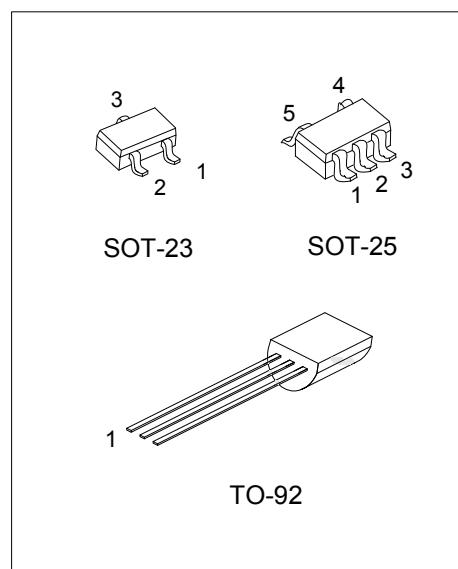


**82CXX****CMOS IC****VOLTAGE DETECTORS****DESCRIPTION**

The UTC **82CXX** series are good performance 3-terminals voltage detectors and manufactured by CMOS technologies with highly accurate, low power consumption. The detection voltage is extremely accurate with minimal temperature drift.

**FEATURES**

- \*High-accuracy detection voltage :  $\pm 2\%$
- \*Detect voltage range : 0.9V to 6.2V in 0.1V increments
- \*Detect voltage temperature characteristics: TYP.  $\pm 100\text{ppm}/^\circ\text{C}$ .
- \*Wide operating voltage range : 0.7V to 10.0V
- \*Low current consumption : TYP 0.7 $\mu\text{A}$ (at  $V_{\text{IN}}=1.5\text{V}$ )

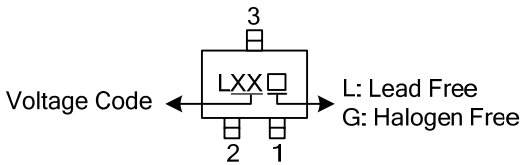
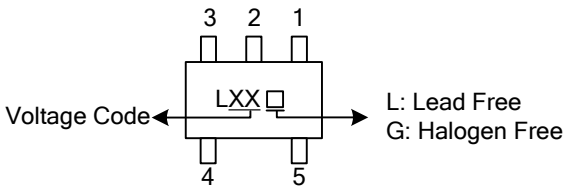
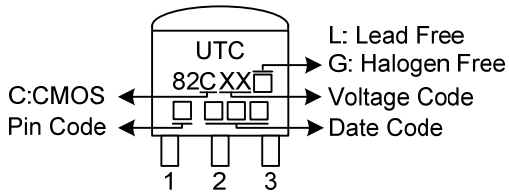
**ORDERING INFORMATION**

| Ordering Number |                | Package | Pin Assignment |   |   |   |   | Packing   |
|-----------------|----------------|---------|----------------|---|---|---|---|-----------|
| Lead Free       | Halogen-Free   |         | 1              | 2 | 3 | 4 | 5 |           |
| 82CxxL-AE3-5-R  | 82CxxG-AE3-5-R | SOT-23  | G              | O | I | - | - | Tape Reel |
| 82CxxL-AF5-R    | 82CxxG-AF5-R   | SOT-25  | O              | I | G | N | N | Tape Reel |
| 82CxxL-T92-D-B  | 82CxxG-T92-D-B | TO-92   | I              | G | O | - | - | Tape Box  |
| 82CxxL-T92-D-K  | 82CxxG-T92-D-K | TO-92   | I              | G | O | - | - | Bulk      |

Note: 1. Pin assignment: I:  $V_{\text{IN}}$  O:  $V_{\text{OUT}}$  G:  $V_{\text{SS}}$  N: NC  
2.xx: Output Voltage, refer to Marking Information

|  |                         |                                          |
|--|-------------------------|------------------------------------------|
|  | (1) Packing Type        | (1) B: Tape Box, K: Bulk, R: Tape Reel   |
|  | (2) Pin Assignment      | (2) refer to Pin Assignment              |
|  | (3) Package Type        | (3) AE3: SOT-23, AF5: SOT-25, T92: TO-92 |
|  | (4) Lead Plating        | (4) G: Halogen Free, L: Lead Free        |
|  | (5) Output Voltage Code | (5) xx: refer to Marking Information     |

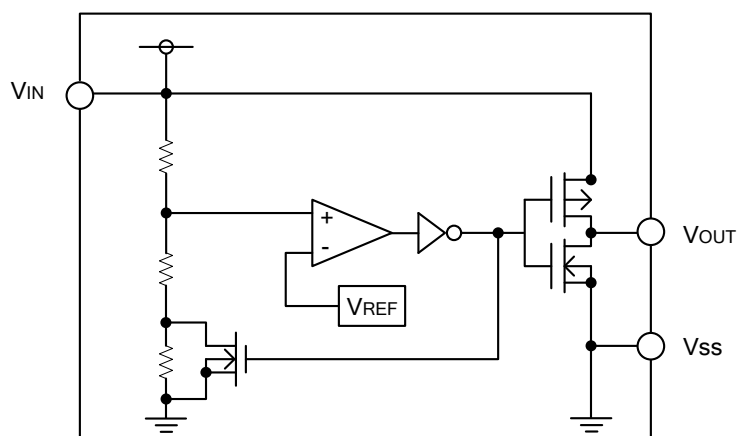
# ■ MARKING INFORMATION

| PACKAGE | VOLTAGE CODE |         | MARKING                                                                                                                                                                                                                                      |
|---------|--------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SOT-23  | 09:0.9V      | 35:3.5V |  <p>Voltage Code ← LXX □ → L: Lead Free<br/>G: Halogen Free</p> <p>Pin 3 is at the top, Pin 2 is at the bottom left, and Pin 1 is at the bottom right.</p> |
|         | 10:1.0V      | 36:3.6V |                                                                                                                                                                                                                                              |
|         | 11:1.1V      | 37:3.7V |                                                                                                                                                                                                                                              |
|         | 12:1.2V      | 38:3.8V |                                                                                                                                                                                                                                              |
|         | 13:1.3V      | 39:3.9V |                                                                                                                                                                                                                                              |
|         | 14:1.4V      | 40:4.0V |                                                                                                                                                                                                                                              |
|         | 15:1.5V      | 41:4.1V |                                                                                                                                                                                                                                              |
|         | 16:1.6V      | 42:4.2V |                                                                                                                                                                                                                                              |
|         | 17:1.7V      | 43:4.3V |                                                                                                                                                                                                                                              |
|         | 18:1.8V      | 44:4.4V |                                                                                                                                                                                                                                              |
|         | 19:1.9V      | 45:4.5V |                                                                                                                                                                                                                                              |
|         | 20:2.0V      | 46:4.6V |                                                                                                                                                                                                                                              |
|         | 21:2.1V      | 47:4.7V |                                                                                                                                                                                                                                              |
|         | 22:2.2V      | 48:4.8V |                                                                                                                                                                                                                                              |
|         | 23:2.3V      | 49:4.9V |                                                                                                                                                                                                                                              |
|         | 24:2.4V      | 50:5.0V |                                                                                                                                                                                                                                              |
|         | 25:2.5V      | 51:5.1V |                                                                                                                                                                                                                                              |
| SOT-25  | 26:2.6V      | 52:5.2V |  <p>Voltage Code ← LXX □ → L: Lead Free<br/>G: Halogen Free</p> <p>Pins 3, 2, 1 are at the top, and pins 4, 5 are at the bottom.</p>                       |
|         | 27:2.7V      | 53:5.3V |                                                                                                                                                                                                                                              |
|         | 28:2.8V      | 54:5.4V |                                                                                                                                                                                                                                              |
|         | 29:2.9V      | 55:5.5V |                                                                                                                                                                                                                                              |
|         | 30:3.0V      | 56:5.6V |                                                                                                                                                                                                                                              |
|         | 31:3.1V      | 57:5.7V |                                                                                                                                                                                                                                              |
|         | 32:3.2V      | 58:5.8V |                                                                                                                                                                                                                                              |
|         | 33:3.3V      | 59:5.9V |                                                                                                                                                                                                                                              |
|         | 34:3.4V      | 60:6.0V |                                                                                                                                                                                                                                              |
|         |              | 62:6.2V |                                                                                                                                                                                                                                              |
| TO-92   |              |         |  <p>UTC<br/>82CXX □</p> <p>C:CMOS ← Pin Code → L: Lead Free<br/>G: Halogen Free<br/>Voltage Code → Date Code</p> <p>Pins 1, 2, 3 are at the bottom.</p>   |

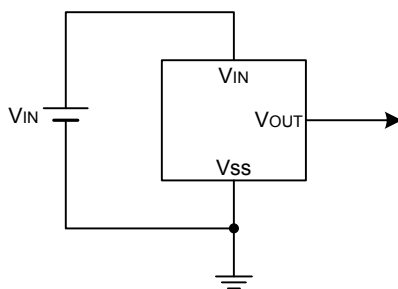
## ■ MARKING CODE FOR SOT-23/SOT-25

| PART<br>NUMBER | DETECT VOLATGE |      | MARKING<br>CODE | PART<br>NUMBER | DETECT VOLATGE |      | MARKING<br>CODE |
|----------------|----------------|------|-----------------|----------------|----------------|------|-----------------|
|                | VOLTAGE        | CODE |                 |                | VOLTAGE        | CODE |                 |
| 82C09          | 0.9V           | 9    | L09             | 82C36          | 3.6V           | 36   | L36             |
| 82C10          | 1.0V           | 10   | L10             | 82C37          | 3.7V           | 37   | L37             |
| 82C11          | 1.1V           | 11   | L11             | 82C38          | 3.8V           | 38   | L38             |
| 82C12          | 1.2V           | 12   | L12             | 82C39          | 3.9V           | 39   | L39             |
| 82C13          | 1.3V           | 13   | L13             | 82C40          | 4.0V           | 40   | L40             |
| 82C14          | 1.4V           | 14   | L14             | 82C41          | 4.1V           | 41   | L41             |
| 82C15          | 1.5V           | 15   | L15             | 82C42          | 4.2V           | 42   | L42             |
| 82C16          | 1.6V           | 16   | L16             | 82C43          | 4.3V           | 43   | L43             |
| 82C17          | 1.7V           | 17   | L17             | 82C44          | 4.4V           | 44   | L44             |
| 82C18          | 1.8V           | 18   | L18             | 82C45          | 4.5V           | 45   | L45             |
| 82C19          | 1.9V           | 19   | L19             | 82C46          | 4.6V           | 46   | L46             |
| 82C20          | 2.0V           | 20   | L20             | 82C47          | 4.7V           | 47   | L47             |
| 82C21          | 2.1V           | 21   | L21             | 82C48          | 4.8V           | 48   | L48             |
| 82C22          | 2.2V           | 22   | L22             | 82C49          | 4.9V           | 49   | L49             |
| 82C23          | 2.3V           | 23   | L23             | 82C50          | 5.0V           | 50   | L50             |
| 82C24          | 2.4V           | 24   | L24             | 82C51          | 5.1V           | 51   | L51             |
| 82C25          | 2.5V           | 25   | L25             | 82C52          | 5.2V           | 52   | L52             |
| 82C26          | 2.6V           | 26   | L26             | 82C53          | 5.3V           | 53   | L53             |
| 82C27          | 2.7V           | 27   | L27             | 82C54          | 5.4V           | 54   | L54             |
| 82C28          | 2.8V           | 28   | L28             | 82C55          | 5.5V           | 55   | L55             |
| 82C29          | 2.9V           | 29   | L29             | 82C56          | 5.6V           | 56   | L56             |
| 82C30          | 3.0V           | 30   | L30             | 82C57          | 5.7V           | 57   | L57             |
| 82C31          | 3.1V           | 31   | L31             | 82C58          | 5.8V           | 58   | L58             |
| 82C32          | 3.2V           | 32   | L32             | 82C59          | 5.9V           | 59   | L59             |
| 82C33          | 3.3V           | 33   | L33             | 82C60          | 6.0V           | 60   | L60             |
| 82C34          | 3.4V           | 34   | L34             | 82C62          | 6.2V           | 62   | L62             |
| 82C35          | 3.5V           | 35   | L35             |                |                |      |                 |

