

# ELM86xxxxBxA Dual 400mA LDO Regulator

## ■ General description

ELM86xxxxBxA is dual CMOS Voltage Regulator which consists of 2 large current LDOs. With the chip enable function of each channel, it is possible to control on/off independently. This chip enable control logic is managed by positive logic. The standby current is designed to be  $0.1\mu\text{A}$  (Typ.). ELM86 series is available only in SOT-26 PKG, while the output voltage is fixed within the range of 1.2 ~ 4.0V. The internal short protection function will limit output current when VOUT pin is in short condition; meanwhile, thermal protection circuit will shut off the output voltage and current when an unusual high chip temperature is detected.

## ■ Features

- Output voltage range : 1.2V~4.0V (by 0.1V)
- Input-output voltage difference : Typ.120mV (Vout=3.0V, Iout=100mA)
- Standby current consumption : Typ.  $0.1\mu\text{A}$
- Current consumption : Typ.  $25\mu\text{A}$
- Input stability : Typ. 0.02%/V (Iout=40mA)
- Load stability : Typ. 5mV ( $1\text{mA} \leq \text{Iout} \leq 100\text{mA}$ )
- Accuracy of output voltage :  $\pm 2.0\%$  (Vout > 1.5V),  
 $\pm 30\text{mV}$  (Vout  $\leq$  1.5V)
- Short circuit current limiter : Typ. 40mA (Vout=0V)
- Thermal shutdown protection : Typ.  $165^\circ\text{C}$
- Package : SOT-26

## ■ Application

- Portable electronics
- Wireless devices
- Cell phones
- Battery-operated devices

## ■ Maximum absolute ratings

| Parameter                              | Symbol        | Limit                        | Unit                      |
|--|---------------|------------------------------|---------------------------|
| Input voltage                          | Vin           | $V_{ss}-0.3 \sim 10.0$       | V                         |
| CE1,CE2 Input voltage                  | Vce           | $V_{ss}-0.3 \sim V_{in}+0.3$ | V                         |
| Vout1,Vout2 voltage                    | Vout          | $V_{ss}-0.3 \sim V_{in}+0.3$ | V                         |
| Output current Iout1+Iout2             | Iout          | 800                          | mA                        |
| Power dissipation                      | Pd            | 300                          | mW                        |
| Thermal resistance junction to ambient | R $\theta$ ja | 400                          | $^\circ\text{C}/\text{W}$ |
| Operating Temperature                  | Top           | -40~+85                      | $^\circ\text{C}$          |
| Storage Temperature                    | Tstg          | -55~+125                     | $^\circ\text{C}$          |

# ELM86xxxxBxA Dual 400mA LDO Regulator

## ■ Selection guide

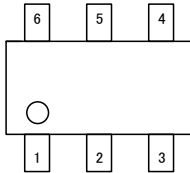
### ELM86xxxxBxA-S

| Symbol |                         |  |
|--------|-------------------------|--|
| a,b    | Output voltage1 (Vout1) | e.g. :<br>12: Vout=1.2V 18: Vout=1.8V<br>30: Vout=3.0V 33: Vout=3.3V |
| c,d    | Output voltage2 (Vout2) | e.g. :<br>12: Vout=1.2V 18: Vout=1.8V<br>30: Vout=3.0V 33: Vout=3.3V |
| e      | Package                 | B : SOT-26   |
| f      | Pin configuration type  | 1 : Type1<br>2 : Type2   |
| g      | Product version         | A  |
| h      | Taping direction        | S : Refer to PKG file  |

ELM86 x x x x B x A - S  
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 a b c d e f g h

## ■ Pin configuration

SOT-26 (TOP VIEW)



ELM86xxxxB1A

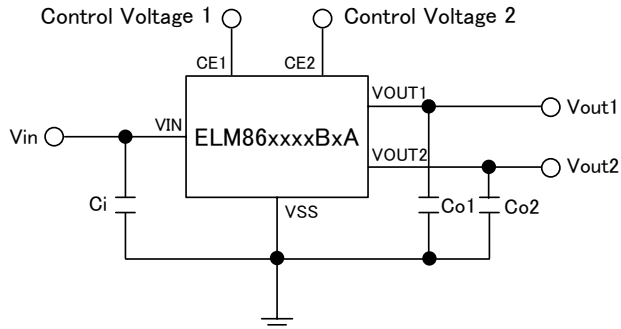
| Pin No. | Pin name |
|---------|----------|
| 1       | VOUT2    |
| 2       | VSS      |
| 3       | CE2 *    |
| 4       | CE1 *    |
| 5       | VIN      |
| 6       | VOUT1    |

