOT-23 (150mW) mini-mold
: SOT-89 (500mW) mini-power mold
Note : There are no products available with a set-up voltage accuracy of ± 1%.

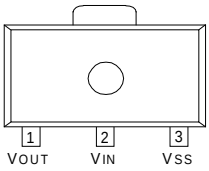
■ Pin Configuration



SSOT-24(SC-82)
(TOP VIEW)



SOT-23
(TOP VIEW)



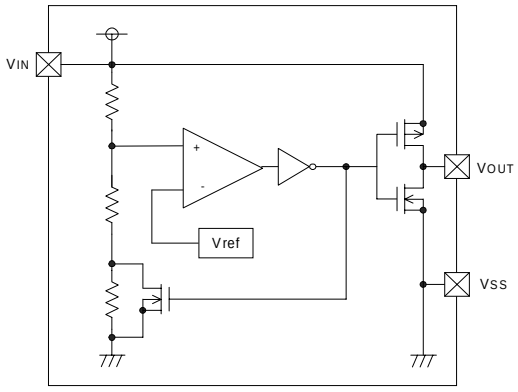
SOT-89
(TOP VIEW)

■ Pin Assignment

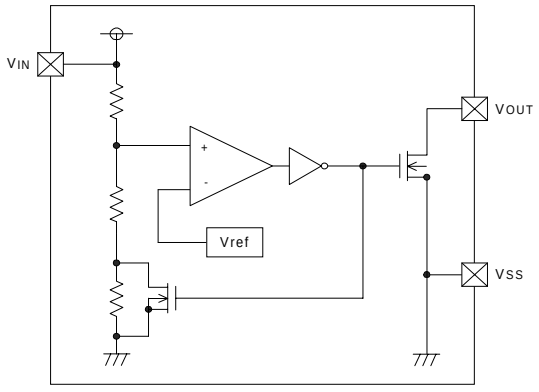
PIN NUMBER			PIN	FUNCTION
SSOT-24	SOT-23	SOT-89	NAME	
2	3	2	VIN	Supply Voltage Input
4	2	3	VSS	Ground
1	1	1	VOUT	Output
3	-	-	NC	No Connection

■ Block Diagram

(1) CMOS Output



(2) Nch Open Drain Output



■ Absolute Maximum Ratings

Ta = 25°C

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		VIN	12	V
Output Current		IOUT	50	mA
Output Voltage	CMOS	VOUT	VSS -0.3 to VIN +0.3	V
	Nch open drain		VSS -0.3 to 12	
Power Dissipation	SSOT-24	Pd	150	mW
	SOT-23		150	
	SOT-89		500	
Operating Ambient Temperature		Topr	-40 to +85	°C
Storage Temperature		Tstg	-40 to +125	°C

■ Electrical Characteristics

VDF (T) = 1.6 to 6.0V ± 2%　　Ta = 25°C

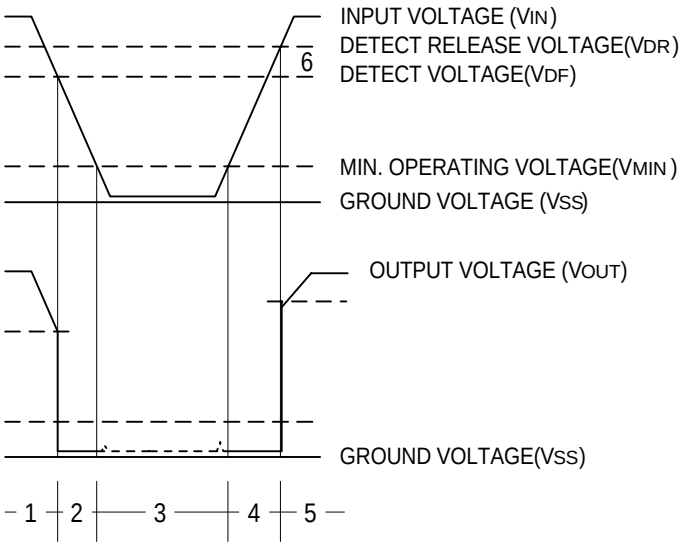
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Detect Voltage	VDF		VDF x 0.98	VDF	VDF x 1.02	V	1
Hysteresis Range	VHYS		VDF x 0.02	VDF x 0.05	VDF x 0.08	V	1
Supply Current	ISS	VIN =1.5V		0.7	2.3	µA	2
		=2.0V		0.8	2.7		
		=3.0V		0.9	3.0		
		=4.0V		1.0	3.2		
		=5.0V		1.1	3.6		
Operating Voltage	VIN	VDF(T) = 1.6V to 6.0V	0.7		10.0	V	1
Output Current	IOUT	Nch VDS=0.5V VIN=1.0V	1.0	2.2		mA	3
		=2.0V	3.0	7.7			
		=3.0V	5.0	10.1			
		=4.0V	6.0	11.5			
		=5.0V	7.0	13.0			
		Pch VDS=2.1V VIN=8.0V (with CMOS output)		-10.0	-2.0		4
Temperature Characteristics	$\frac{\Delta VDF}{\Delta Topr \cdot VDF}$	-40°C ≤ Topr ≤ 85°C		±100		ppm/°C	-
Delay Time (VDR→VOUT inversion)	tDLY				0.2	ms	5

