

# GS2823

## 300mA High PSRR Low Dropout Voltage Linear Regulators

### Product Description

The GS2823 is a low dropout and low noise linear regulator with high ripple rejection ratio and fast turn-on time. GS2823 is fixed output voltage type. It has fixed output voltage ranging from 1.2V to 4V.

The GS2823 includes a voltage reference unit, an error amplifier, resistor net for voltage setting, a current limit circuit and a chip enable circuit. These ICs perform with low dropout voltage and a chip enable function DFN1x1-4L SOT-23, SOT-23-5L and package only.

The GS2823 works well with low ESR ceramic capacitors, suitable for portable RF and wireless battery-powered applications with stringent space requirements and demanding performance. It also offers ultra low noise output and has low quiescent current.

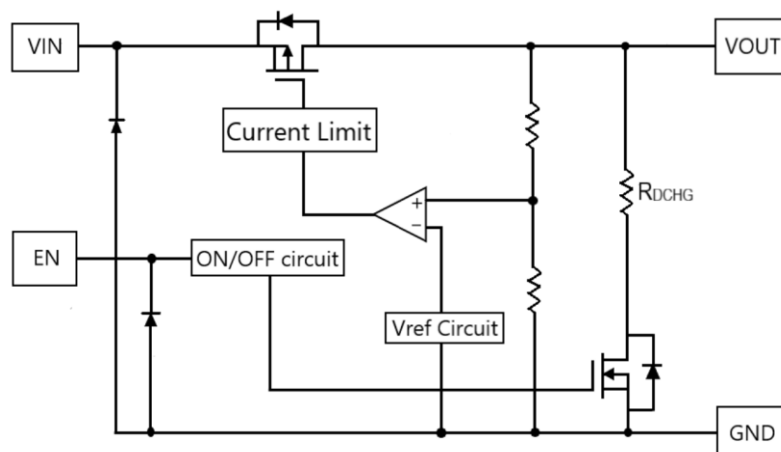
### Features

- Input Voltage Range: 1.6V to 5.5V
- Low Dropout Voltage: 0.2V at 300mA (Typ) (Vout=3V)
- Output Current: 300mA
- High Ripple Rejection: 80dB (Typ) (f=1kHz)
- Output Voltage: Vout $\geq$ 2V (Accuracy  $\pm$ 1.0%)  
Vout<2V (Accuracy  $\pm$ 20mV)
- Low Supply Current: 150 $\mu$ A (Typ)
- Standby Current: 0.1 $\mu$ A (Typ)
- EN Function: Active High
- Operating Ambient Temperature: -40~+85 $^{\circ}$ C
- Current Limit and Short Circuit Protection
- Fixed Output Voltage: 1.2V to 4.0V
- Low ESR Capacitors: Cin=1 $\mu$ F, CL=1 $\mu$ F
- Miniature Packages: SOT-23, SOT-23-5L, and DFN1x1-4L
- RoHS Compliant, 100%Pb & Halogen Free

### Applications

- Mobile Devices
- Portable Communication Equipment
- Modules
- Hand-Held Instruments
- Wireless Communications

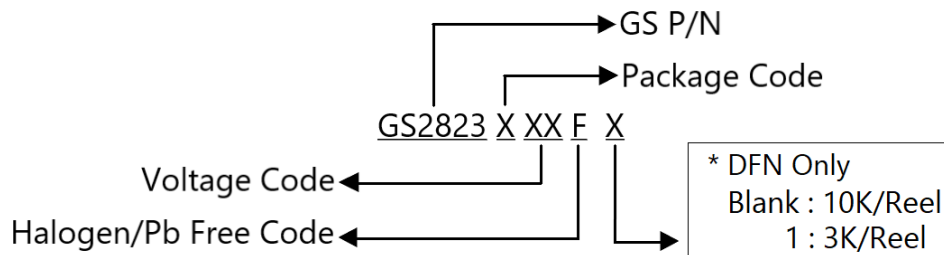
### Block Diagram



## Packages & Pin Assignments

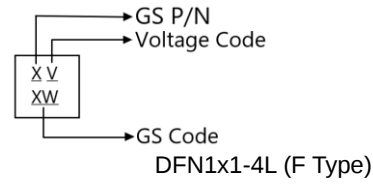
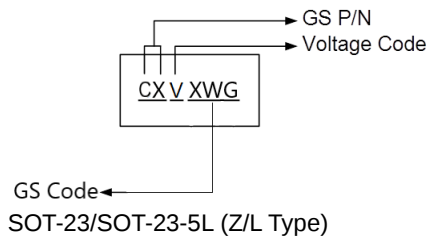
| SOT-23    | SOT-23-5L                                                                                                                                                                                                                          | DFN1X1-4L |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|           |                                                                                                                                                                                                                                    |           |
| Pin Name  | Function                                                                                                                                                                                                                           |           |
| NC        | No Connect.                                                                                                                                                                                                                        |           |
| EN        | Enable Input. Pulling this pin below 0.3V turn the regulator off, reducing the quiescent current to a fraction of its operating value. The device will be enabled if this pin is left open. Connect to $V_{IN}$ if not being used. |           |
| GND       | Ground Pin.                                                                                                                                                                                                                        |           |
| $V_{IN}$  | Power Supply Input.                                                                                                                                                                                                                |           |
| $V_{OUT}$ | The pin is the power output of the device.                                                                                                                                                                                         |           |

## Ordering Information



| SOT-23     | SOT-23-5L  | DFN1x1-4L                 | Output Voltage |
|------------|------------|---------------------------|----------------|
| GS2823Z12F | GS2823L12F | GS2823F12F<br>GS2823F12F1 | 1.2V           |
| GS2823Z15F | GS2823L15F | GS2823F15F<br>GS2823F15F1 | 1.5V           |
| GS2823Z18F | GS2823L18F | GS2823F18F<br>GS2823F18F1 | 1.8V           |
| GS2823Z25F | GS2823L25F | GS2823F25F<br>GS2823F25F1 | 2.5V           |
| GS2823Z28F | GS2823L28F | GS2823F28F<br>GS2823F28F1 | 2.8V           |
| GS2823Z29F | GS2823L29F | GS2823F29F<br>GS2823F29F1 | 2.9V           |
| GS2823Z33F | GS2823L33F | GS2823F33F<br>GS2823F33F1 | 3.3V           |
| GS2823Z40F | GS2823L40F | GS2823F40F<br>GS2823F40F1 | 4.0V           |

## Marking Information



| SOT-23     | SOT-23-5L  | Marking            | DFN1x1-4L                 | Marking  | Output Voltage |
|------------|------------|--------------------|---------------------------|----------|----------------|
| GS2823Z12F | GS2823L12F | CXD <sub>XWG</sub> | GS2823F12F<br>GS2823F12F1 | XD<br>XW | 1.2V           |
| GS2823Z15F | GS2823L15F | CXG <sub>XWG</sub> | GS2823F15F<br>GS2823F15F1 | XG<br>XW | 1.5V           |
| GS2823Z18F | GS2823L18F | CXF <sub>XWG</sub> | GS2823F18F<br>GS2823F18F1 | XF<br>XW | 1.8V           |
| GS2823Z25F | GS2823L25F | CXH <sub>XWG</sub> | GS2823F25F<br>GS2823F25F1 | XH<br>XW | 2.5V           |
| GS2823Z28F | GS2823L28F | CXJ <sub>XWG</sub> | GS2823F28F<br>GS2823F28F1 | XJ<br>XW | 2.8V           |
| GS2823Z29F | GS2823L29F | CXP <sub>XWG</sub> | GS2823F29F<br>GS2823F29F1 | XP<br>XW | 2.9V           |
| GS2823Z33F | GS2823L33F | CXR <sub>XWG</sub> | GS2823F33F<br>GS2823F33F1 | XR<br>XW | 3.3V           |
| GS2823Z40F | GS2823L40F | CXU <sub>XWG</sub> | GS2823F40F<br>GS2823F40F1 | XU<br>XW | 4.0V           |