ELM86xxxxB2A

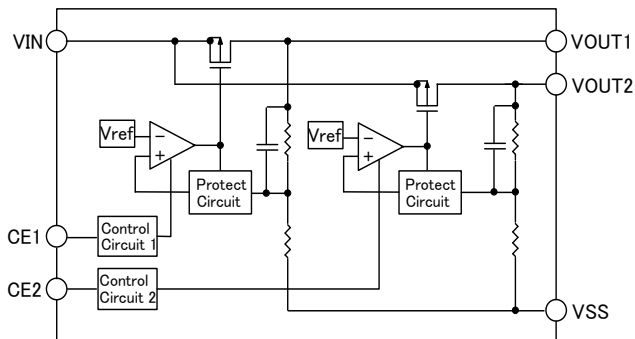
| Pin No. | Pin name |
|---------|----------|
| 1       | CE1 *    |
| 2       | VIN      |
| 3       | CE2 *    |
| 4       | VOUT2    |
| 5       | VSS      |
| 6       | VOUT1    |

\* CE1,CE2 : Active high

## ■ Standard circuit



## ■ Block diagram



## ■ Electrical characteristics

Vout1, Vout2=1.2V (ELM861212BxA)

Top=25°C

| Parameter                              | Symbol                            | Condition                                | Min.  | Typ.  | Max.  | Unit              |
|--|-----------------------------------|--|-------|-------|-------|-------------------|
| Output voltage                         | Vout                              | Vin=2.2V, Iout=40mA                      | 1.170 | 1.200 | 1.230 | V                 |
| Output current                         | Iout                              | Vin=2.2V                                 | 240   |       |       | mA                |
| Input stability                        | $\Delta V_{out} / \Delta V_{in}$  | Iout=40mA, 1.7V ≤ Vin ≤ 6.0V             |       | 0.02  | 0.20  | %/V               |
| Load stability                         | $\Delta V_{out} / \Delta I_{out}$ | 1mA ≤ Iout ≤ 100mA, Vin=2.2V             |       | 5     | 20    | mV                |
| Input-Output voltage differential      | Vdif                              | Iout=100mA                               |       | 380   | 620   | mV                |
| Current consumption                    | I <sub>ss</sub>                   | Vin=Vce=2.2V, No-load                    |       | 15    | 50    | μA                |
| Standby current consumption            | I <sub>standby</sub>              | Vin=2.2V, Vce=0V                         |       | 0.1   | 0.5   | μA                |
| Input voltage                          | Vin                               |  | 1.4   |       | 6.0   | V                 |
| CE input voltage High                  | Vceh                              | Vin=6.0V                                 | 1.8   |       | Vin   | V                 |
| CE input voltage Low                   | Vcel                              | Vin=1.4V                                 | 0.00  |       | 0.25  | V                 |
| CE input current High                  | Iceh                              | Vin=Vce=2.2V                             | -0.5  | 0.05  | 0.5   | μA                |
| CE input current Low                   | Icel                              | Vin=2.2V, Vce=0V                         | -0.5  | 0.0   | 0.5   | μA                |
| Output voltage temperature coefficient | $\Delta V_{out} / \Delta T_{op}$  | -40°C ≤ Top ≤ +85°C, Iout=40mA, Vin=2.2V |       | ±100  |       | ppm/°C            |
| Short circuit current                  | I <sub>lim</sub>                  | Vout=0V                                  |       | 40    |       | mA                |
| Ripple rejection ratio                 | RR                                | f=1kHz, Iout=40mA                        |       | 60    |       | dB                |
| Thermal shutdown temperature           | T <sub>sd</sub>                   |  |       | 165   |       | °C                |
| Output noise                           | V <sub>no</sub>                   | BW=10Hz ~ 100kHz                         |       | 30    |       | μV <sub>rms</sub> |

\*: Electrical characteristics of both channels are identical while this table only represents those of one channel.

# ELM86xxxxBxA Dual 400mA LDO Regulator

Vout1, Vout2=1.8V (ELM861818BxA)