Note :
VDF (T) : Established Detect Voltage Value
Release Voltage : VDR = VDF + VHYS

■ Functional Description (CMOS output)

1. When input voltage (VIN) rises above detect voltage (VDF), output voltage (VOUT) will be equal to VIN. (A condition of high impedance exists with Nch open drain output configurations.)
2. When input voltage (VIN) falls below detect voltage (VDF), output voltage (VOUT) will be equal to the ground voltage (VSS) level.
3. When input voltage (VIN) falls to a level below that of the minimum operating voltage (VMIN), output will become unstable. In this condition, VIN will equal the pulled-up output (should output be pulled-up.)
4. When input voltage (VIN) rises above the ground voltage (VSS) level, output will be unstable at levels below the minimum operating voltage (VMIN). Between the VMIN and detect release voltage (VDR) levels, the ground voltage (VSS) level will be maintained.
5. When input voltage (VIN) rises above detect release voltage (VDR), output voltage (VOUT) will be equal to VIN. (A condition of high impedance exists with Nch open drain output configurations.)
6. The difference between VDR and VDF represents the hysteresis range.

■ Timing Chart

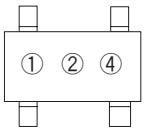


■ Ordering Information

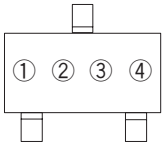
XC61C xx x x x x x
a b c d e f

DESIGNATOR	DESCRIPTION	DESIGNATOR	DESCRIPTION
a	Output Configuration : C = CMOS N = Nch open drain	e	Package Type N = SSOT-24 (SC-82) M = SOT-23 P = SOT-89 T = TO-92
b	Detect Voltage : 25 = 2.5V 38 = 3.8V		
c	Output Delay : 0 = No delay	f	Device Orientation : R = Embossed Tape (Right) L = Embossed Tape (Left) H = Paper Type (TO-92) B = Bag (TO-92)
d	Detect Accuracy : 2 = within ±2.0%		

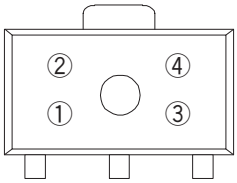
■ Marking



SSOT-24(SC-82)
(TOP VIEW)



SOT - 23
(TOP VIEW)



SOT - 89
(TOP VIEW)

① Represents the integer of the Output Voltage and Detect Voltage

DESIGNATOR	CONFIGURATION	VOLTAGE (V)
A	CMOS	0.②
B	CMOS	1.②
C	CMOS	2.②
D	CMOS	3.②
E	CMOS	4.②
F	CMOS	5.②
H	CMOS	6.②

DESIGNATOR	CONFIGURATION	VOLTAGE (V)
K	Nch	0.②
L	Nch	1.②
M	Nch	2.②
N	Nch	3.②
P	Nch	4.②
R	Nch	5.②
S	Nch	6.②