## ■ BLOCK DIAGRAM



## ■ TYPICAL APPLICATION CIRCUITS



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise specified.)

| PARAMETER             |               | SYMBOL           | RATINGS                                     | UNIT |
|-----------------------|---------------|------------------|---------------------------------------------|------|
| Input Voltage         |               | V <sub>IN</sub>  | 12                                          | V    |
| Output Current        |               | I <sub>OUT</sub> | 50                                          | mA   |
| Output Voltage        |               | V <sub>OUT</sub> | V <sub>SS</sub> -0.3 ~ V <sub>IN</sub> +0.3 | V    |
| Power Dissipation     | SOT-23/SOT-25 | P <sub>D</sub>   | 150                                         | mW   |
|                       | TO-92         |                  | 300                                         | mW   |
| Operating Temperature |               | T <sub>OPR</sub> | -40 ~ +85                                   | °C   |
| Storage Temperature   |               | T <sub>STG</sub> | -40 ~ +150                                  | °C   |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified.)

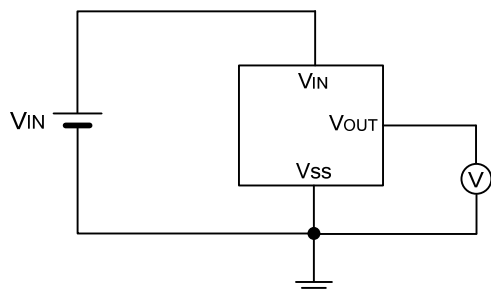
| PARAMETER                               | SYMBOL                                               | CIRCUIT | TEST CONDITONS                                       | MIN                                              | TYP                   | MAX                      | UNIT   |
|-----------------------------------------|------------------------------------------------------|---------|------------------------------------------------------|--------------------------------------------------|-----------------------|--------------------------|--------|
| Detect Voltage (Note 2)                 | V <sub>DF</sub>                                      | 1       |                                                      | V <sub>DF</sub><br>×0.98                         | V <sub>DF</sub>       | V <sub>DF</sub><br>×1.02 | V      |
| Hysteresis Range                        | V <sub>HYS</sub>                                     | 1       |                                                      | V <sub>DF</sub><br>×0.02                         | V <sub>DF</sub> ×0.05 | V <sub>DF</sub><br>×0.08 | V      |
| Supply Current                          | I <sub>SS</sub>                                      | 2       | V <sub>IN</sub> = 1.5V                               |                                                  | 0.7                   | 2.3                      | μA     |
|                                         |                                                      |         | V <sub>IN</sub> = 2.0V                               |                                                  | 0.8                   | 2.7                      | μA     |
|                                         |                                                      |         | V <sub>IN</sub> = 3.0V                               |                                                  | 0.9                   | 3.0                      | μA     |
|                                         |                                                      |         | V <sub>IN</sub> = 4.0V                               |                                                  | 1.0                   | 3.2                      | μA     |
|                                         |                                                      |         | V <sub>IN</sub> = 5.0V                               |                                                  | 1.1                   | 3.6                      | μA     |
| Operating Voltage                       | V <sub>IN</sub>                                      | 1       | V <sub>DF(T)</sub> = 0.9V ~ 1.5V                     | 0.7                                              |                       | 6                        | V      |
|                                         |                                                      |         | V <sub>DF(T)</sub> = 1.6V ~ 6.2V                     | 0.7                                              |                       | 10                       | V      |
| Output Current (V <sub>DF</sub> ≤ 1.5V) | I <sub>OUT</sub>                                     | 3       | N-ch, V <sub>DS</sub> = 0.5V                         | V <sub>IN</sub> = 0.7V<br>V <sub>IN</sub> = 1.0V | 0.1<br>0.85           | 0.8                      | mA     |
|                                         |                                                      | 4       | P-ch, V <sub>DS</sub> = 2.1V, V <sub>IN</sub> = 6.0V |                                                  | -7.5                  | -1.5                     | mA     |
| Output Current (V <sub>DF</sub> ≥ 1.6V) | I <sub>OUT</sub>                                     | 3       | N-ch, V <sub>DS</sub> = 0.5V                         | V <sub>IN</sub> = 1.0V                           | 1.0                   | 2.2                      | mA     |
|                                         |                                                      |         |                                                      | V <sub>IN</sub> = 2.0V                           | 3.0                   | 7.7                      | mA     |
|                                         |                                                      |         |                                                      | V <sub>IN</sub> = 3.0V                           | 5.0                   | 10.1                     | mA     |
|                                         |                                                      |         |                                                      | V <sub>IN</sub> = 4.0V                           | 6.0                   | 11.5                     | mA     |
|                                         |                                                      |         |                                                      | V <sub>IN</sub> = 5.0V                           | 7.0                   | 13.0                     | mA     |
|                                         |                                                      | 4       | P-ch, V <sub>DS</sub> = 2.1V, V <sub>IN</sub> = 8.0V |                                                  | -10.0                 | -2                       | mA     |
| Temperature Characteristics             | $\frac{\Delta V_{DF}}{\Delta T_{OPR} \times V_{DF}}$ |         | -40°C ≤ T <sub>OPR</sub> ≤ 85°C                      |                                                  | ±100                  |                          | ppm/°C |
| Transient Delay Time                    | t <sub>DLY</sub>                                     | 5       |                                                      |                                                  |                       | 0.2                      | ms     |

Note: 1. Detect voltage of ±1% tolerance is also available per customer's request.

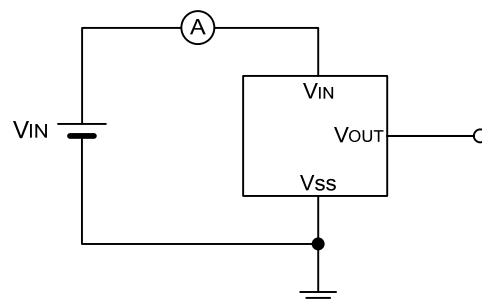
2. V<sub>DF(T)</sub>: Established Detect Voltage Value