Top=25°C

| Parameter                              | Symbol                            | Condition                                | Min.  | Typ.  | Max.  | Unit              |
|--|-----------------------------------|--|-------|-------|-------|-------------------|
| Output voltage                         | Vout                              | Vin=2.8V, Iout=40mA                      | 1.764 | 1.800 | 1.836 | V                 |
| Output current                         | Iout                              | Vin=2.8V                                 | 300   |       |       | mA                |
| Input stability                        | $\Delta V_{out} / \Delta V_{in}$  | Iout=40mA, 2.3V ≤ Vin ≤ 6.0V             |       | 0.02  | 0.20  | %/V               |
| Load stability                         | $\Delta V_{out} / \Delta I_{out}$ | 1mA ≤ Iout ≤ 100mA, Vin=2.8V             |       | 5     | 20    | mV                |
| Input-Output voltage differential      | Vdif                              | Iout=100mA                               |       | 145   | 230   | mV                |
| Current consumption                    | I <sub>ss</sub>                   | Vin=Vce=2.8V, No-load                    |       | 15    | 50    | μA                |
| Standby current consumption            | I <sub>standby</sub>              | Vin=2.8V, Vce=0V                         |       | 0.1   | 0.5   | μA                |
| Input voltage                          | Vin                               |  | 1.4   |       | 6.0   | V                 |
| CE input voltage High                  | Vceh                              | Vin=6.0V                                 | 1.8   |       | Vin   | V                 |
| CE input voltage Low                   | Vcel                              | Vin=1.4V                                 | 0.00  |       | 0.25  | V                 |
| CE input current High                  | Iceh                              | Vin=Vce=2.8V                             | -0.5  | 0.05  | 0.5   | μA                |
| CE input current Low                   | Icel                              | Vin=2.8V, Vce=0V                         | -0.5  | 0.0   | 0.5   | μA                |
| Output voltage temperature coefficient | $\Delta V_{out} / \Delta T_{top}$ | -40°C ≤ Top ≤ +85°C, Iout=40mA, Vin=2.8V |       | ±100  |       | ppm/°C            |
| Short circuit current                  | I <sub>lim</sub>                  | Vout=0V                                  |       | 40    |       | mA                |
| Ripple rejection ratio                 | RR                                | f=1kHz, Iout=40mA                        |       | 60    |       | dB                |
| Thermal shutdown temperature           | Tsd                               |  |       | 165   |       | °C                |
| Output noise                           | Vno                               | BW=10Hz ~ 100kHz                         |       | 30    |       | μV <sub>RMS</sub> |

\*: Electrical characteristics of both channels are identical while this table only represents those of one channel.

Vout1, Vout2=3.0V (ELM863030BxA)

Top=25°C

| Parameter                              | Symbol                            | Condition                                | Min.  | Typ.  | Max.  | Unit              |
|--|-----------------------------------|--|-------|-------|-------|-------------------|
| Output voltage                         | Vout                              | Vin=4.0V, Iout=40mA                      | 2.940 | 3.000 | 3.060 | V                 |
| Output current                         | Iout                              | Vin=4.0V                                 | 400   |       |       | mA                |
| Input stability                        | $\Delta V_{out} / \Delta V_{in}$  | Iout=40mA, 3.5V ≤ Vin ≤ 6.0V             |       | 0.02  | 0.20  | %/V               |
| Load stability                         | $\Delta V_{out} / \Delta I_{out}$ | 1mA ≤ Iout ≤ 100mA, Vin=4.0V             |       | 5     | 20    | mV                |
| Input-Output voltage differential      | Vdif                              | Iout=100mA                               |       | 110   | 175   | mV                |
| Current consumption                    | I <sub>ss</sub>                   | Vin=Vce=4.0V, No-load                    |       | 15    | 50    | μA                |
| Standby current consumption            | I <sub>standby</sub>              | Vin=4.0V, Vce=0V                         |       | 0.1   | 0.5   | μA                |
| Input voltage                          | Vin                               |  | 1.4   |       | 6.0   | V                 |
| CE input voltage High                  | Vceh                              | Vin=6.0V                                 | 1.8   |       | Vin   | V                 |
| CE input voltage Low                   | Vcel                              | Vin=1.4V                                 | 0.00  |       | 0.25  | V                 |
| CE input current High                  | Iceh                              | Vin=Vce=4.0V                             | -0.5  | 0.05  | 0.5   | μA                |
| CE input current Low                   | Icel                              | Vin=4.0V, Vce=0V                         | -0.5  | 0.0   | 0.5   | μA                |
| Output voltage temperature coefficient | $\Delta V_{out} / \Delta T_{top}$ | -40°C ≤ Top ≤ +85°C, Iout=40mA, Vin=4.0V |       | ±100  |       | ppm/°C            |
| Short circuit current                  | I <sub>lim</sub>                  | Vout=0V                                  |       | 40    |       | mA                |
| Ripple rejection ratio                 | RR                                | f=1kHz, Iout=40mA                        |       | 60    |       | dB                |
| Thermal shutdown temperature           | Tsd                               |  |       | 165   |       | °C                |
| Output noise                           | Vno                               | BW=10Hz ~ 100kHz                         |       | 30    |       | μV <sub>RMS</sub> |

\*: Electrical characteristics of both channels are identical while this table only represents those of one channel.