## Absolute Maximum Ratings

(T<sub>A</sub>=25°C unless otherwise specified)

| Symbol            | Parameter                         |           | Max                     | Units |
|-------------------|-----------------------------------|-----------|-------------------------|-------|
| V <sub>IN</sub>   | Power Supply Voltage              |           | 7.0                     | V     |
| V <sub>EN</sub>   | Enable Voltage                    |           | 7.0                     | V     |
| V <sub>OUT</sub>  | Output Voltage                    |           | -0.3 to V <sub>IN</sub> | V     |
| I <sub>OUT</sub>  | Output Current                    |           | 500                     | mA    |
| P <sub>D</sub>    | Power Dissipation                 | SOT-23-5L | 600                     | mW    |
|                   |                                   | SOT-23    | 560                     |       |
|                   |                                   | DFN1x1-4L | 340                     |       |
| T <sub>STG</sub>  | Storage Temperature Range         |           | -55 to 125              | °C    |
| T <sub>A</sub>    | Operating Ambient Temperature     |           | -40 to 85               | °C    |
| T <sub>J</sub>    | Operating Junction Temperature    |           | +125                    | °C    |
| T <sub>LEAD</sub> | Lead Temperature(soldering) 5sec. |           | 260                     | °C    |
| θ <sub>JA</sub>   | Thermal Resistance Junction to    | SOT-23-5L | 166                     | °C/W  |

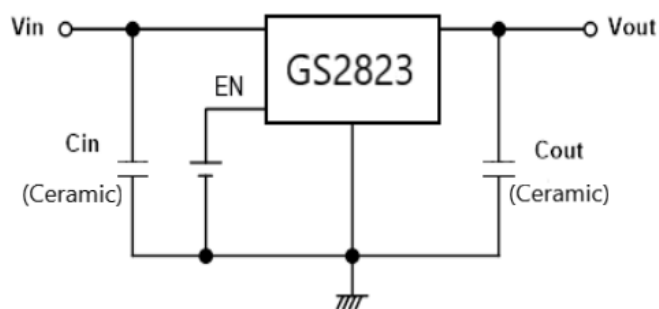
|  |         |           |     |  |
|--|---------|-----------|-----|--|
|  | Ambient | SOT-23    | 179 |  |
|  |         | DFN1x1-4L | 294 |  |

## Electrical Characteristics

(Unless otherwise specified  $V_{IN}=V_{OUT}+1V$ ,  $T_A=25^{\circ}C$ )

| Symbol                    | Parameter                              | Conditions                                                                         |                               | Min                   | Typ       | Max                   | Unit             |
|---------------------------|----------------------------------------|------------------------------------------------------------------------------------|-------------------------------|-----------------------|-----------|-----------------------|------------------|
| $I_{SS}$                  | Supply Current                         | $V_{IN}=V_{OUT}+1.0V$ , En pin=ON, No Load                                         |                               | -                     | 150       | -                     | $\mu A$          |
| $I_{stand-by}$            | Standby Current                        | $V_{IN}=V_{OUT}+1.0V$ , En pin=OFF, No Load                                        |                               | -                     | 0.01      | 0.4                   | $\mu A$          |
| $V_{IN}$                  | Input Voltage                          |                                                                                    |                               | 1.6                   | -         | 5.5                   | V                |
| $V_{OUT}$                 | Output Voltage                         | $V_{IN}=V_{OUT}+1.0V$<br>$I_{OUT} = 10mA$                                          | $V_{OUT}<2.0V$                | $V_{OUT}-0.02$        | $V_{OUT}$ | $V_{OUT}+0.02$        | V                |
|                           |                                        |                                                                                    | $V_{OUT} \geq 2V$             | $V_{OUT} \times 0.99$ | $V_{OUT}$ | $V_{OUT} \times 1.01$ |                  |
| $I_{OUTMAX}$              | Max Output Current                     | $V_{IN} \geq V_{OUT}+1.0V$                                                         | $1.2V \leq V_{OUT} \leq 4.0V$ | 300                   | -         | -                     | mA               |
| $\Delta V_{LINE}$         | Line regulation                        | $V_{OUT}+0.5V \leq V_{IN} \leq 5.5V$<br>$I_{OUT} = 50mA$                           | $1.2V \leq V_{OUT} \leq 4.0V$ | -                     | 0.01      | 0.1                   | %/V              |
| $\Delta V_{LOAD}$         | Load Regulation                        | $V_{IN}=V_{OUT}+1V$<br>$0.1mA \leq I_{OUT} \leq 300mA$                             | $1.2V \leq V_{OUT} \leq 4.0V$ | -                     | 25        | 45                    | mV               |
| $V_{DROP}$                | Dropout Voltage                        | $I_{OUT} = 300mA$                                                                  | $1.2V \leq V_{OUT} < 1.3V$    | -                     | 0.48      | 0.63                  | V                |
|                           |                                        |                                                                                    | $1.3V \leq V_{OUT} < 1.4V$    | -                     | 0.44      | 0.58                  |                  |
|                           |                                        |                                                                                    | $1.4V \leq V_{OUT} < 1.5V$    | -                     | 0.42      | 0.52                  |                  |
|                           |                                        |                                                                                    | $1.5V \leq V_{OUT} < 1.6V$    | -                     | 0.42      | 0.46                  |                  |
|                           |                                        |                                                                                    | $1.6V \leq V_{OUT} < 1.8V$    | -                     | 0.40      | 0.44                  |                  |
|                           |                                        |                                                                                    | $1.8V \leq V_{OUT} < 2.0V$    | -                     | 0.30      | 0.41                  |                  |
|                           |                                        |                                                                                    | $2.0V \leq V_{OUT} < 2.5V$    | -                     | 0.27      | 0.38                  |                  |
|                           |                                        |                                                                                    | $2.5V \leq V_{OUT} < 3.0V$    | -                     | 0.24      | 0.35                  |                  |
|                           |                                        |                                                                                    | $3.0V < V_{OUT} \leq 4.0V$    | -                     | 0.20      | 0.31                  |                  |
| $\Delta V_{OUT}/\Delta T$ | Output Voltage Temperature Coefficient | $V_{IN}=V_{OUT}+1V$ , $I_{OUT}=10mA$ ,<br>$-40^{\circ}C \leq T_A \leq 85^{\circ}C$ |                               | -                     | $\pm 100$ | -                     | ppm/ $^{\circ}C$ |
| PSRR                      | Power Supply Rejection Ratio           | $V_{IN}=V_{OUT}+1V$<br>$I_{OUT}=30mA$ , $f=1KHZ$                                   |                               |                       | 80        |                       | dB               |
| $V_{EN(HI)}$              | EN Input High Voltage                  | $V_{IN}=V_{OUT}+1V$                                                                |                               | 1.0                   | -         | -                     | V                |
| $V_{EN(LO)}$              | EN Input Low Voltage                   | $V_{IN}=V_{OUT}+1V$                                                                |                               | -                     | -         | 0.3                   | V                |
| $I_{EN(HI)}$              | EN Input High Current                  | $V_{IN}=V_{EN}=5.5V$                                                               |                               | 3.0                   | 5.5       | 9.0                   | $\mu A$          |
| $I_{EN(LO)}$              | EN Input Low Current                   | $V_{EN}=0V$                                                                        |                               | -0.1                  | -         | 0.1                   | $\mu A$          |
| $I_{short}$               | Short-Circuit Current                  | $V_{IN}=V_{OUT}+1.0V$ , En Pin=ON, $V_{OUT}=0V$                                    |                               | -                     | 50        | -                     | mA               |
| $I_{LIM}$                 | Current Limit                          | $V_{IN}=V_{EN}$                                                                    |                               | 310                   | 400       | -                     | mA               |
| $I_{RUSH}$                | Inrush Current                         | $V_{IN}=5.5V$ , $V_{EN}=0 \sim 5.5V$                                               |                               | -                     | 150       | -                     | mA               |
| $R_{DCHG}$                | On Resistance for Discharge            | $V_{IN}=5.5V$ , $V_{OUT}=2V$ , $V_{EN}=0V$                                         |                               | -                     | 280       | -                     | $\Omega$         |