② Represents the decimal point of the Detect Voltage

DESIGNATOR	VOLTAGE	DESIGNATOR	VOLTAGE
0	①.0	5	①.5
1	①.1	6	①.6
2	①.2	7	①.7
3	①.3	8	①.8
4	①.4	9	①.9

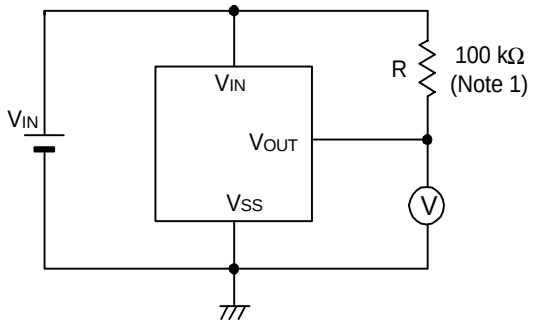
③ Based on Internal Standards
(SSOT-24 excepted)

DESIGNATOR
3

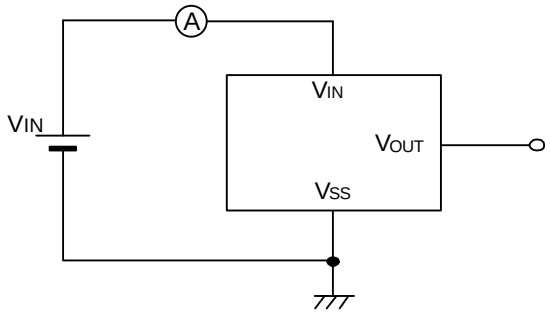
④ Represents the assembly lot no.
Based on internal standards

■ Measuring Circuits

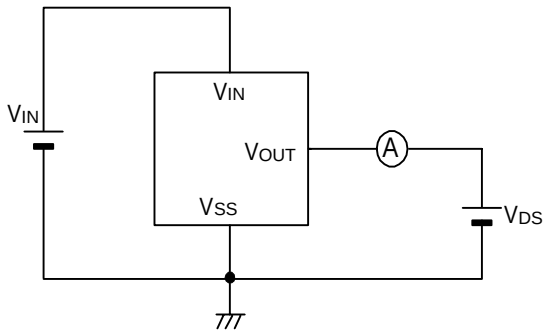
Circuit 1



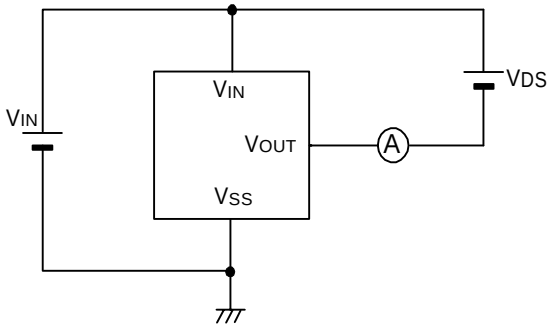
Circuit 2



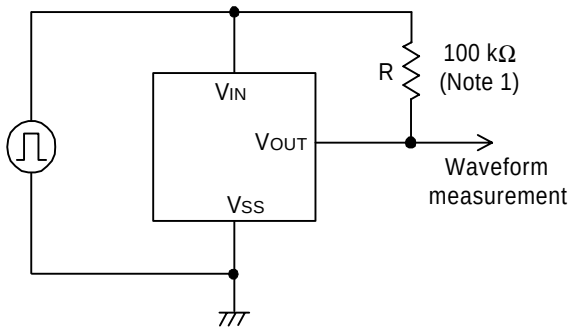
Circuit 3



Circuit 4



Circuit 5



Note 1 : Not necessary with CMOS output products.

■ Notes on Use

1. When a resistor is connected between the VIN pin and the input with CMOS output configurations, oscillation may occur as a result of voltage drops at RIN if load current (IOUT) exists. (refer to N.B. 1 - (1) below)
2. When a resistor is connected between the VIN pin and the input with CMOS output configurations, irrespective of Nch output configurations, oscillation may occur as a result of through current at the time of voltage release even if load current (IOUT) does not exist. (refer to N.B. 1 - (2) below)
3. With a resistor connected between the VIN pin and the input, detect and release voltage will rise as a result of the IC's supply current flowing through the VIN pin.
4. In order to stabilise the IC's operations, please ensure that VIN pin's input frequency's rise and fall times are more than several μ sec / V.