# ELM86xxxxBxA Dual 400mA LDO Regulator

Vout1, Vout2=3.3V (ELM863333BxA)

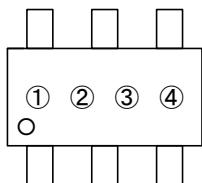
Top=25°C

| Parameter                              | Symbol                            | Condition                                | Min.  | Typ.  | Max.  | Unit   |
|--|-----------------------------------|--|-------|-------|-------|--------|
| Output voltage                         | Vout                              | Vin=4.3V, Iout=40mA                      | 3.234 | 3.300 | 3.366 | V      |
| Output current                         | Iout                              | Vin=4.3V                                 | 400   |       |       | mA     |
| Input stability                        | $\Delta V_{out} / \Delta V_{in}$  | Iout=40mA, 3.8V ≤ Vin ≤ 6.0V             |       | 0.02  | 0.20  | %/V    |
| Load stability                         | $\Delta V_{out} / \Delta I_{out}$ | 1mA ≤ Iout ≤ 100mA, Vin=4.3V             |       | 5     | 20    | mV     |
| Input-Output voltage differential      | Vdif                              | Iout=100mA                               |       | 110   | 175   | mV     |
| Current consumption                    | I <sub>ss</sub>                   | Vin=Vce=4.3V, No-load                    |       | 15    | 50    | μA     |
| Standby current consumption            | I <sub>standby</sub>              | Vin=4.3V, Vce=0V                         |       | 0.1   | 0.5   | μA     |
| Input voltage                          | Vin                               |  | 1.4   |       | 6.0   | V      |
| CE input voltage High                  | Vceh                              | Vin=6.0V                                 | 1.8   |       | Vin   | V      |
| CE input voltage Low                   | Vcel                              | Vin=1.4V                                 | 0.00  |       | 0.25  | V      |
| CE input current High                  | Iceh                              | Vin=Vce=4.3V                             | -0.5  | 0.05  | 0.5   | μA     |
| CE input current Low                   | Icel                              | Vin=4.3V, Vce=0V                         | -0.5  | 0.0   | 0.5   | μA     |
| Output voltage temperature coefficient | $\Delta V_{out} / \Delta T_{top}$ | -40°C ≤ Top ≤ +85°C, Iout=40mA, Vin=4.3V |       | ±100  |       | ppm/°C |
| Short circuit current                  | I <sub>lim</sub>                  | Vout=0V                                  |       | 40    |       | mA     |
| Ripple rejection ratio                 | RR                                | f=1kHz, Iout=40mA                        |       | 60    |       | dB     |
| Thermal shutdown temperature           | T <sub>sd</sub>                   |  |       | 165   |       | °C     |
| Output noise                           | V <sub>no</sub>                   | BW=10Hz ~ 100kHz                         |       | 30    |       | μVrms  |

\*: Electrical characteristics of both channels are identical while this table only represents those of one channel.

## ■ Marking

SOT-26



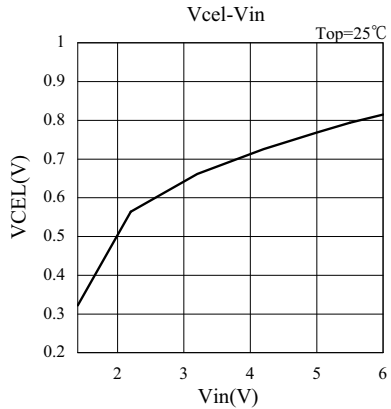
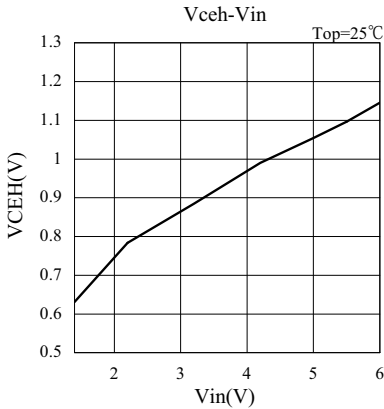
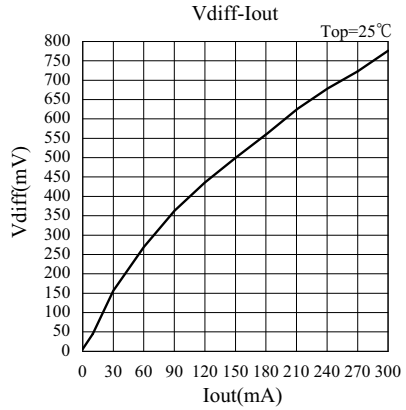
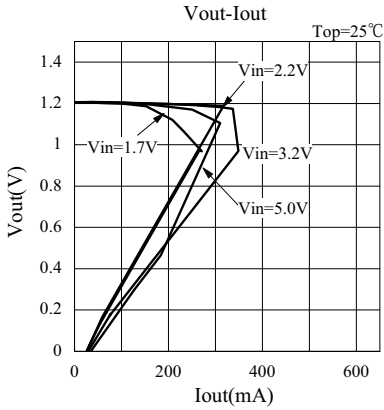
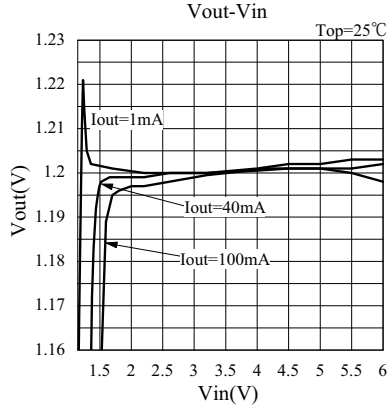
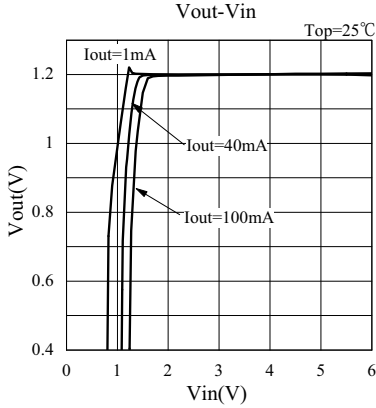
No. ①~④ : Assembly lot No.