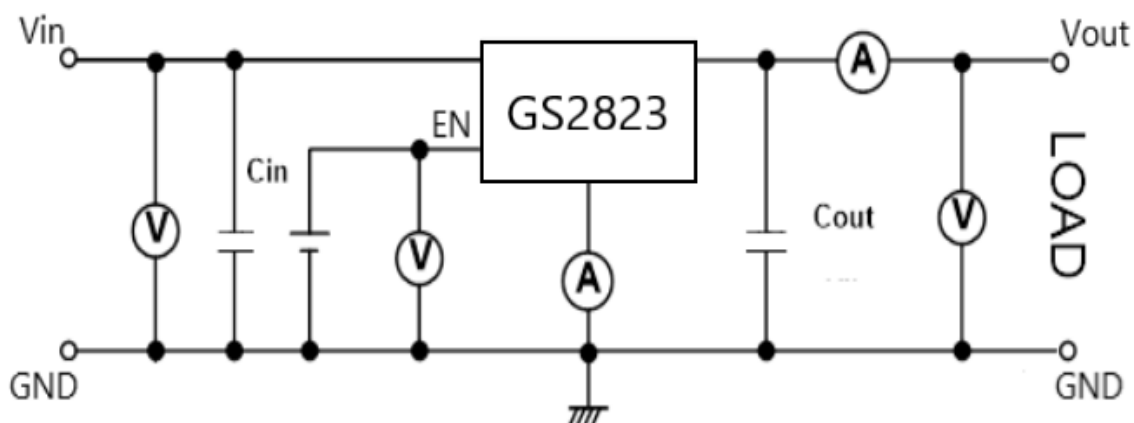
## Typical Applications



$C_{IN}$  :  $1\mu F$  or more.  $C_{OUT}$  :  $1\mu F$  or more

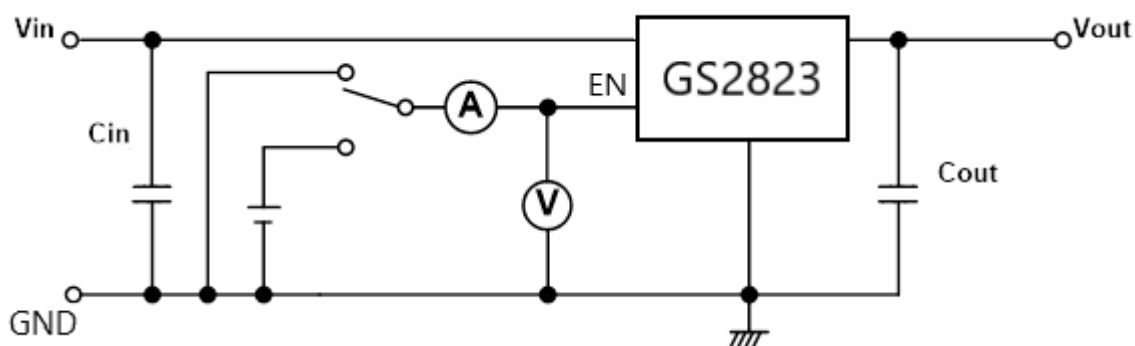
## Test Circuit

### Operating Function Test



$C_{IN}$  :  $1\mu F$  or more.  $C_{OUT}$  :  $1\mu F$  or more

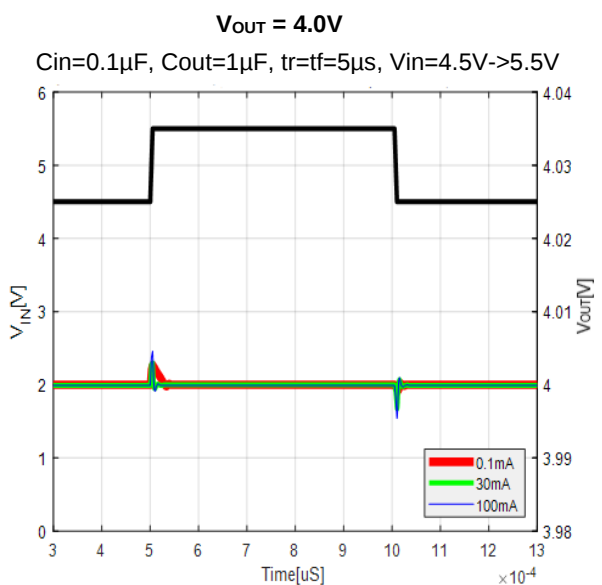
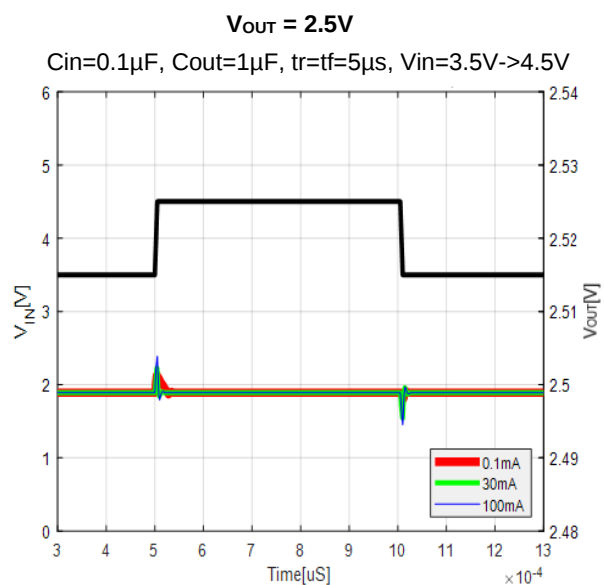
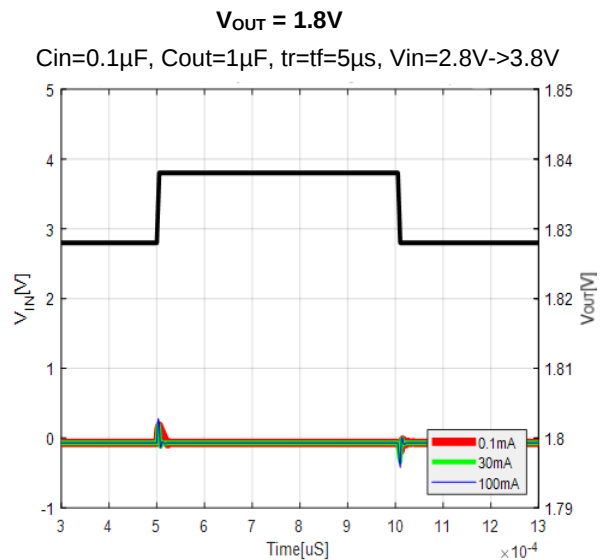
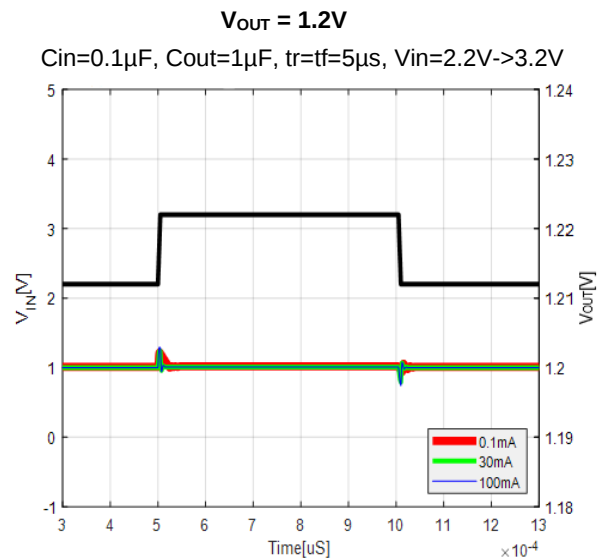
### Enable Function Test