■ N.B.

1. Oscillation

(1) Output current oscillation with the CMOS output configuration

When the voltage applied at IN rises, release operations commence and the detector's output voltage increases. Load current (IOUT) will flow at RL. Because a voltage drop (RIN x IOUT) is produced at the RIN resistor, located between the input (IN) and the VIN pin, the load current will flow via the IC's VIN pin. The voltage drop will also lead to a fall in the voltage level at the VIN pin. When the VIN pin voltage level falls below the detect voltage level, detect operations will commence. Following detect operations, load current flow will cease and since voltage drop at RIN will disappear, the voltage level at the VIN pin will rise and release operations will begin over again.

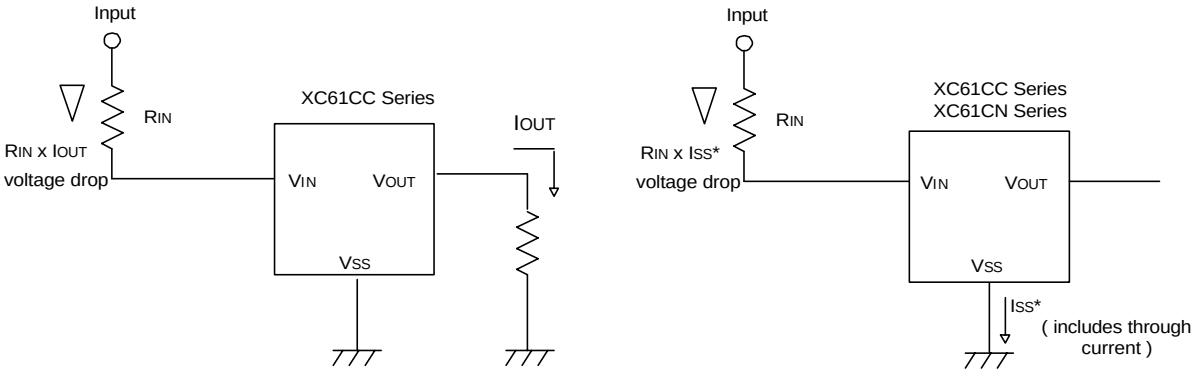
Oscillation may occur with this " release - detect - release " repetition.

Further, this condition will also appear via means of a similar mechanism during detect operations.

(2) Oscillation as a result of through current

Since the XC61C series are CMOS ICs, through current will flow when the IC's internal circuit switching operates (during release and detect operations). Consequently, oscillation is liable to occur as a result of drops in voltage at the through current's resistor (RIN) during release voltage operations. (refer to diagram 2)

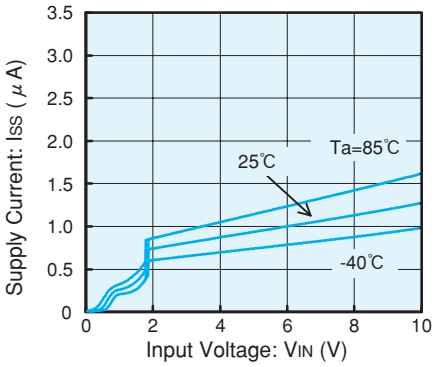
Since hysteresis exists during detect operations, oscillation is unlikely to occur.



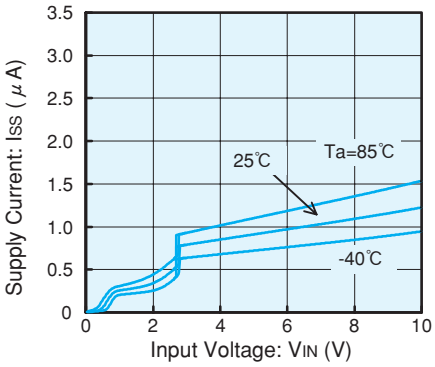
■ Electrical Characteristics

(1) SUPPLY CURRENT vs. INPUT VOLTAGE

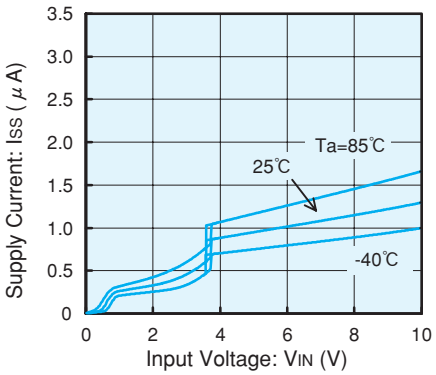
XC61CC1802 (1.8V)