A~Z (I, O, X excepted) and 0~9

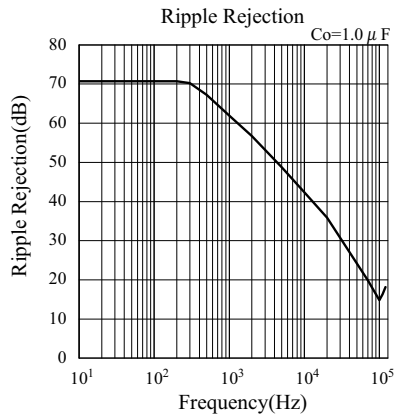
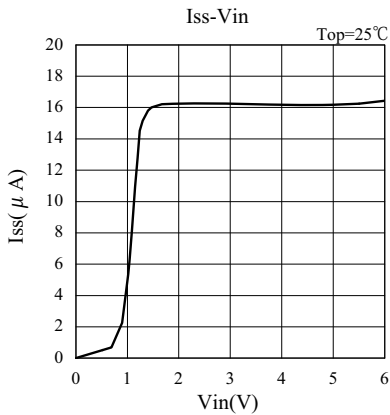
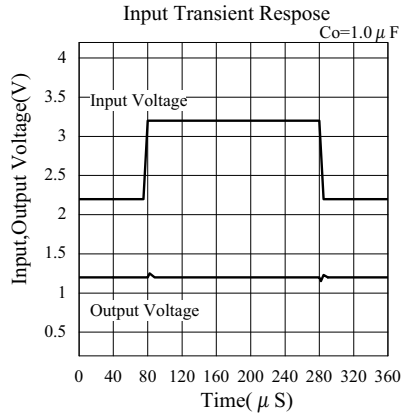
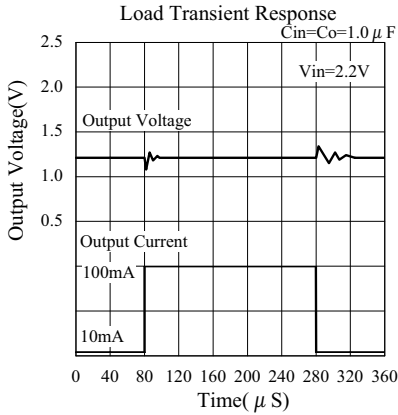
## Typical characteristics

(Electrical characteristics of both channels are identical and the following graphs represent typical characteristics of one channel.)