## ■ TEST CIRCUITS

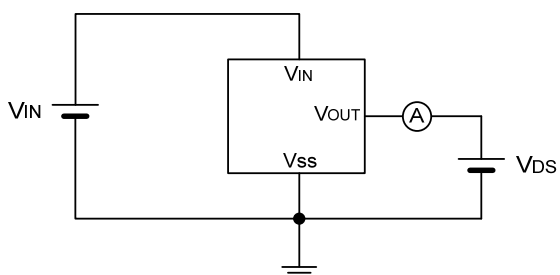
Circuit 1



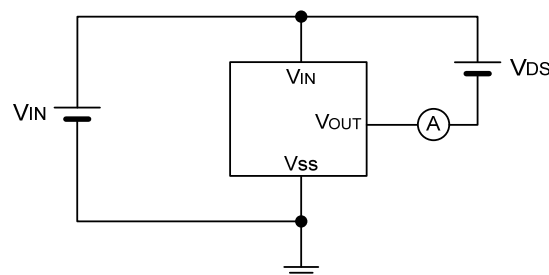
Circuit 2



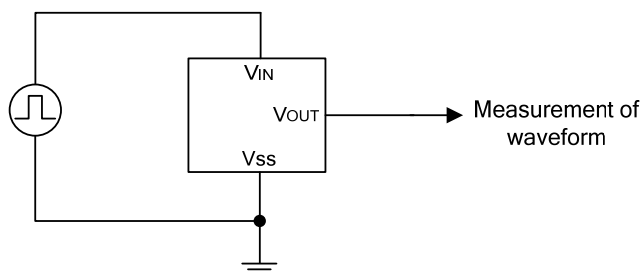
Circuit 3



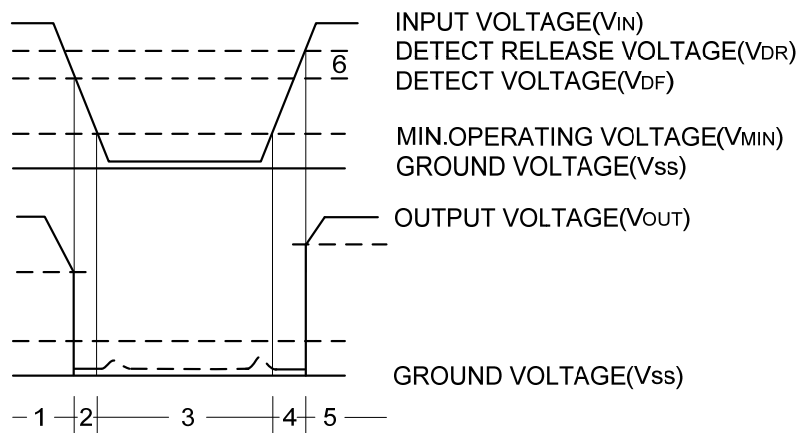
Circuit 4



Circuit 5



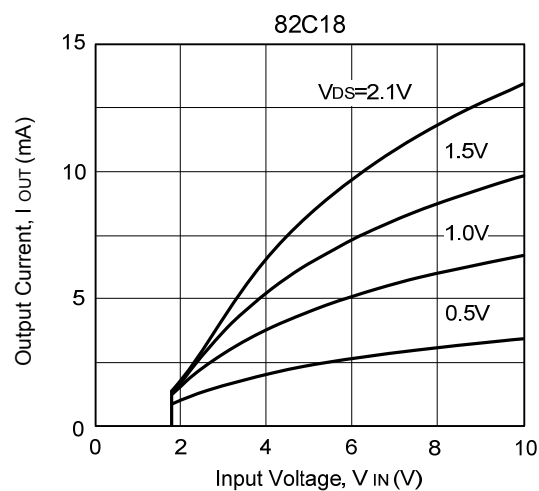
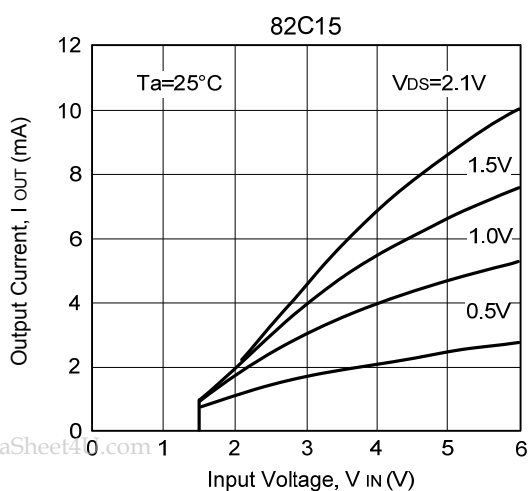
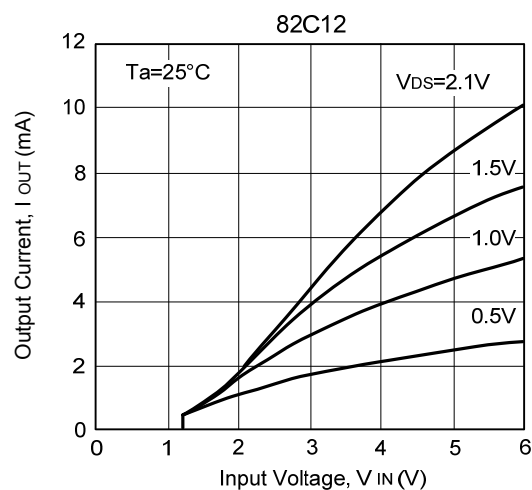
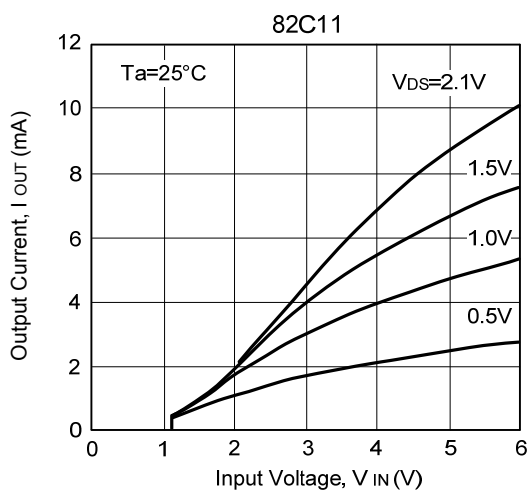
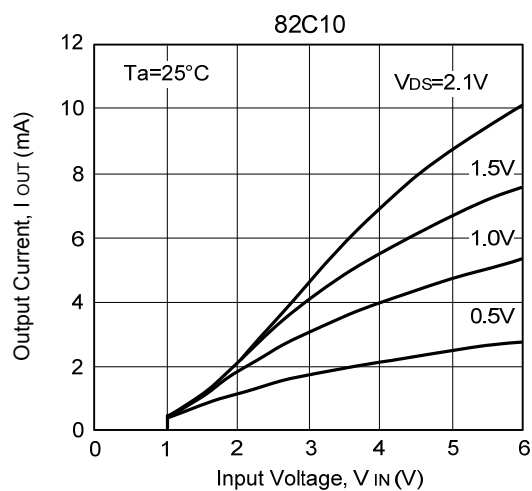
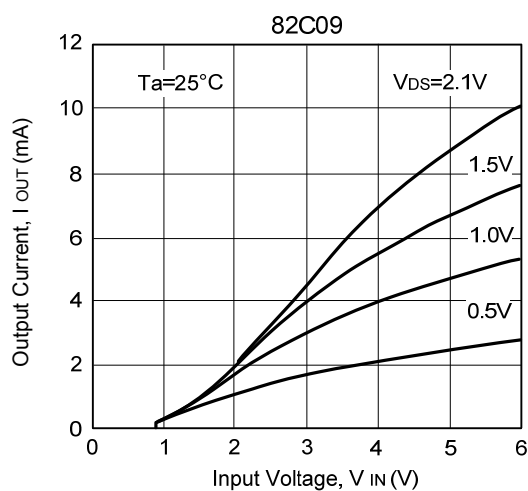
# ■ TIMING CHART FUNCTIONAL DESCRIPTION



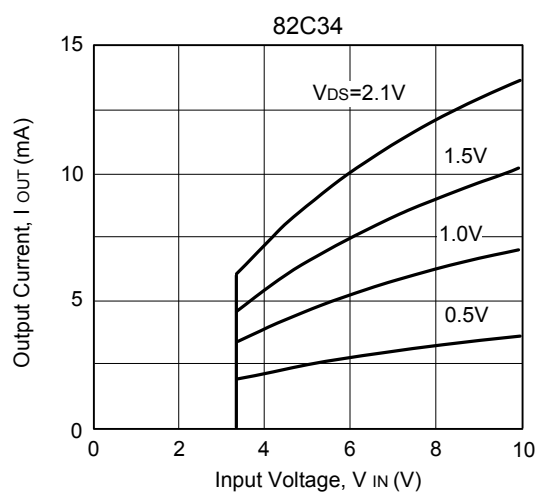
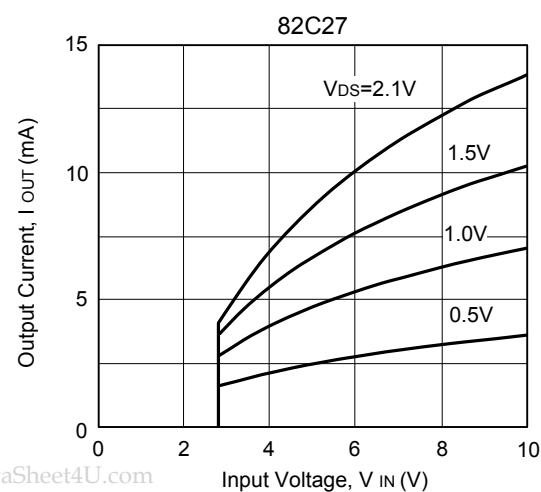
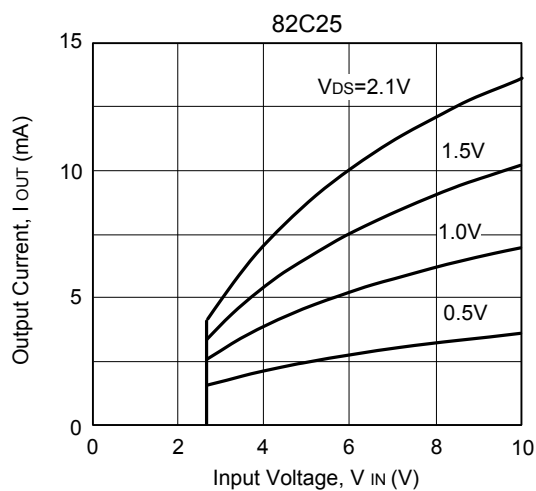
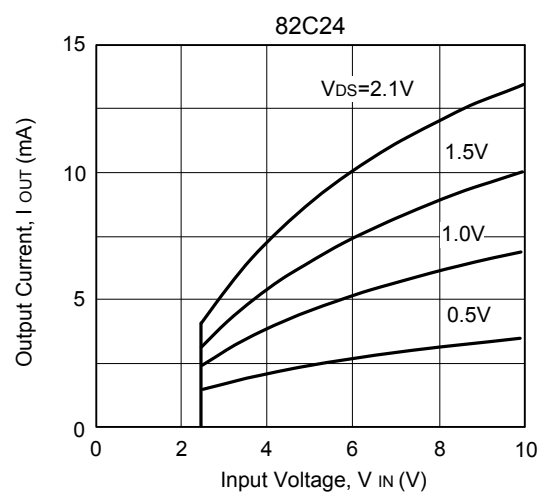
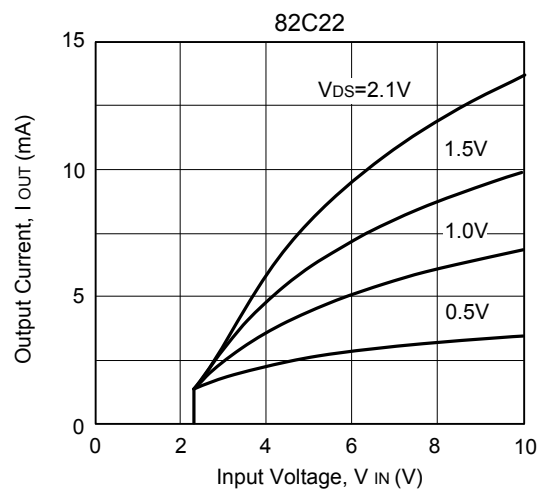
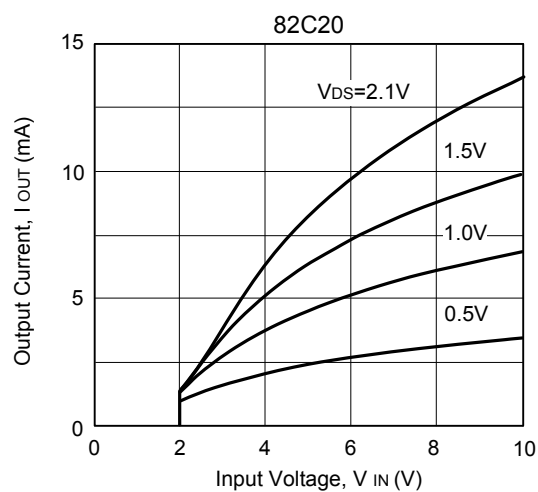
1. When input voltage ( $V_{IN}$ ) rises above detect voltage ( $V_{DF}$ ), output voltage ( $V_{OUT}$ ) will be equal to  $V_{IN}$ .
2. When input voltage ( $V_{IN}$ ) falls below detect voltage ( $V_{DF}$ ), output voltage ( $V_{OUT}$ ) will be equal to the ground voltage ( $V_{SS}$ ) level.
3. When input voltage ( $V_{IN}$ ) falls to a level below that of the minimum operating voltage ( $V_{MIN}$ ), output will become unstable. In this condition,  $V_{IN}$  will equal the pulled-up output (should output be pulled-up.)
4. When input voltage ( $V_{IN}$ ) rises above the ground voltage ( $V_{SS}$ ) level, output will be unstable at levels below the minimum operating voltage ( $V_{MIN}$ ). Between the  $V_{MIN}$  and detect release voltage ( $V_{DR}$ ) levels, the ground voltage ( $V_{SS}$ ) level will be maintained.
5. When input voltage ( $V_{IN}$ ) rises above detect release voltage ( $V_{DR}$ ), output voltage ( $V_{OUT}$ ) will be equal to  $V_{IN}$ .
6. The difference between  $V_{DR}$  and  $V_{DF}$  represents the hysteresis range.