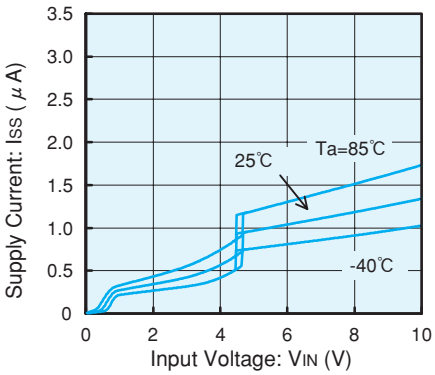
XC61CC2702 (2.7V)



XC61CC3602 (3.6V)

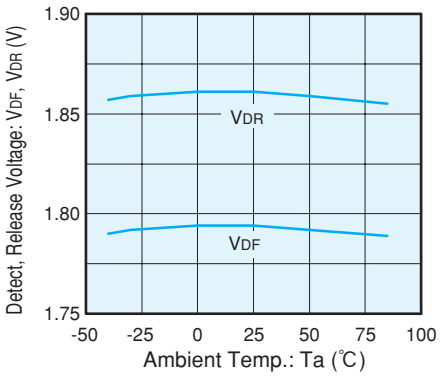


XC61CC4502 (4.5V)

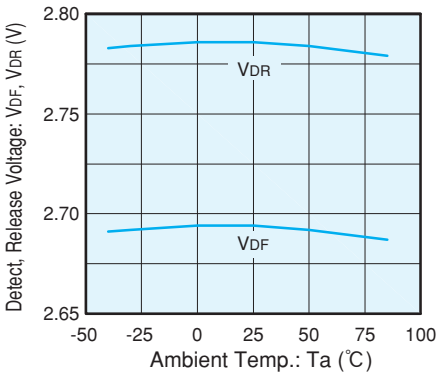


(2) DETECT, RELEASE VOLTAGE vs. AMBIENT TEMP.

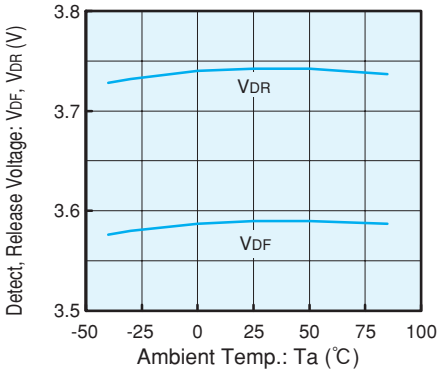
XC61CC1802 (1.8V)



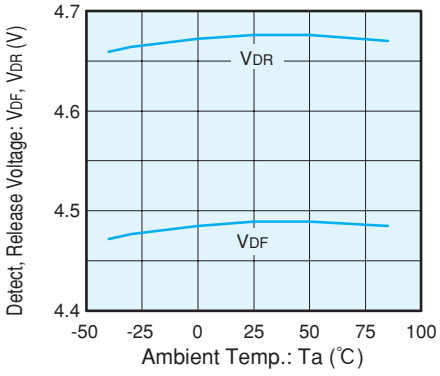
XC61CC2702 (2.7V)



XC61CC3602 (3.6V)

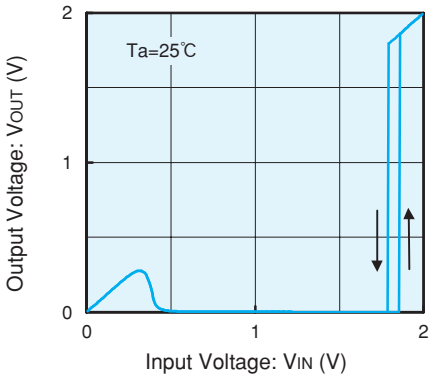


XC61CC4502 (4.5V)