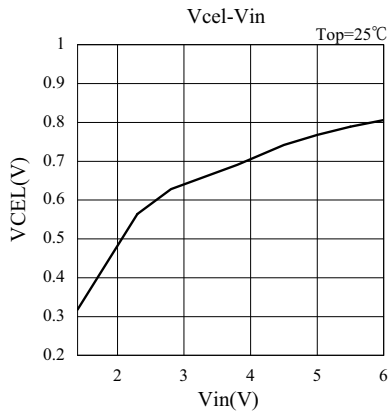
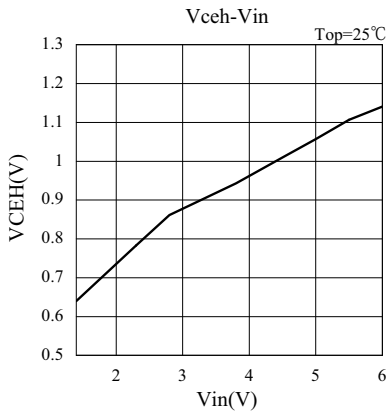
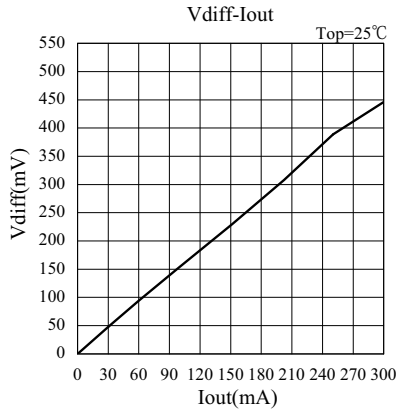
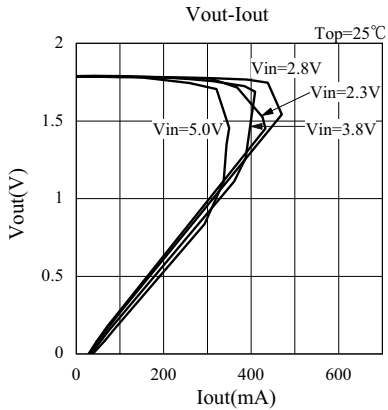
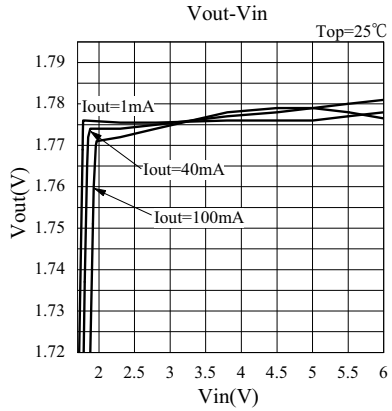
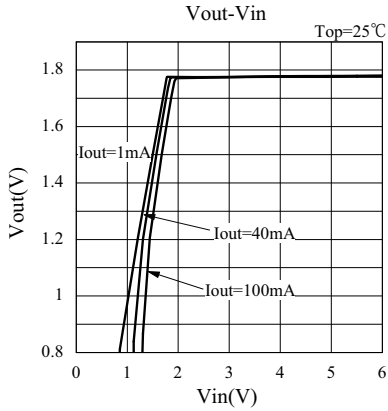
- 1.2V  $V_{out}$  unit



# ELM86xxxxBxA Dual 400mA LDO Regulator

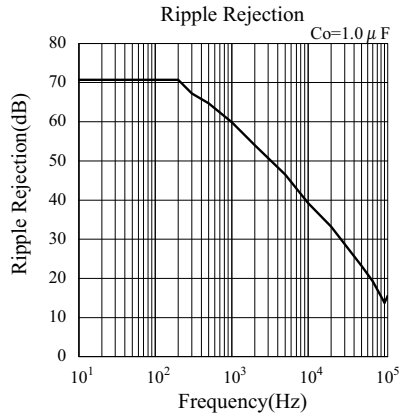
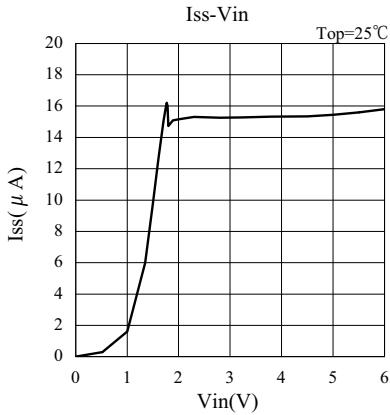
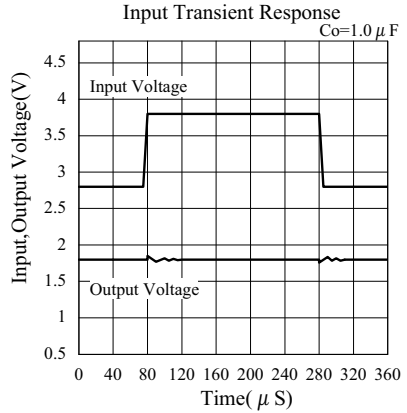
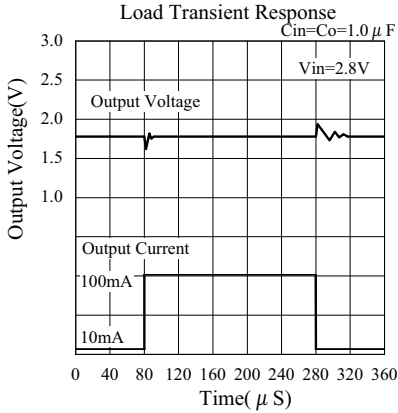