$C_{IN}$  :  $1\mu F$  or more.  $C_{OUT}$  :  $1\mu F$  or more

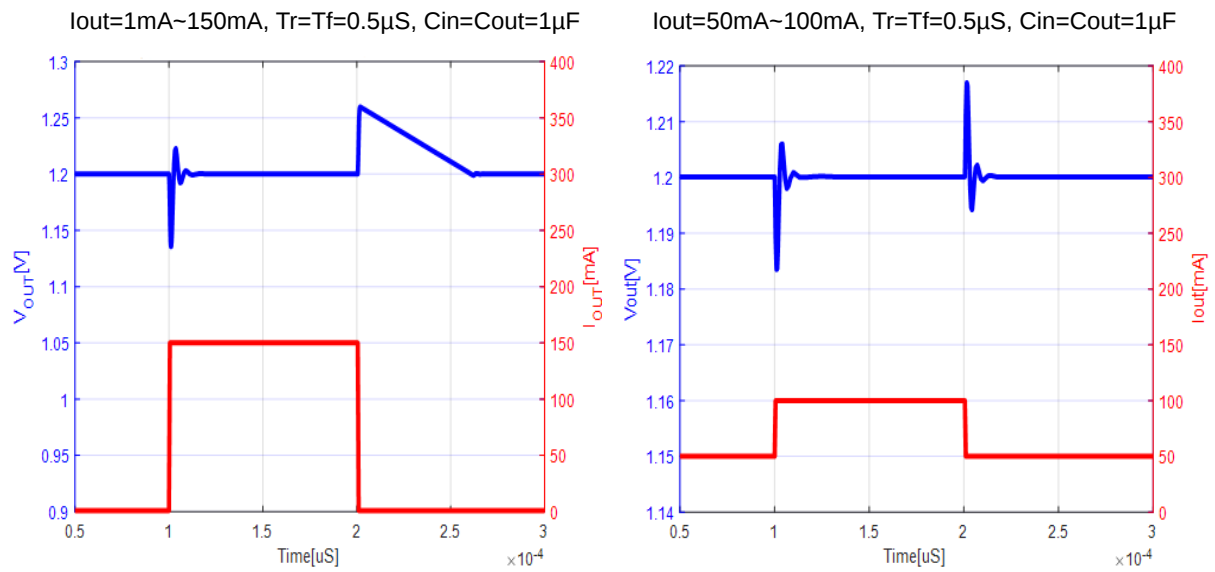
## Typical Performance Characteristics

### Line Transient response characteristics ( $T_A=25^\circ\text{C}$ )

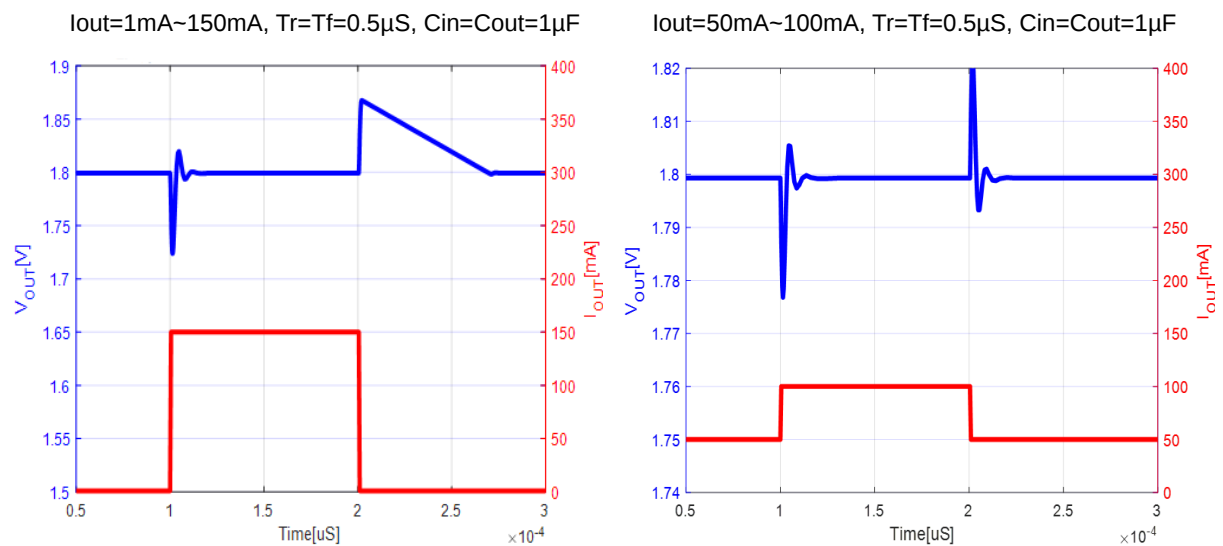


## Load Transient response characteristics (T<sub>A</sub>=25°C)

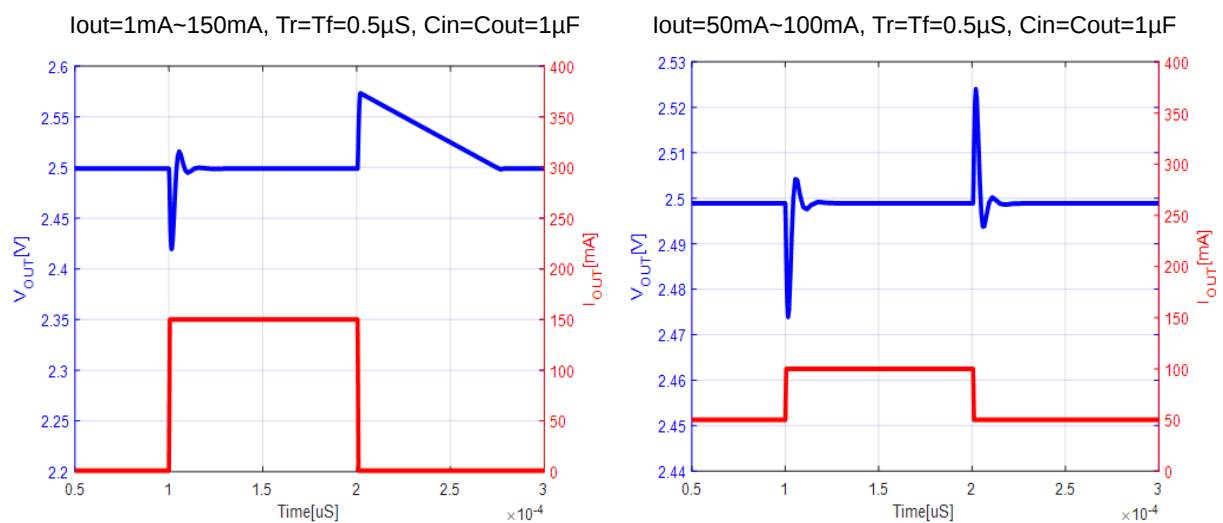
V<sub>OUT</sub> = 1.2V



V<sub>OUT</sub> = 1.8V

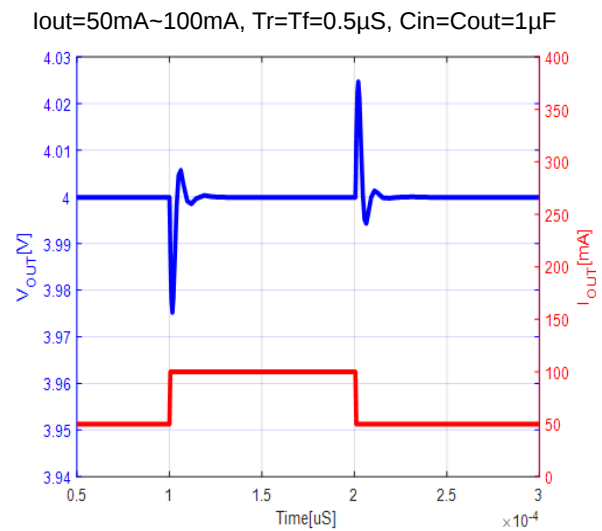
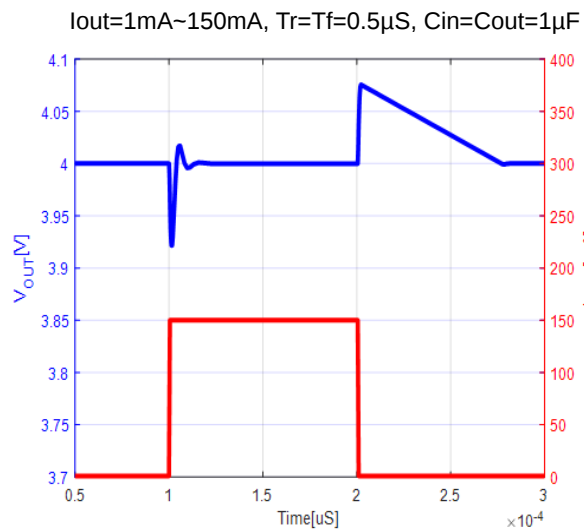