# ■ TYPICAL PERFORMANCE CHARACTERISTICS

## (1) P-CHANNEL DRIVER OUTPUT CURRENT vs. INPUT VOLTAGE

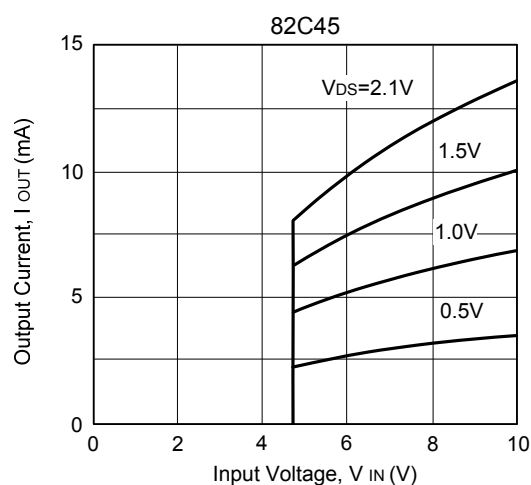
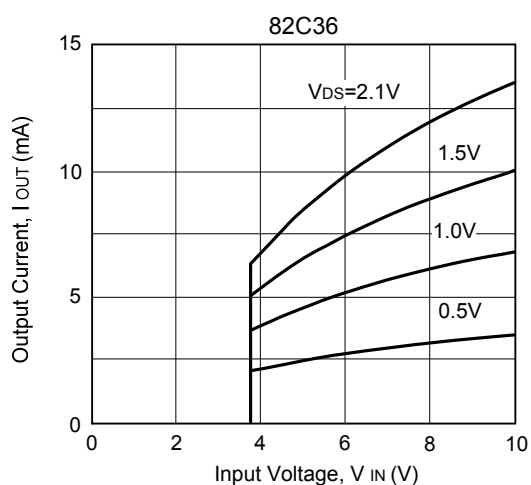


■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)

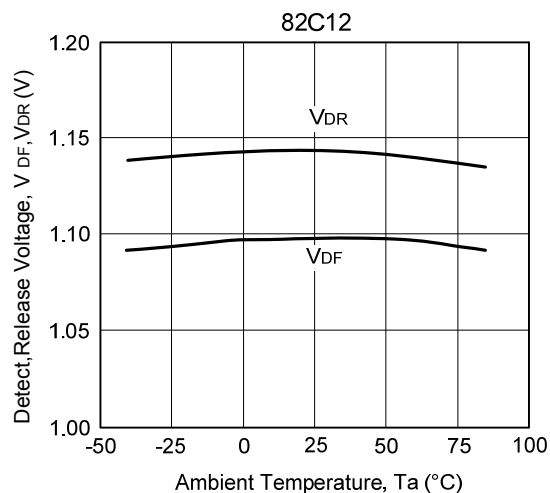
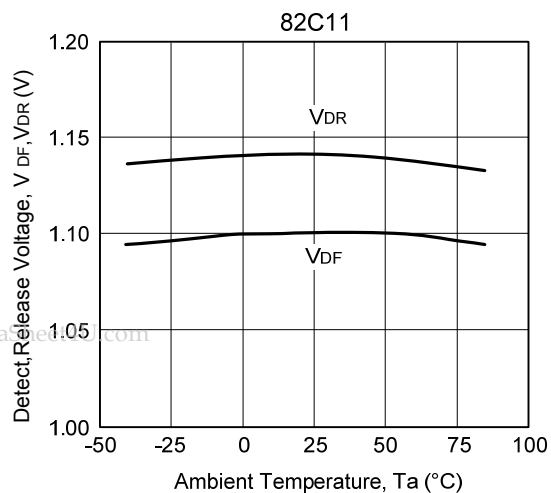
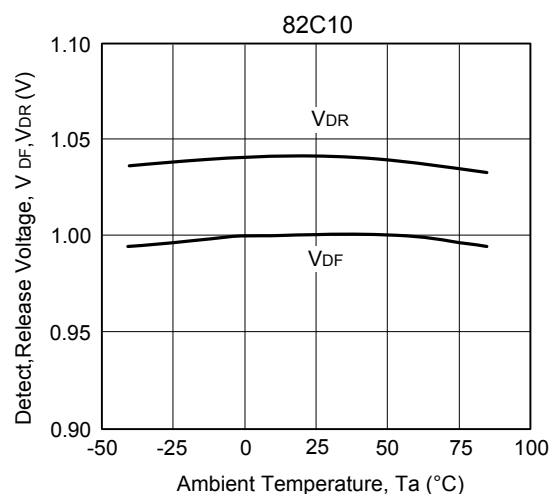
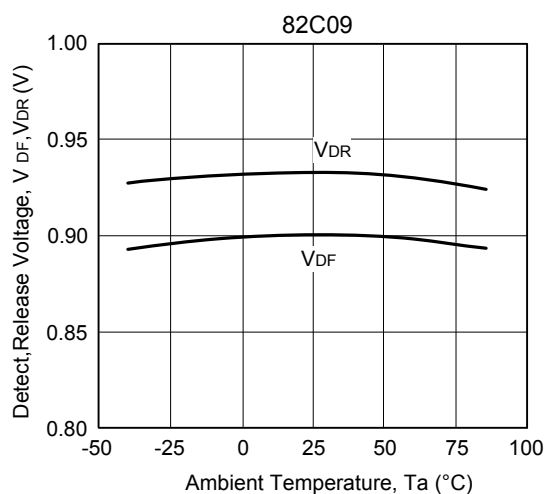


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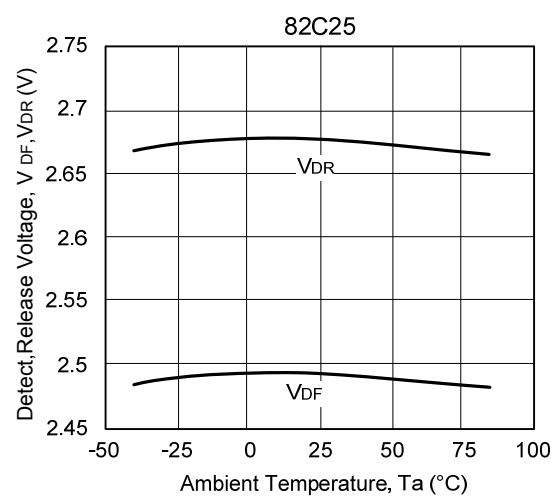
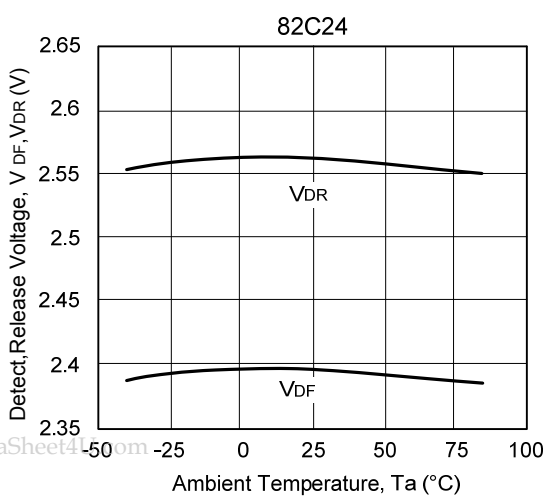
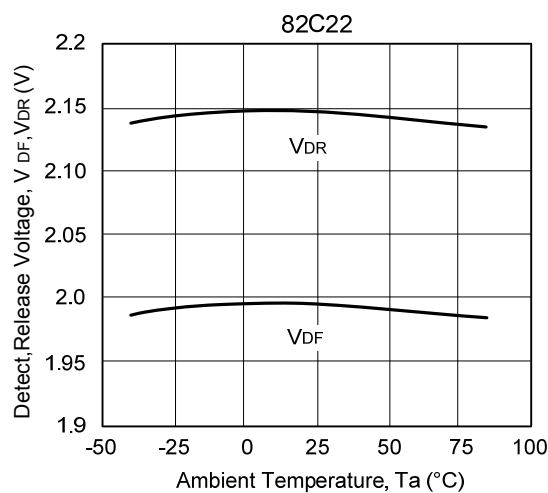
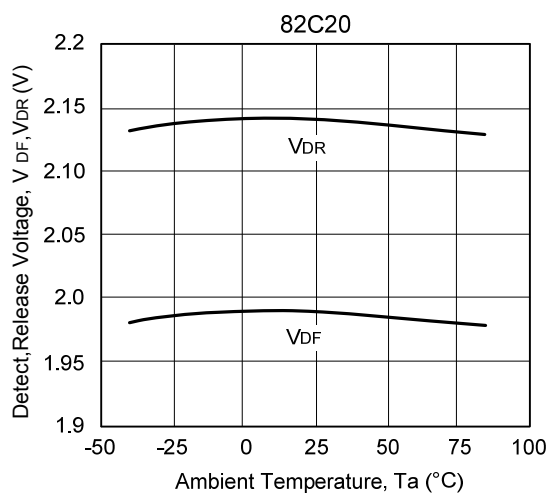
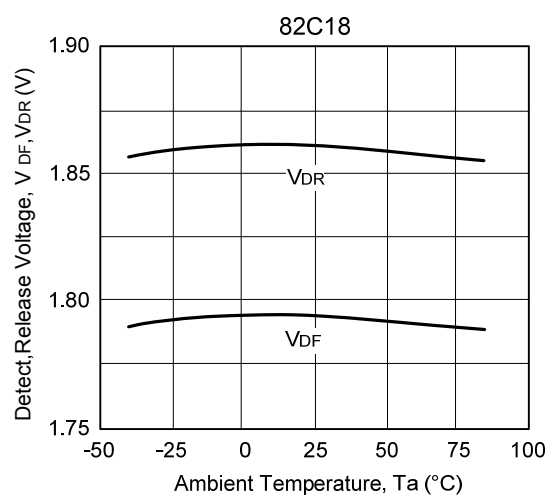
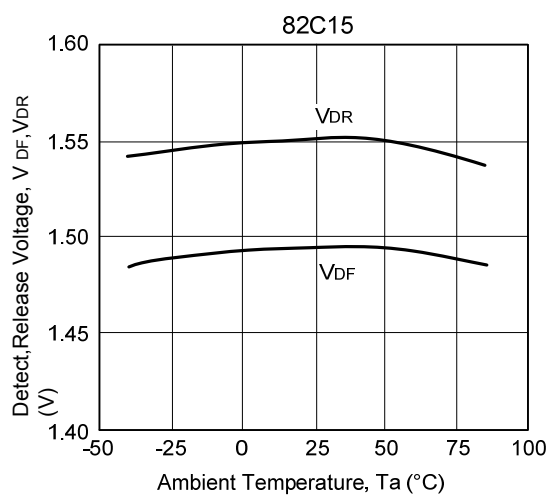
## ■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)