- 1.8V  $V_{out}$  unit

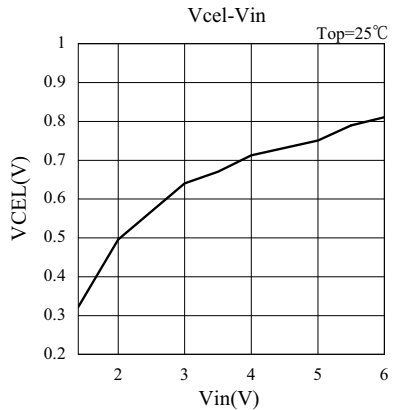
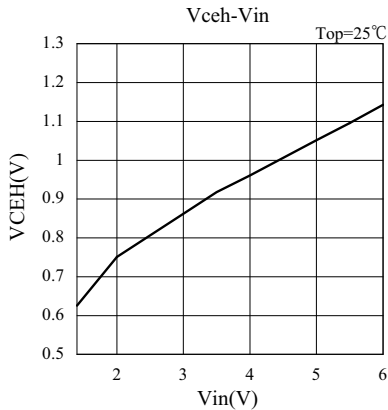
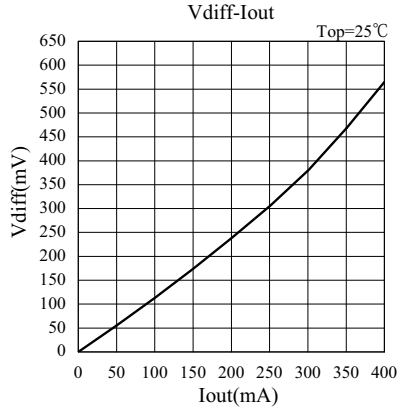
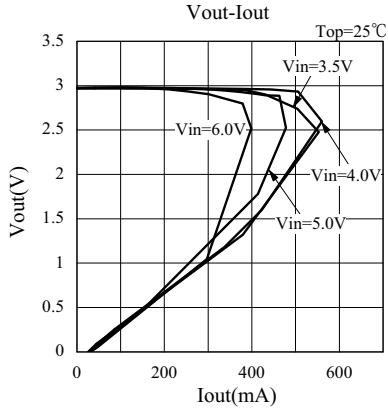
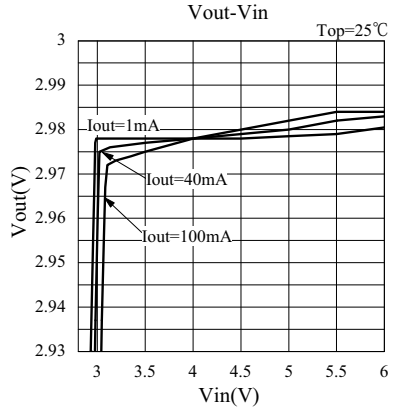
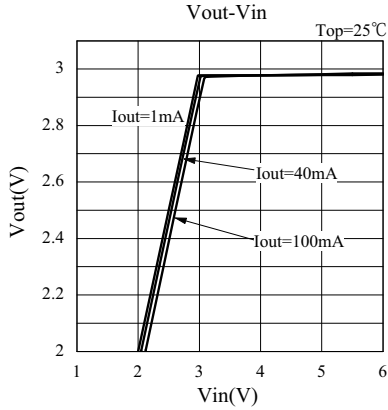




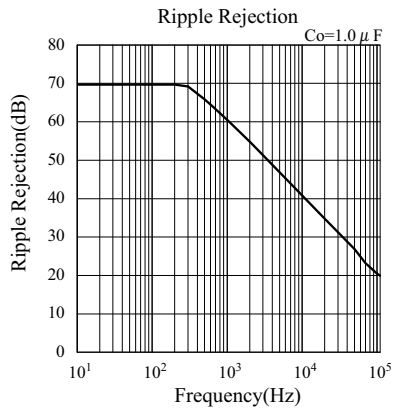
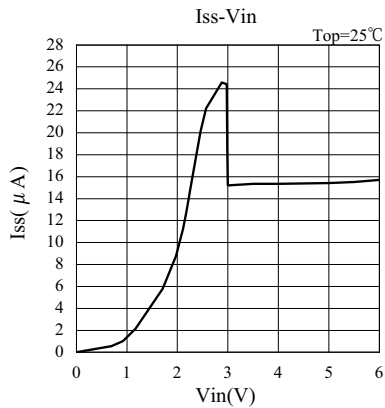
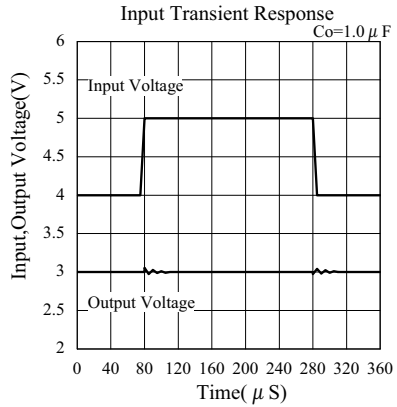
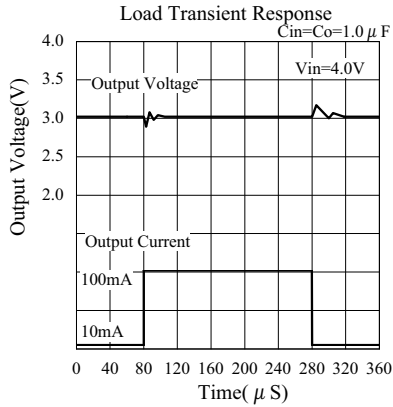
# ELM86xxxxBxA Dual 400mA LDO Regulator