V<sub>OUT</sub> = 2.5V

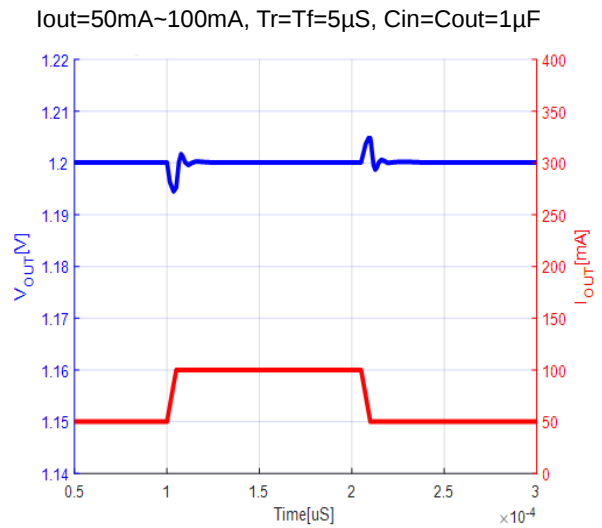
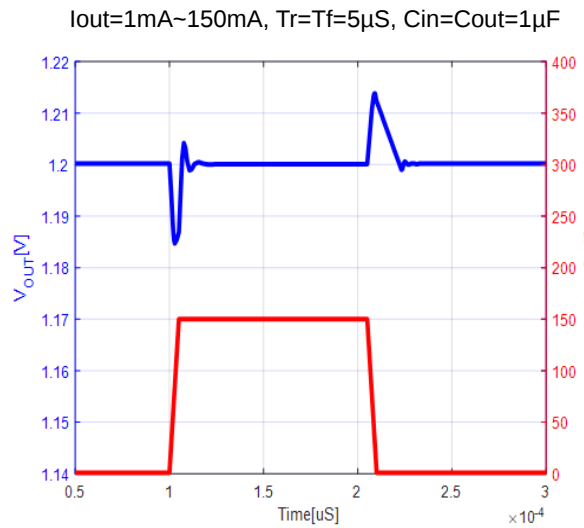


## Load Transient response characteristics (T<sub>A</sub>=25°C)

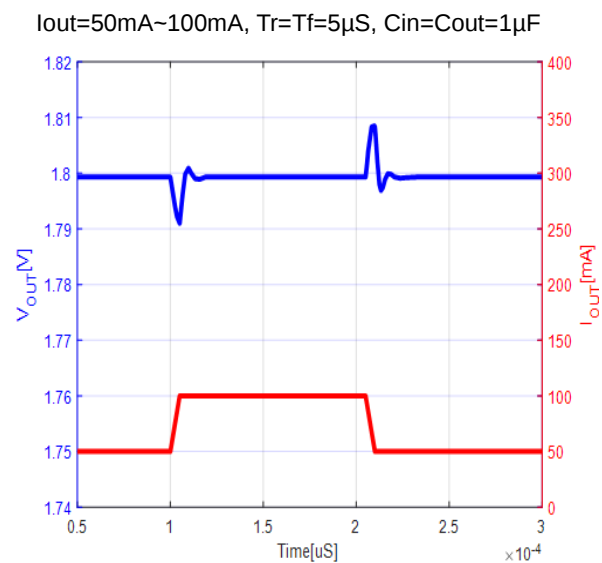
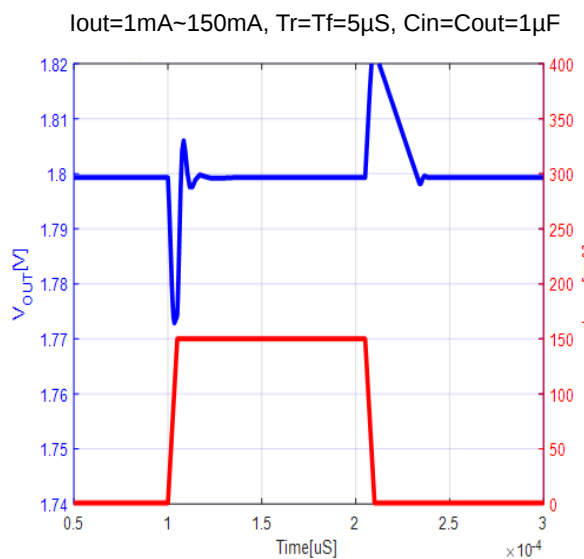
V<sub>OUT</sub> = 4.0V



V<sub>OUT</sub> = 1.2V

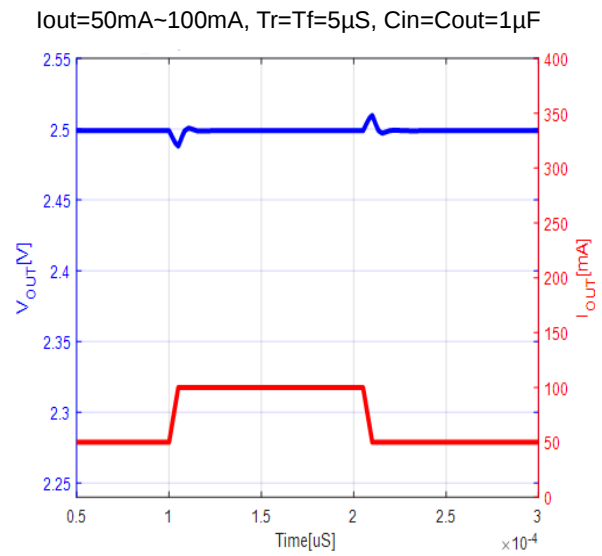
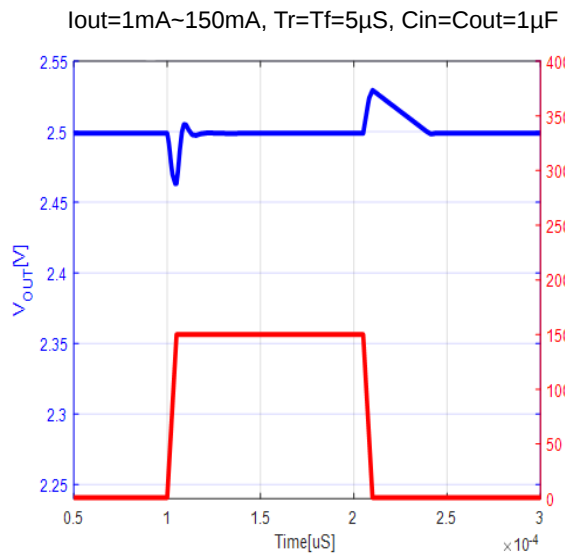


V<sub>OUT</sub> = 1.8V

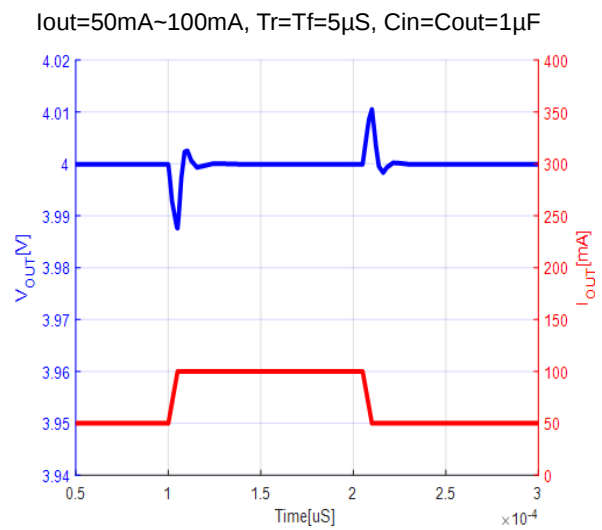
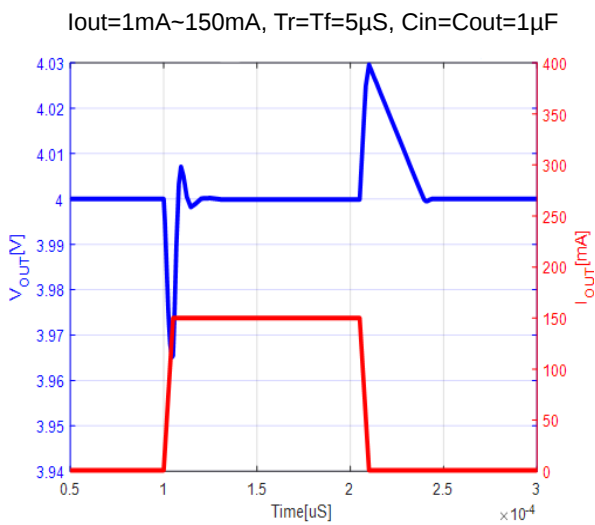