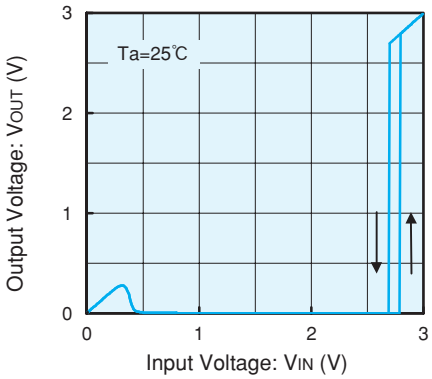


(3) OUTPUT VOLTAGE vs. INPUT VOLTAGE

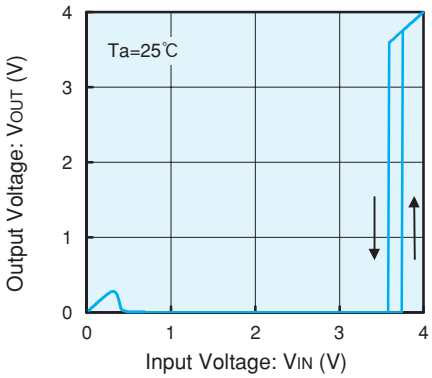
XC61CN1802 (1.8V)



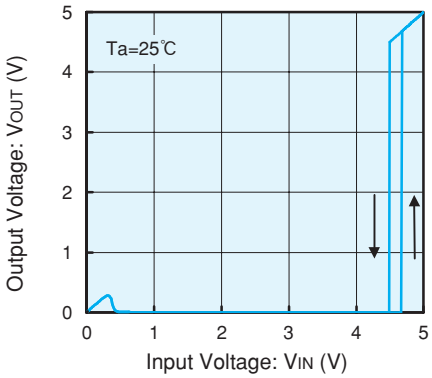
XC61CN2702 (2.7V)



XC61CN3602 (3.6V)



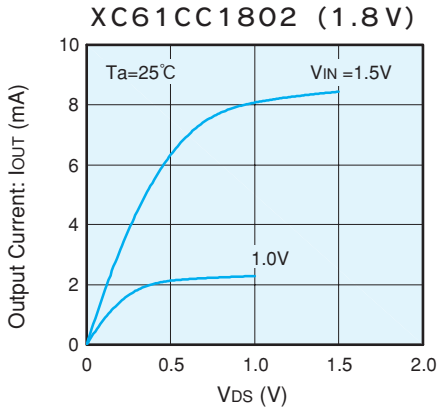
XC61CN4502 (4.5V)



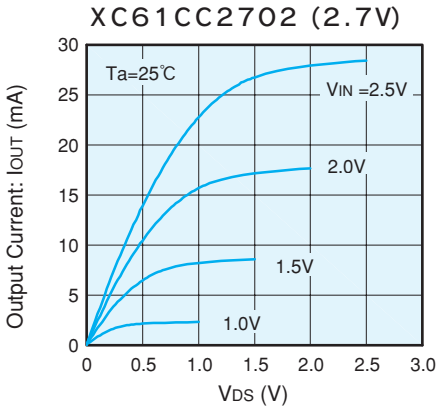
Note : The N-channel open drain pull up resistance value is 100kΩ.

(4) Nch DRIVER OUTPUT CURRENT vs. VDS

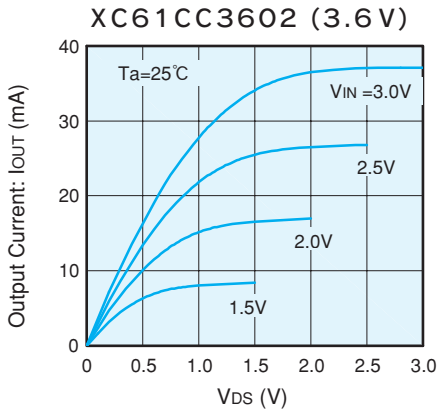
XC61CC1802 (1.8V)



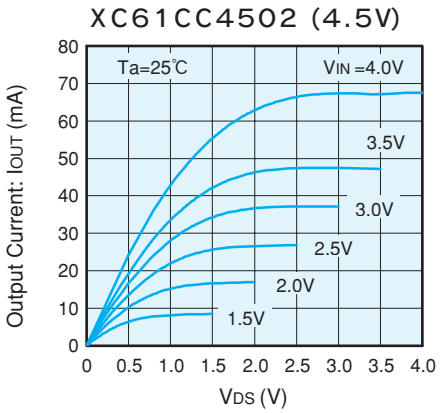
XC61CC2702 (2.7V)