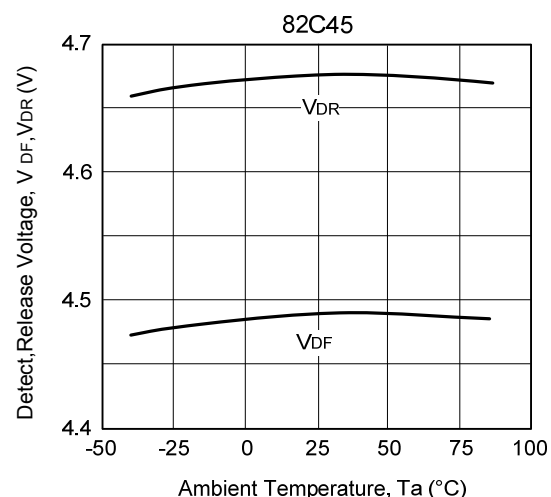
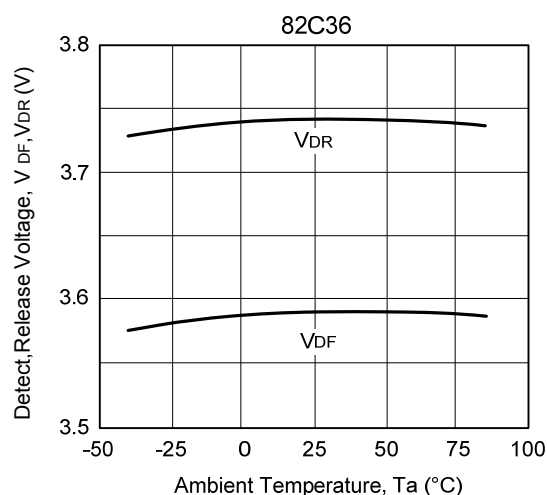
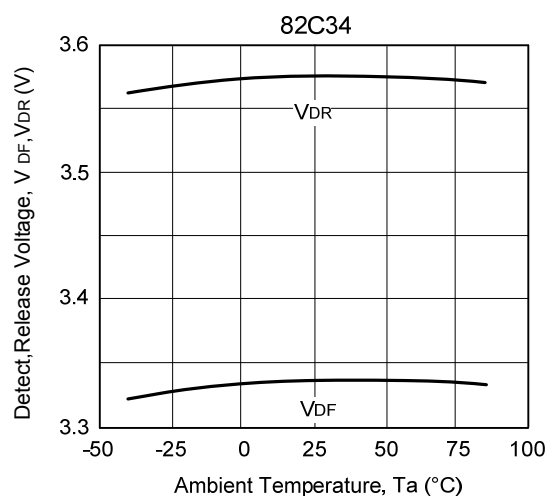
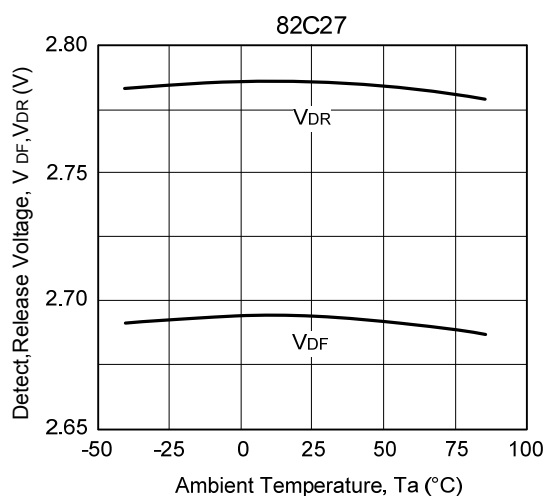
## (2) DETECT, RELEASE VOLTAGE vs. AMBIENT TEMPERATURE



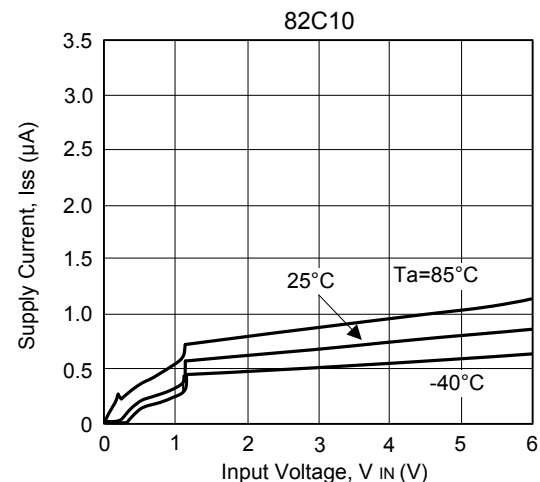
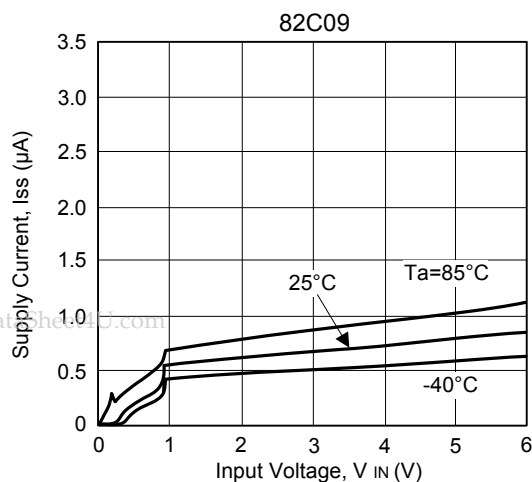
■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)



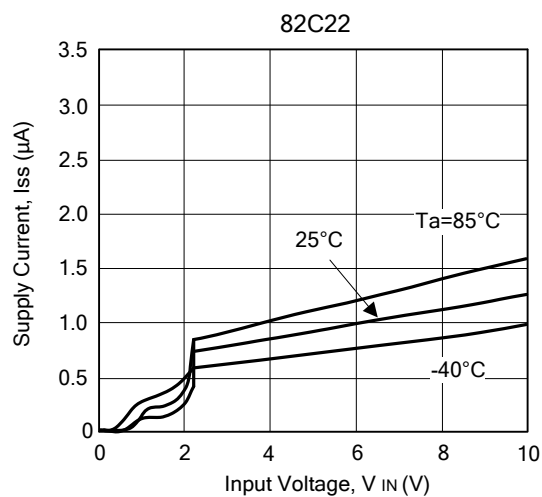
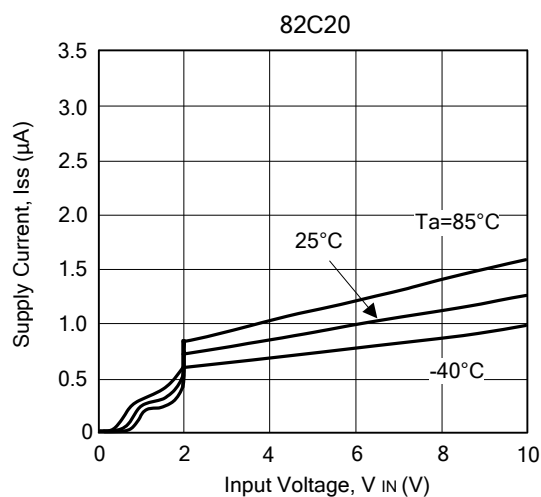
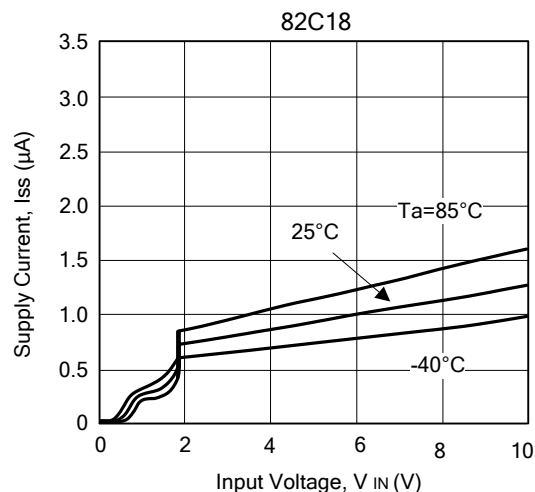
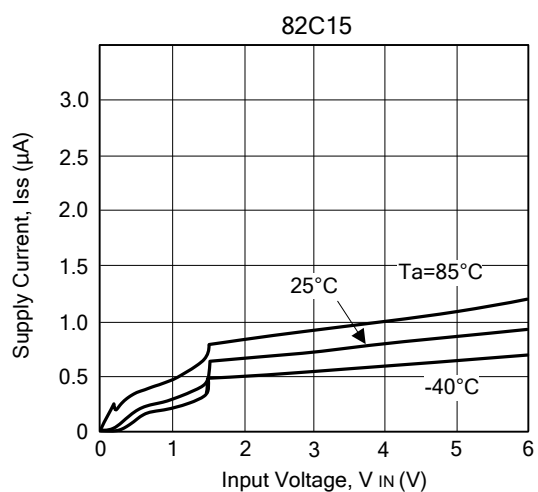
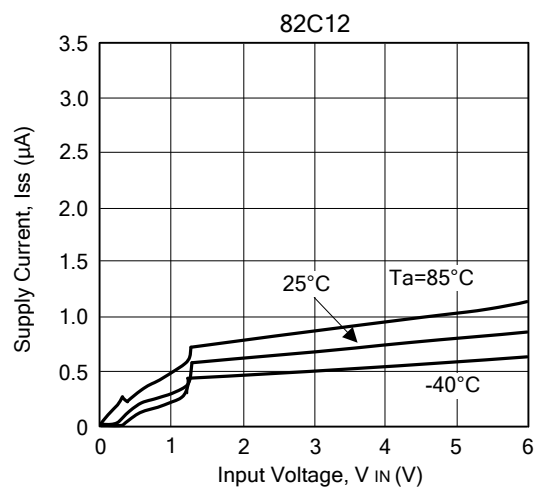
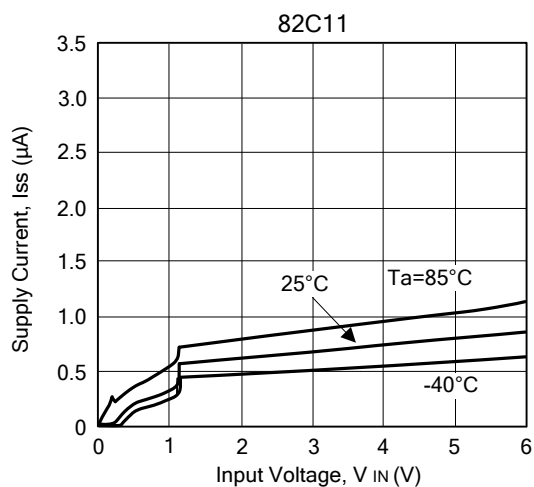
# ■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)