## Load Transient response characteristics ( $T_A=25^\circ\text{C}$ )

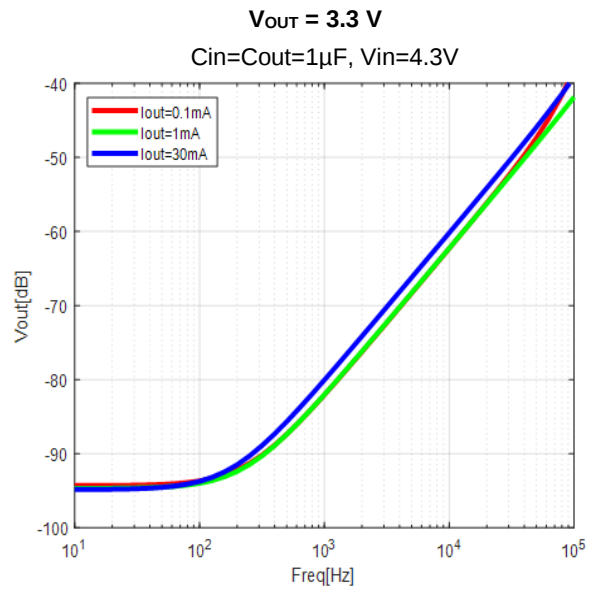
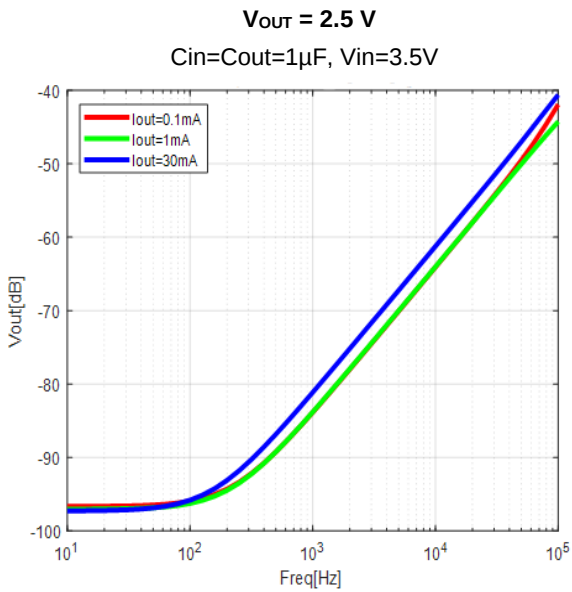
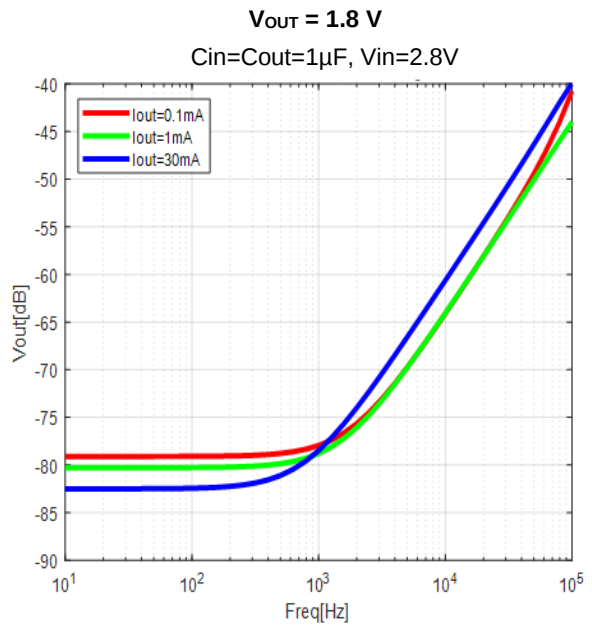
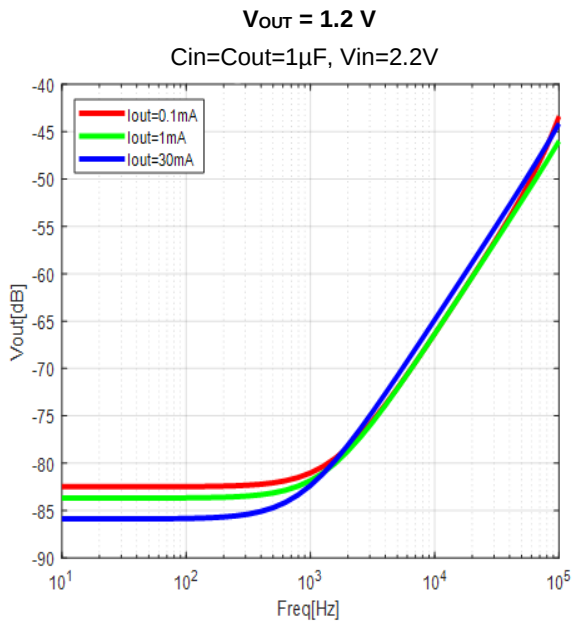
$V_{OUT} = 2.5\text{V}$



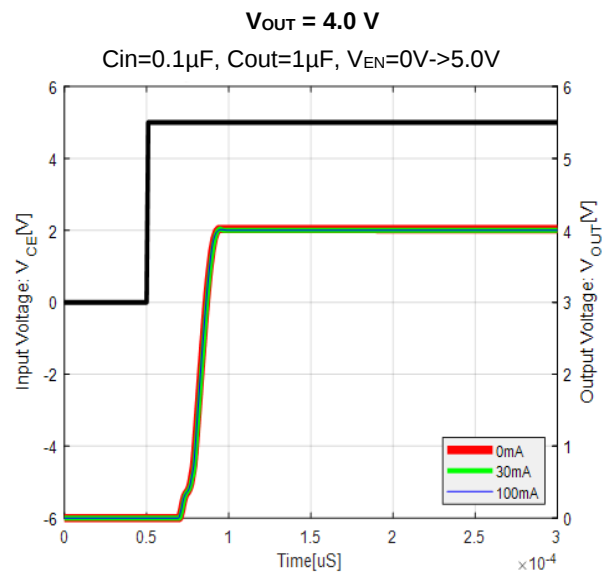
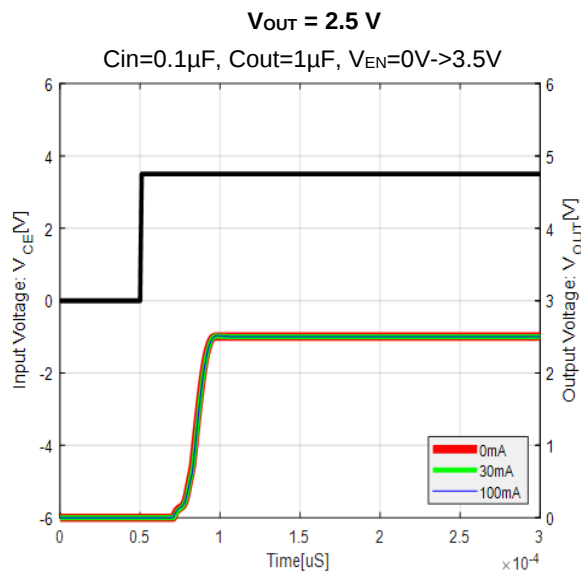
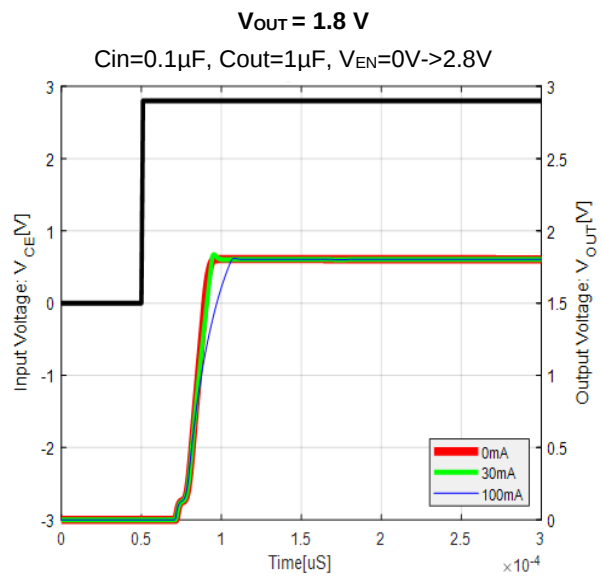
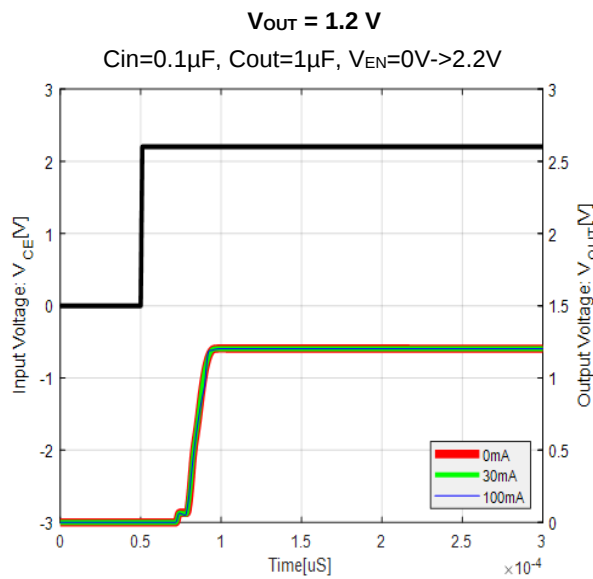
$V_{OUT} = 4.0\text{V}$