XC61CC3602 (3.6V)

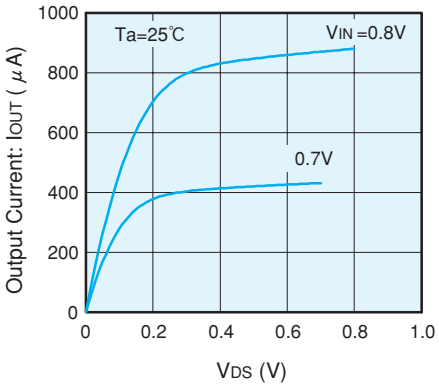


XC61CC4502 (4.5V)

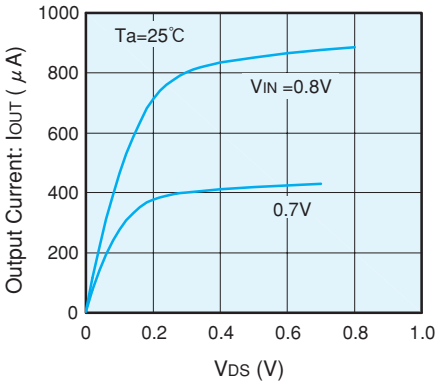


(4) Nch DRIVER OUTPUT CURRENT vs. VDS(contd.)

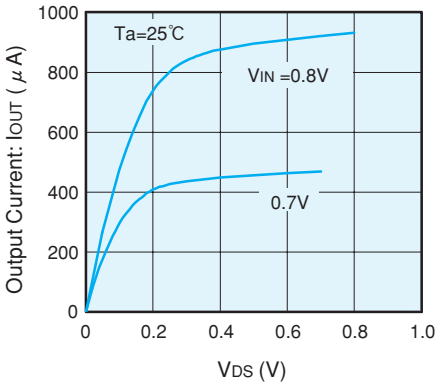
XC61CC1802 (1.8V)



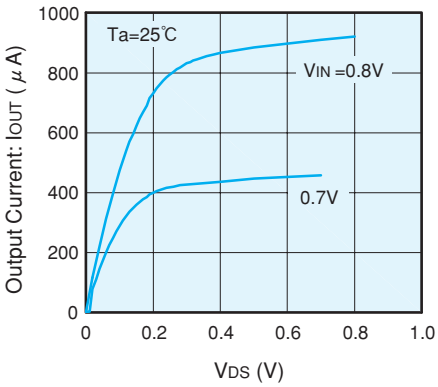
XC61CC2702 (2.7V)



XC61CC3602 (3.6V)

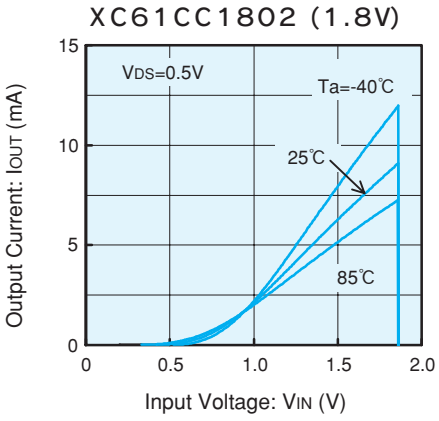


XC61CC4502 (4.5V)