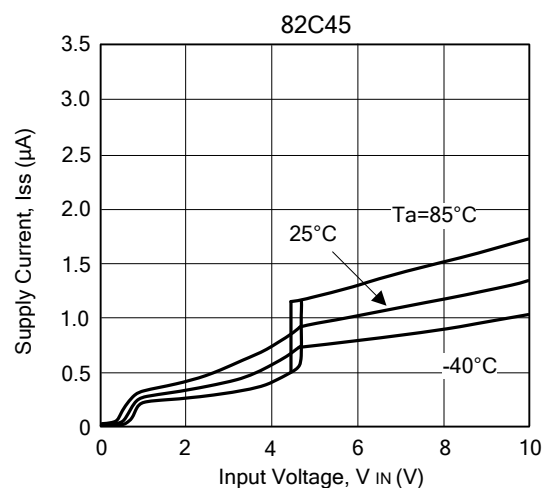
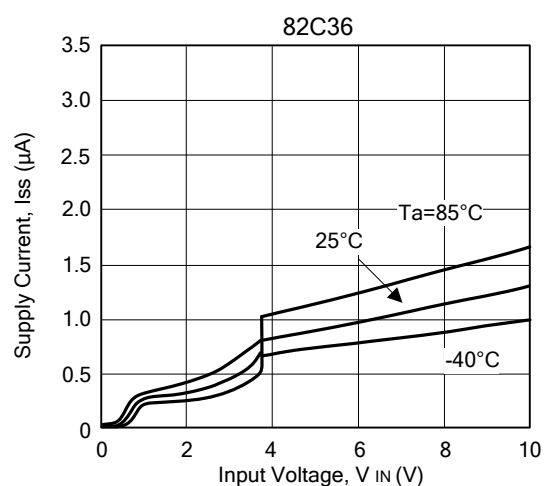
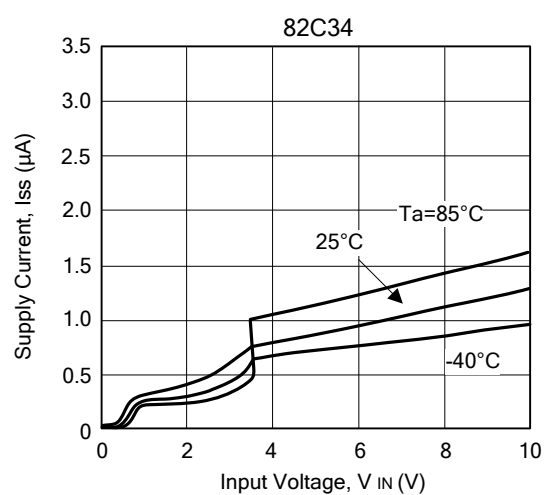
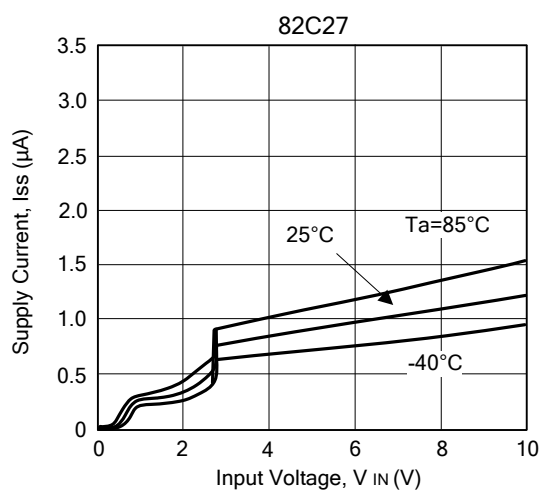
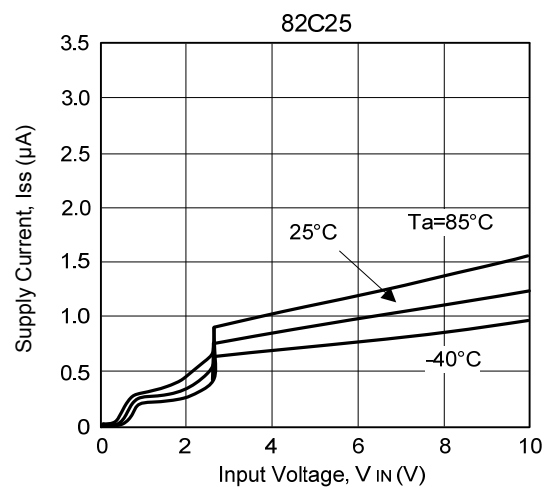
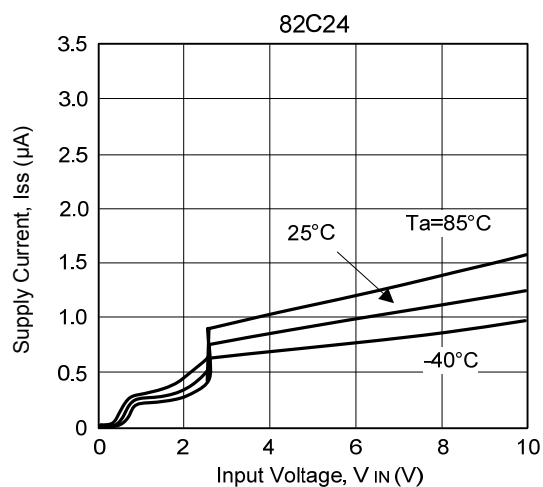
## (3) SUPPLY CURRENT vs. INPUT VOLTAGE



■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)

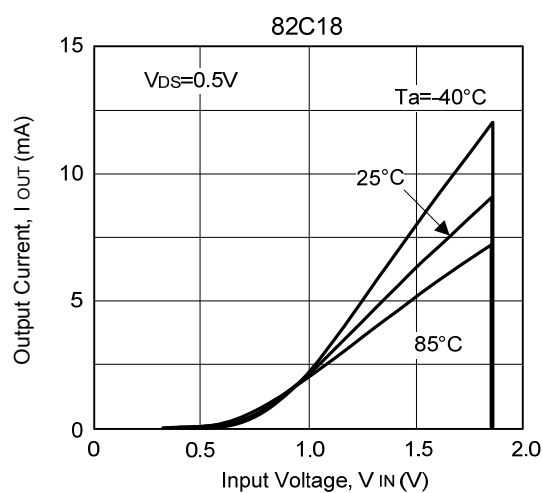
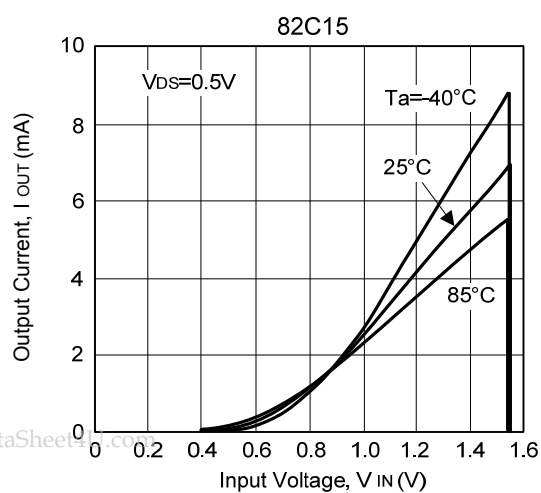
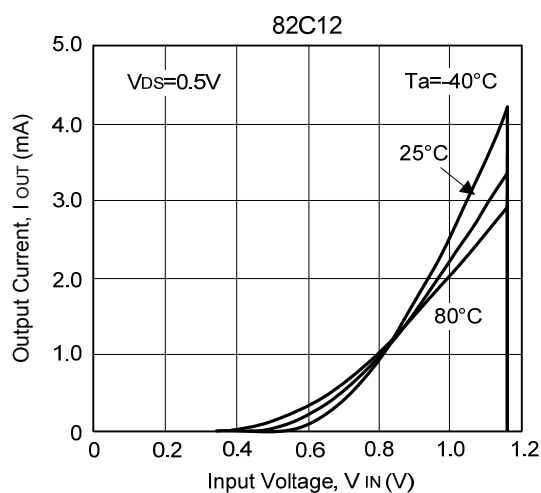
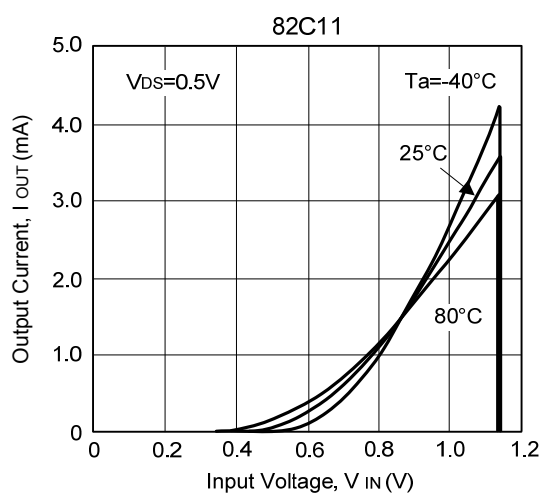
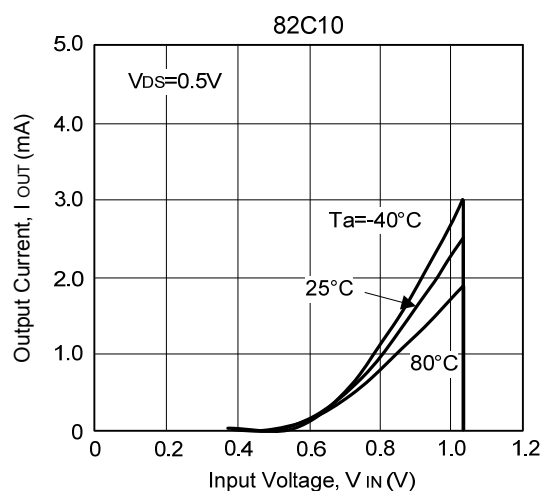
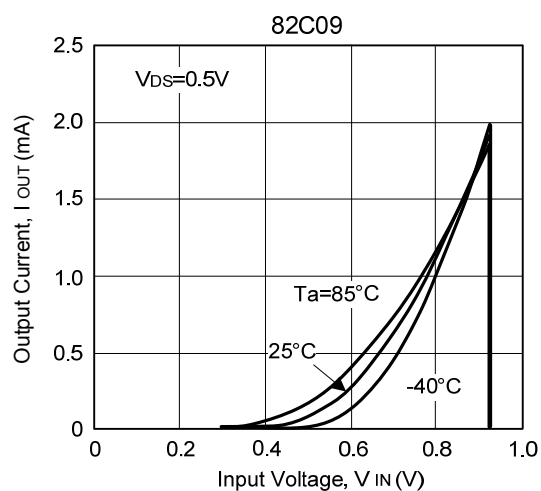


■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)