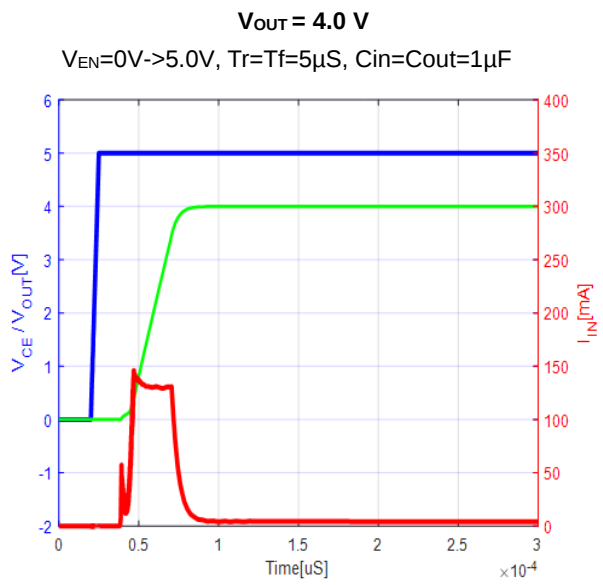
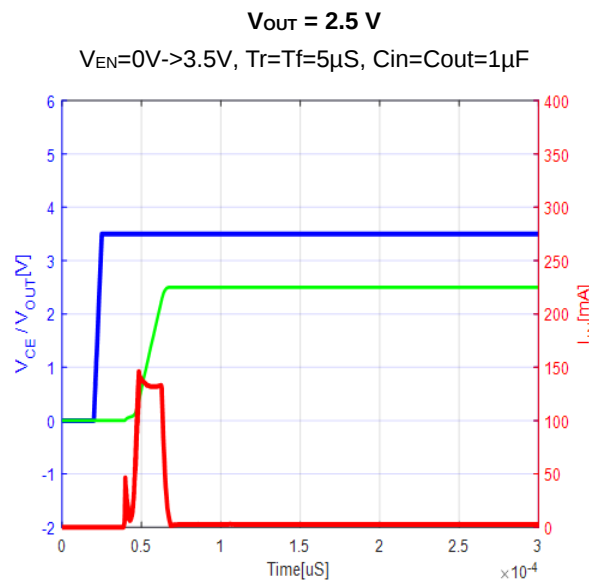
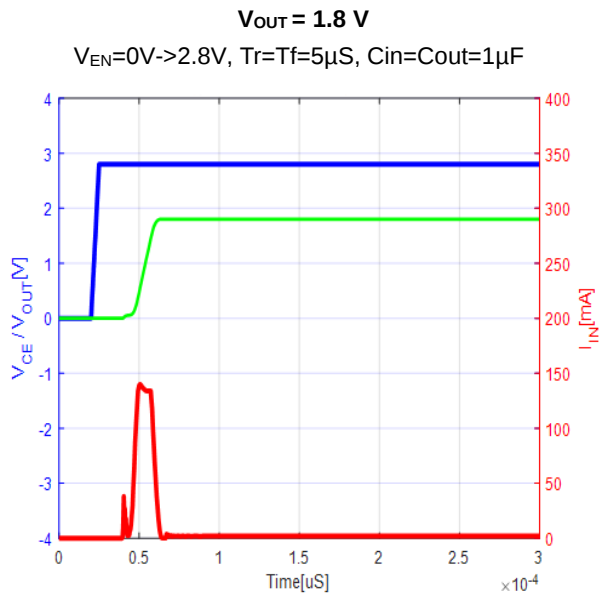
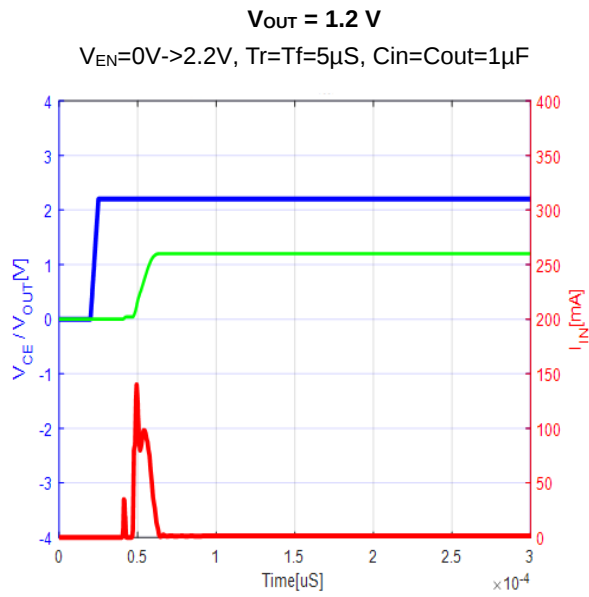
Ripple rejection ( $T_A=25^\circ\text{C}$ )