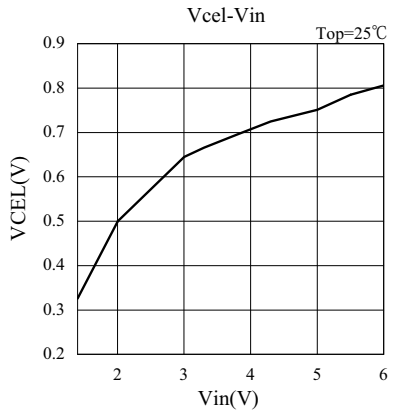
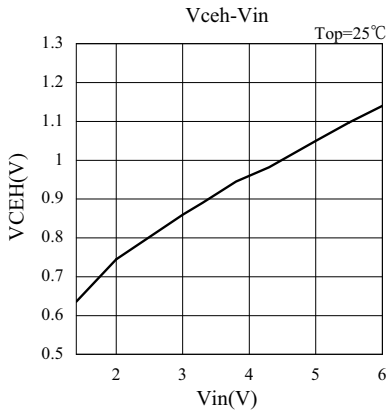
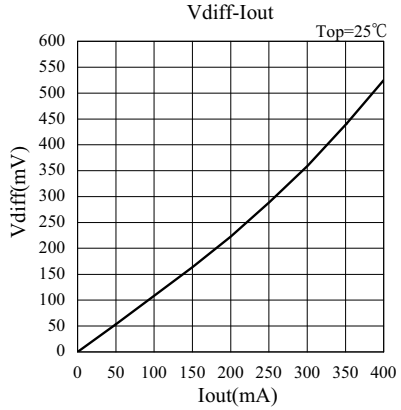
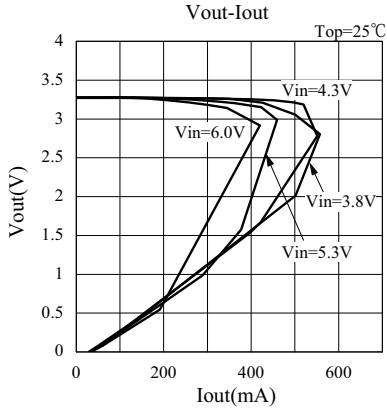
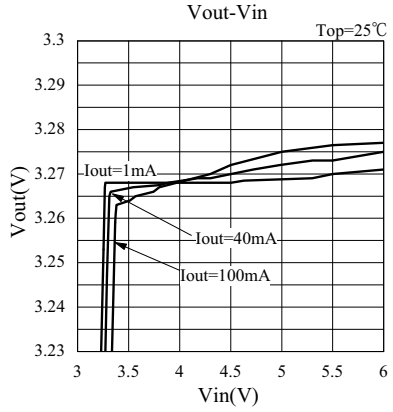
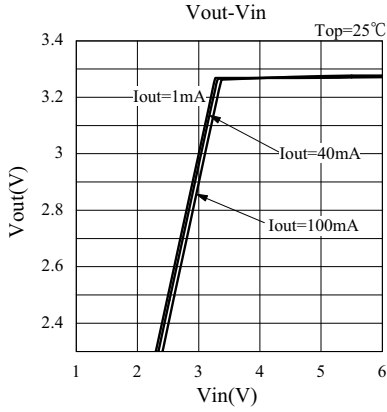
- 3.0V  $V_{out}$  unit



# ELM86xxxxBxA Dual 400mA LDO Regulator



- 3.3V  $V_{out}$  unit



# ELM86xxxxBxA Dual 400mA LDO Regulator