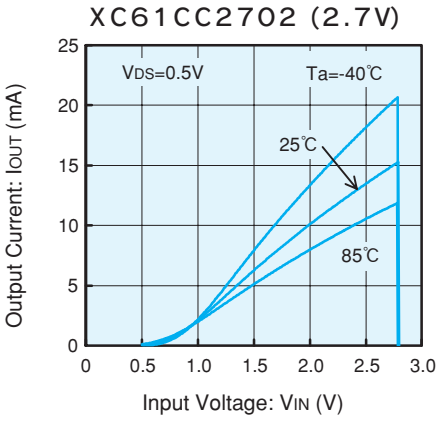


(5) Nch DRIVER OUTPUT CURRENT vs. INPUT VOLTAGE

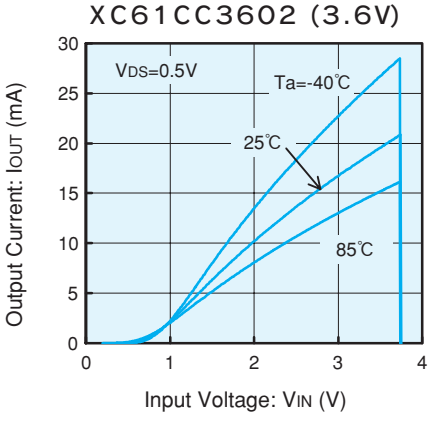
XC61CC1802 (1.8V)



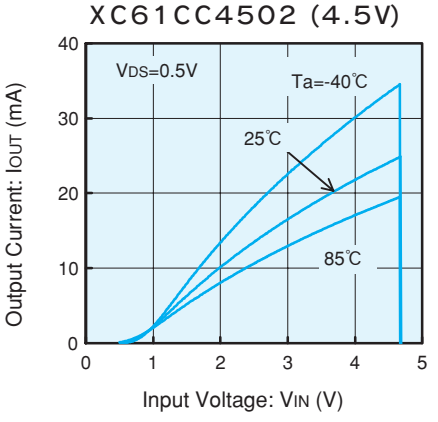
XC61CC2702 (2.7V)



XC61CC3602 (3.6V)

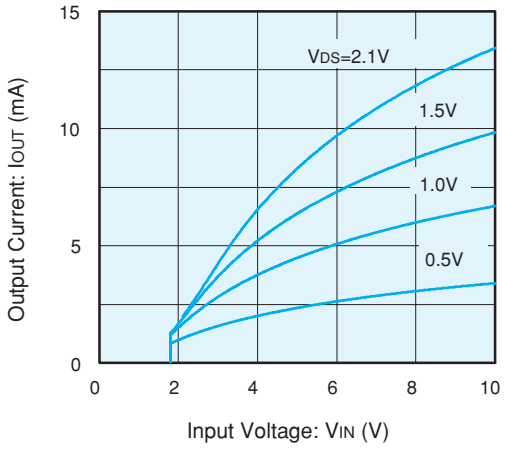


XC61CC4502 (4.5V)

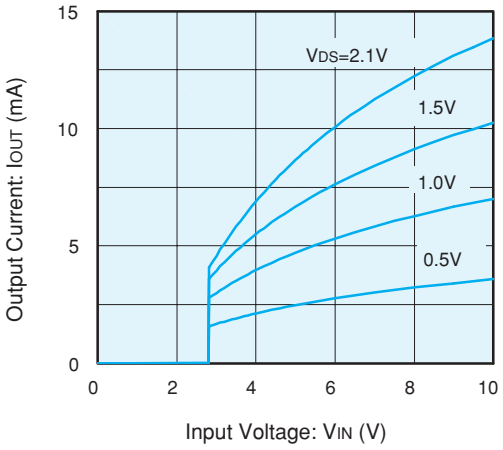


(6) Pch DRIVER OUTPUT CURRENT vs. INPUT VOLTAGE

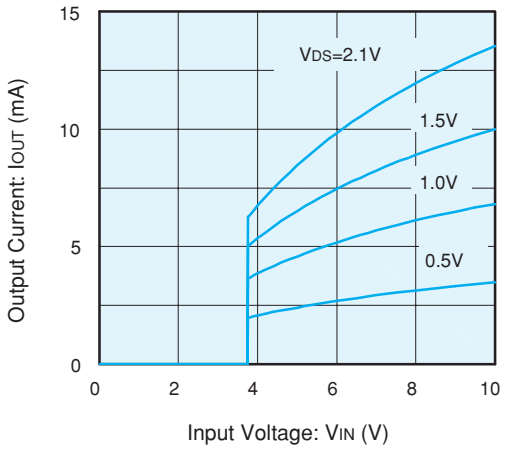
XC61CC1802 (1.8V)



XC61CC2702 (2.7V)



XC61CC3602 (3.6V)



XC61CC4502 (4.5V)