## EN Pin rising response characteristics ( $T_A=25^\circ\text{C}$ )

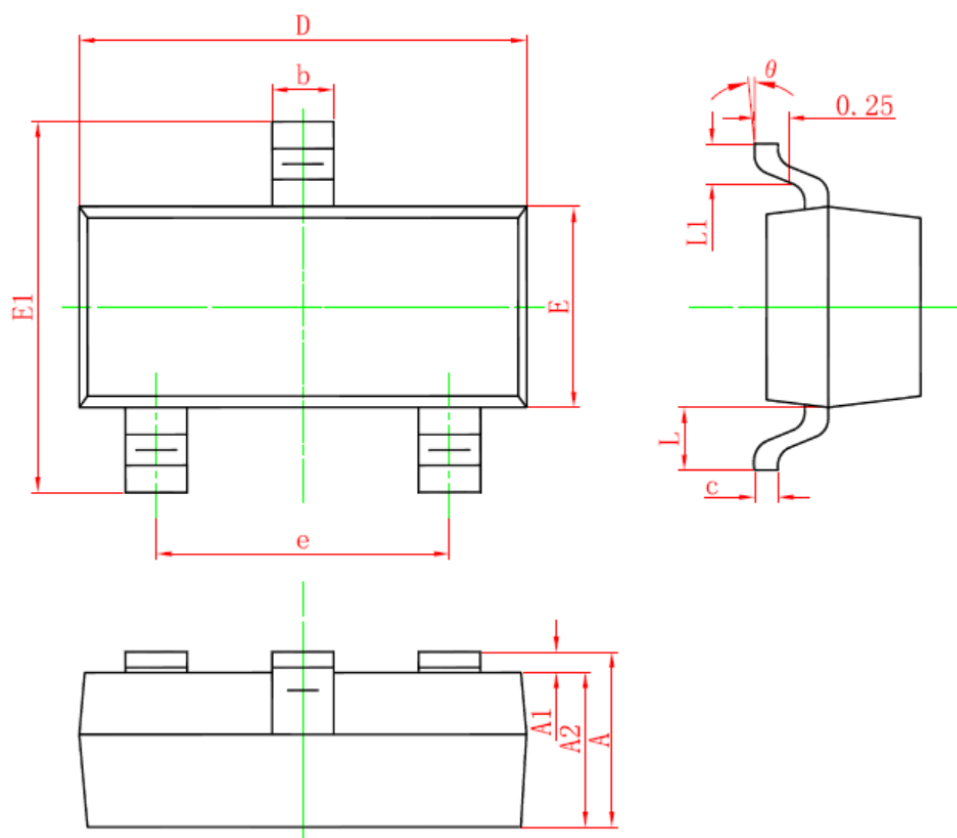


## Inrush Current Response Time( $T_A=25^{\circ}\text{C}$ )



## Package Dimension

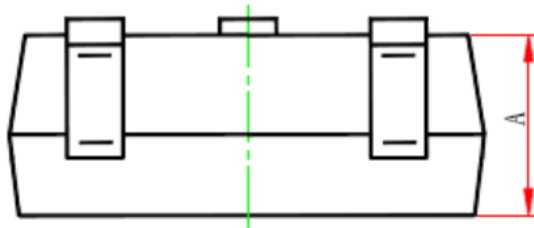
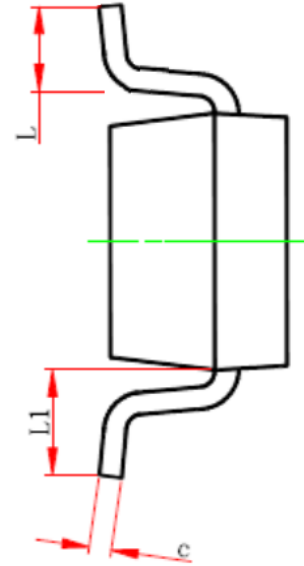
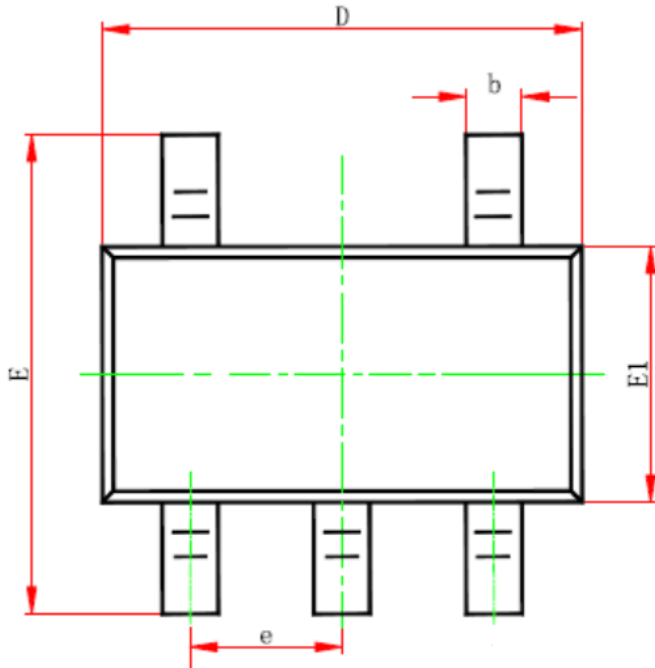
### SOT-23



### Dimensions

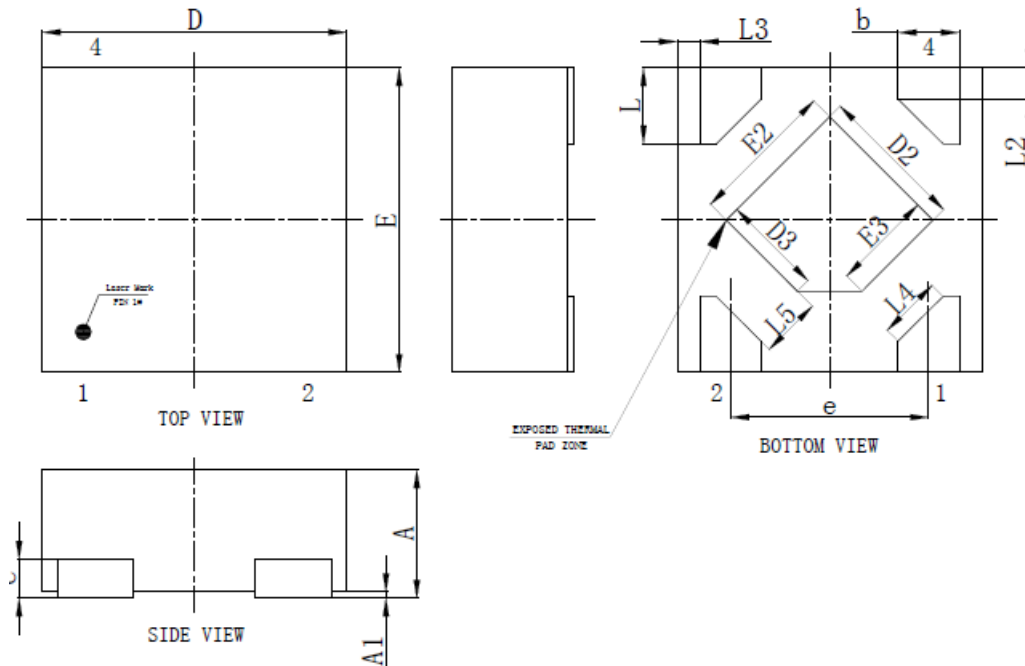
| SYMBOL                     | Millimeters |      | Inches      |       |
|----------------------------|-------------|------|-------------|-------|
|                            | MIN         | MAX  | MIN         | MAX   |
| <b>A</b>                   | 0.75        | 1.15 | 0.030       | 0.045 |
| <b>A1</b>                  | 0.00        | 0.10 | 0.000       | 0.004 |
| <b>A2</b>                  | 0.90        | 1.10 | 0.035       | 0.043 |
| <b>b</b>                   | 0.30        | 0.50 | 0.012       | 0.020 |
| <b>c</b>                   | 0.13        | 0.20 | 0.005       | 0.008 |
| <b>D</b>                   | 2.80        | 3.00 | 0.110       | 0.118 |
| <b>E</b>                   | 1.20        | 1.40 | 0.047       | 0.055 |
| <b>E1</b>                  | 2.25        | 2.55 | 0.089       | 0.100 |
| <b>e</b>                   | 1.90 (TYP)  |      | 0.075 (TYP) |       |
| <b>L</b>                   | 0.55 (TYP)  |      | 0.022 (TYP) |       |
| <b>L1</b>                  | 0.30        | 0.50 | 0.012       | 0.020 |
| <b><math>\theta</math></b> | 0°          | 8°   | 0°          | 8°    |

## SOT-23-5L



| Dimensions |             |      |             |       |
|------------|-------------|------|-------------|-------|
| SYMBOL     | Millimeters |      | Inches      |       |
|            | MIN         | MAX  | MIN         | MAX   |
| A          | 1.05        | 1.25 | 0.041       | 0.049 |
| b          | 0.30        | 0.50 | 0.012       | 0.020 |
| c          | 0.10        | 0.20 | 0.004       | 0.008 |
| D          | 2.82        | 3.02 | 0.111       | 0.119 |
| E          | 2.80        | 3.10 | 0.110       | 0.122 |
| E1         | 1.50        | 1.70 | 0.059       | 0.067 |
| e          | 0.95 (TYP)  |      | 0.037 (TYP) |       |
| L          | 0.30        | 0.60 | 0.012       | 0.024 |
| L1         | 0.65 (TYP)  |      | 0.026 (TYP) |       |

## DFN1x1-4L



### Dimensions

| SYMBOL | Millimeters |       | Inches      |       |
|--------|-------------|-------|-------------|-------|
|        | MIN         | MAX   | MIN         | MAX   |
| A      | 0.350       | 0.400 | 0.014       | 0.016 |
| A1     | 0.000       | 0.050 | 0.000       | 0.002 |
| b      | 0.200       | 0.300 | 0.008       | 0.012 |
| b1     | 0.130       | 0.230 | 0.005       | 0.009 |
| c      | 0.070       | 0.170 | 0.003       | 0.007 |
| D      | 0.950       | 1.050 | 0.037       | 0.041 |
| D2     | 0.430       | 0.530 | 0.017       | 0.021 |
| e      | 0.650(BSC). |       | 0.026(BSC). |       |
| E      | 0.950       | 1.050 | 0.037       | 0.041 |
| E2     | 0.430       | 0.530 | 0.017       | 0.021 |
| L      | 0.200       | 0.300 | 0.008       | 0.012 |
| L1     | 0.270       | 0.370 | 0.011       | 0.015 |
| L2     | 0.077(REF). |       | 0.003(REF). |       |
| L3     | 0.050(REF). |       | 0.002(REF). |       |
| L4     | 0.340(REF). |       | 0.013(REF). |       |
| L5     | 0.200(REF). |       | 0.008(REF). |       |
| R      | 0.050(REF). |       | 0.002(REF). |       |
| h      | 0.060(REF). |       | 0.002(REF). |       |



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