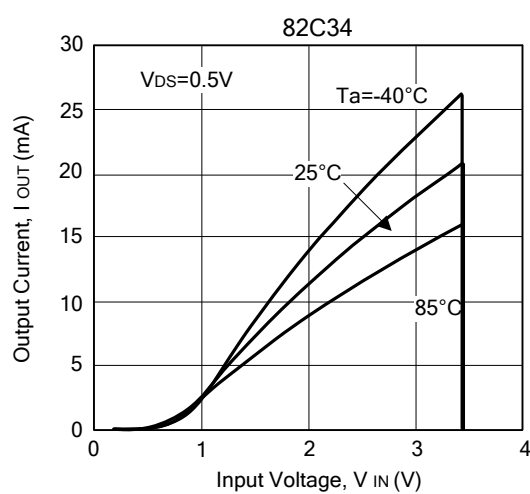
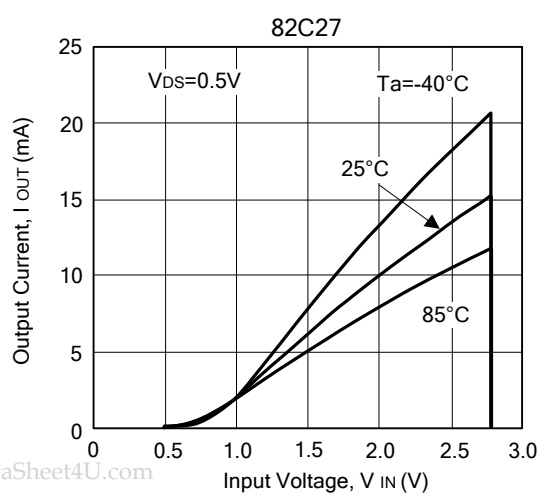
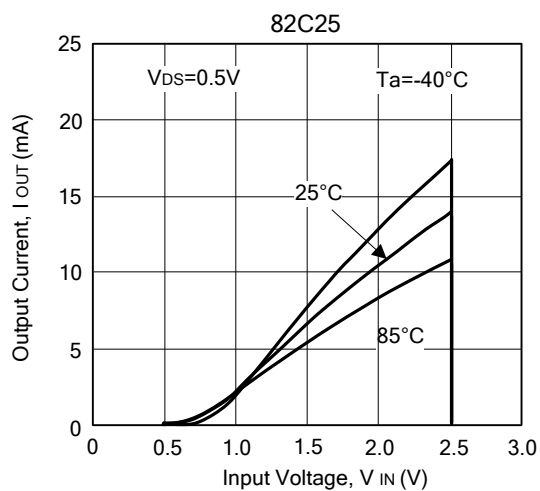
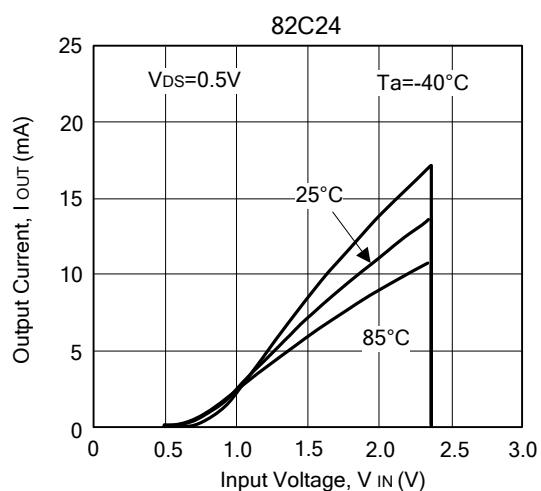
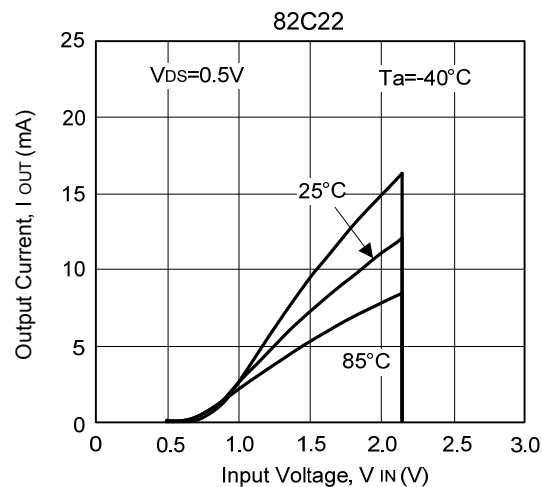
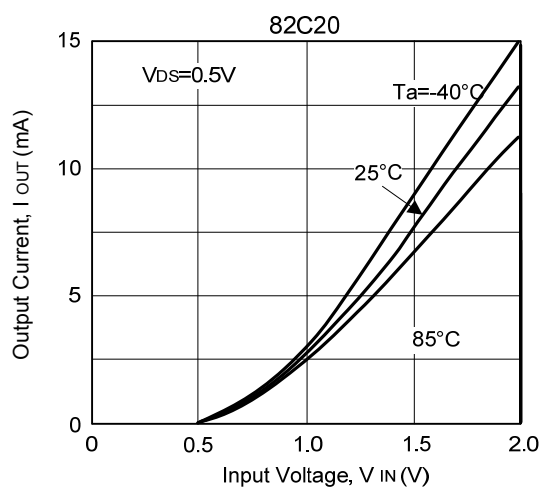


# ■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)

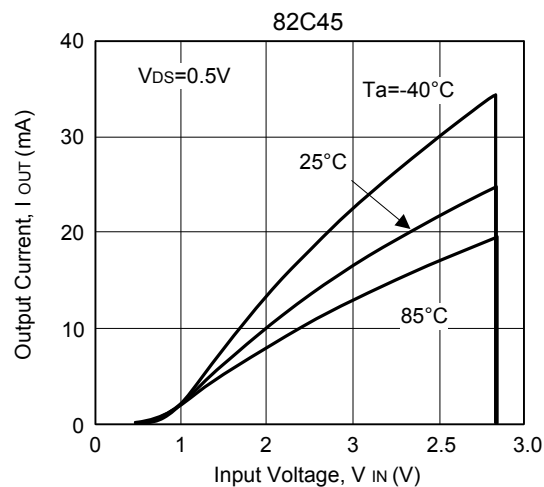
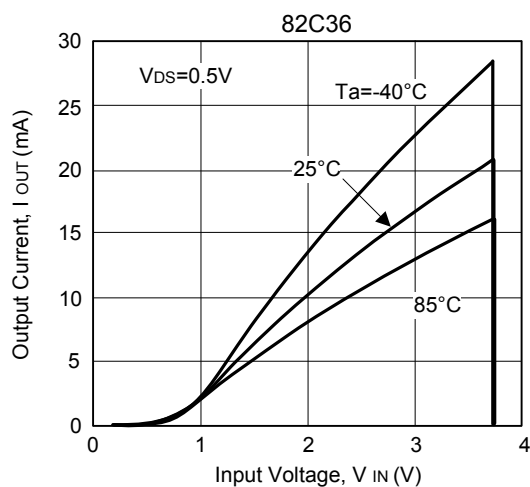
## (4) N-CHANNEL DRIVER OUTPUT CURRENT vs. INPUT VOLTAGE



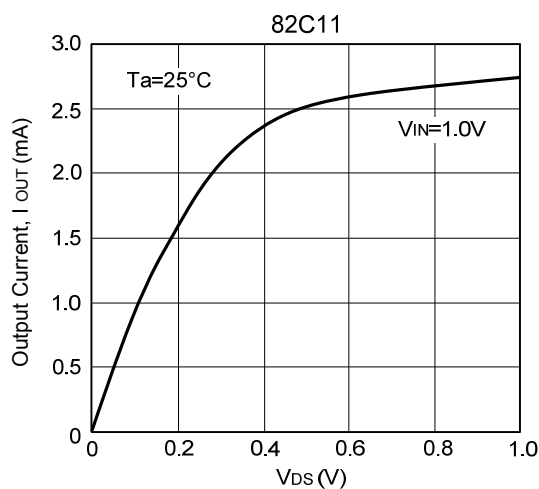
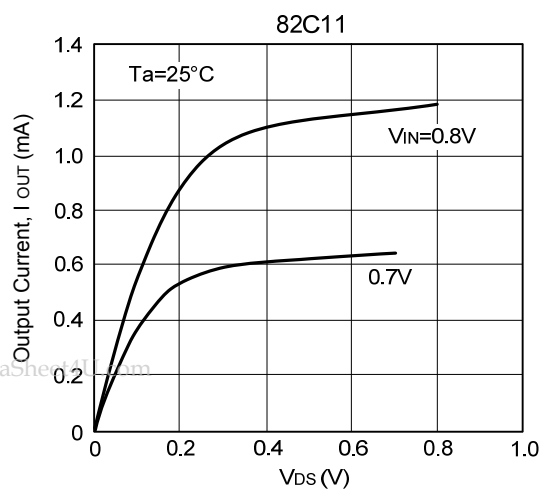
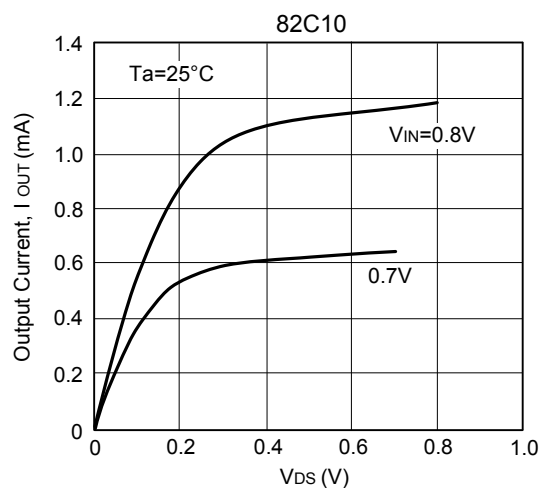
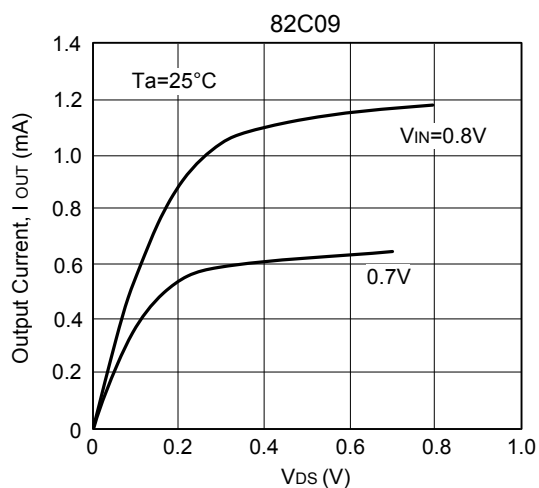
# ■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)



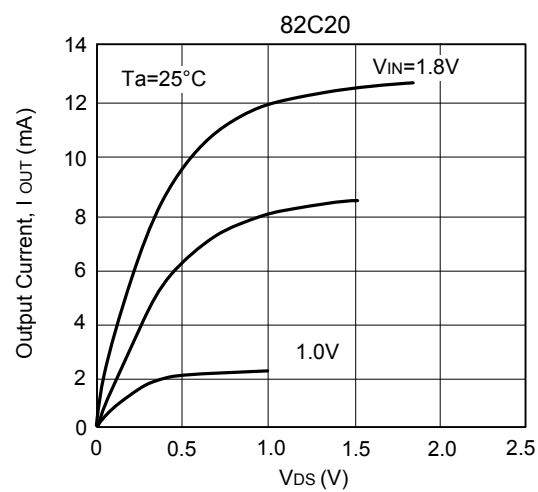
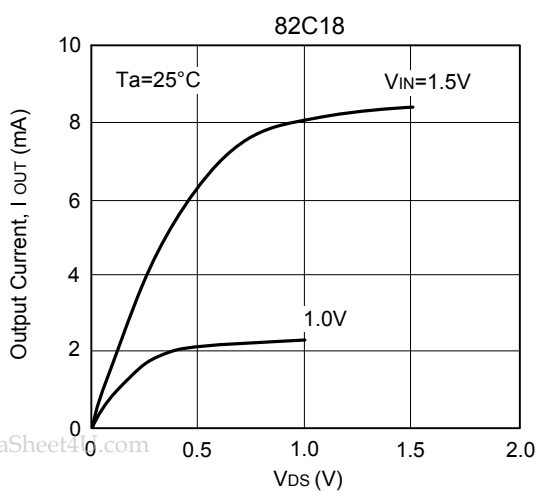
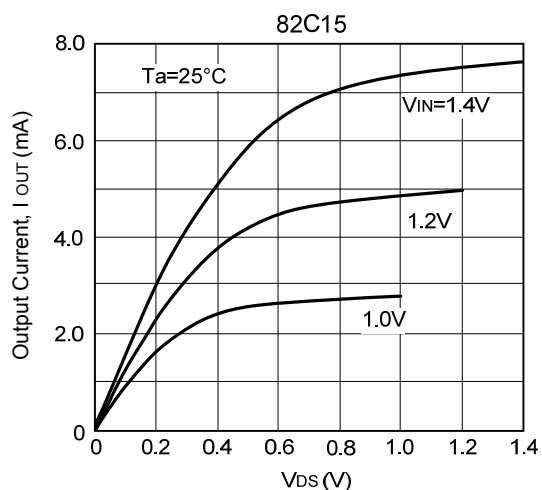
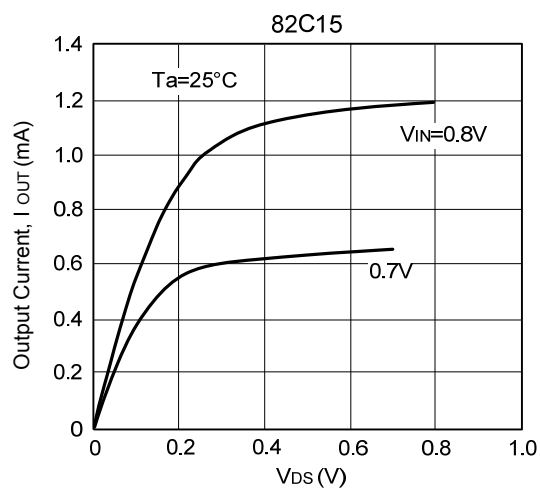
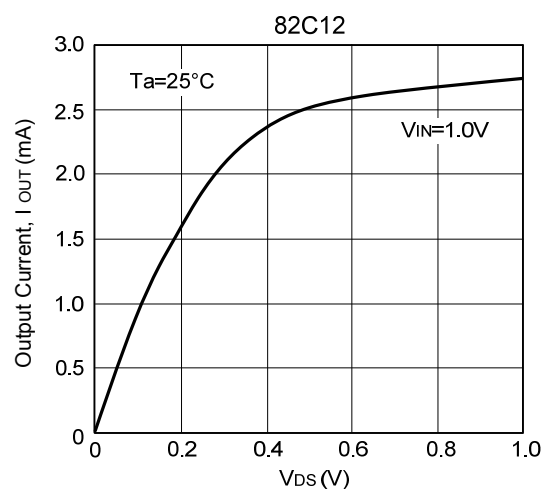
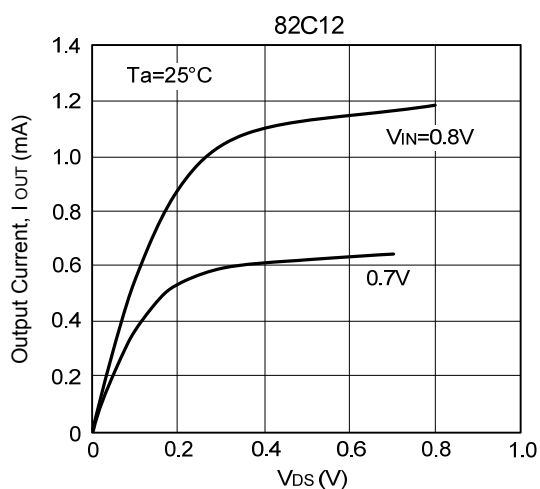
# ■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)



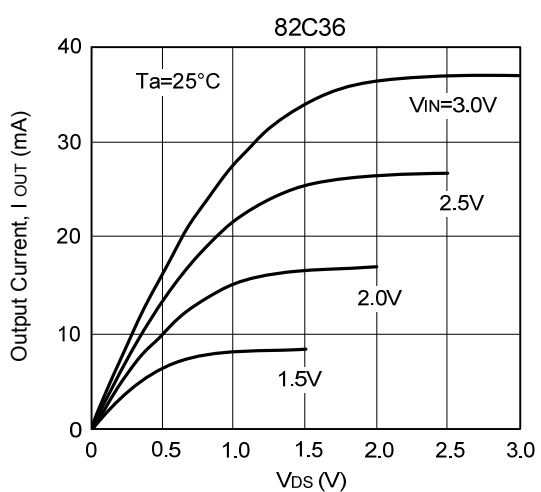
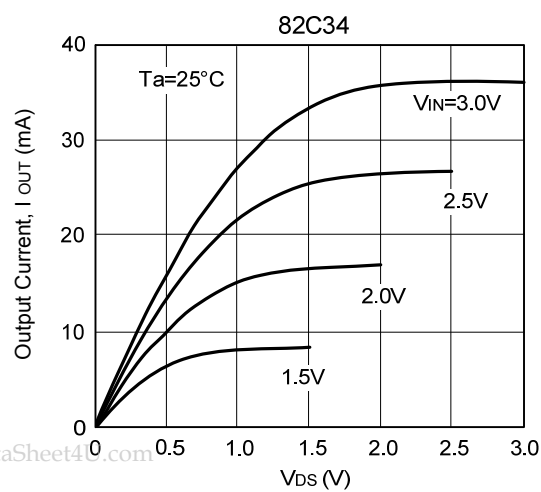
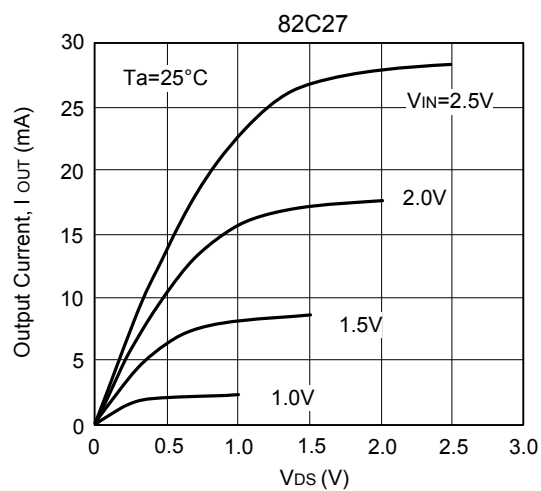
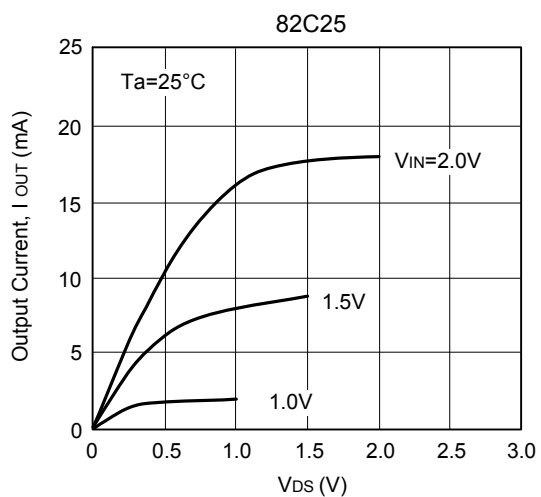
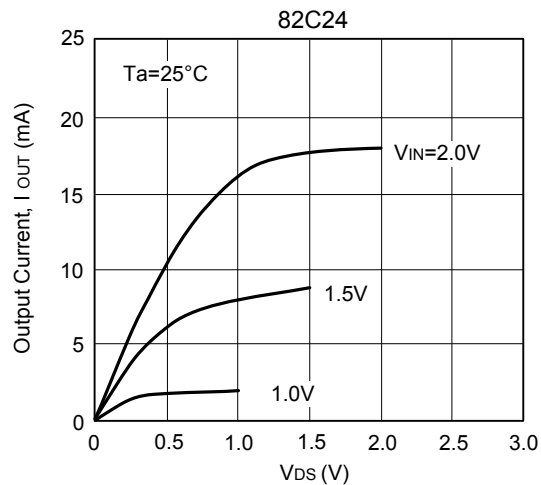
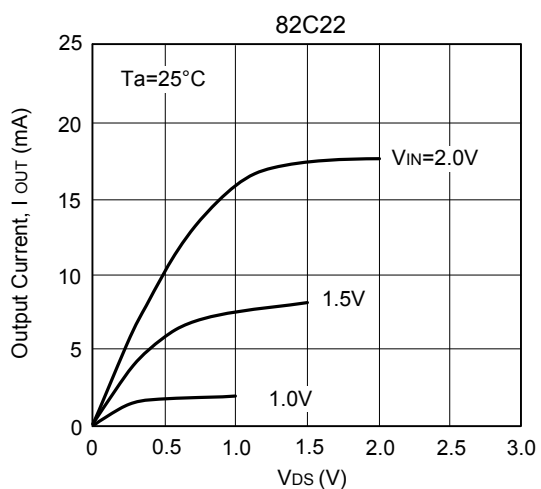
## (5) N-CHANNEL DRIVER OUTPUT CURRENT vs. $V_{DS}$



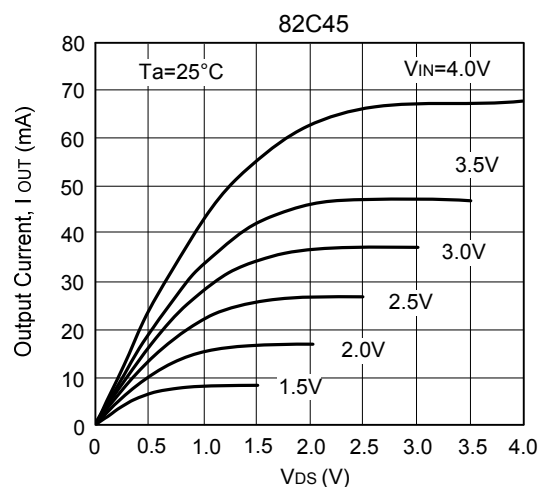
■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)



# ■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)



# ■ TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)



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