

# ELM87xxxA Low power consumption CMOS 300mA V/R

## ■ General description

ELM87xxxA is the CMOS voltage regulator which is characterized with low current consumption and low dropout. ELM87 series provides high output current of 300mA while the consumption current is comparatively low, which is 1.0μA(Typ.). The standard output voltages are 1.8V, 2.5V, 3.0V, 3.3V, 5.0V; ELM87 series can also be designed as a semi-customed IC within the range of 1.5V~5.0V by 0.1V step. Thermal shutdown protection and short-circuit current limiter are included in the IC. Ceramic condenser with low ESR can be used as input and output ones. ELM87 series is available in SOT-89, SOT-23, SC-70 package.

## ■ Features

- Output voltage range : 1.5V~5.0V (by 0.1V)
- Maximum output current : 200mA (1.5V~3.9V)  
300mA (4.0V~5.0V)
- Current consumption : Typ.1.0μA
- Input stability : Typ.0.05%/V
- Load stability : Typ.10mV (1mA≤Iout≤100mA)
- Accuracy of output voltage : ±2.0%
- Input-output voltage difference : Typ.125mV(Vout=3.0V, Iout=100mA)
- Short circuit current limiter : Typ.50mA (Vout=0V)
- Thermal shutdown protection : Typ.160°C
- Package : SOT-89, SOT-23, SC-70(SOT-323)

## ■ Application

- Cell phones
- Battery operated devices
- Wireless devices
- Portable AV equipments

## ■ Maximum absolute ratings

| Parameter             | Symbol | Limit  | Unit |
|-----------------------|--------|--|------|
| Input voltage         | Vin    | Vss-0.3~7.0  | V    |
| Output voltage        | Vout   | Vss-0.3~Vin+0.3                                      | V    |
| Output current        | Iout   | 600  | mA   |
| Power dissipation     | Pd     | 300 (SOT-89)<br>200 (SOT-23)<br>150 (SC-70)(SOT-323) | mW   |
| Operating temperature | Top    | -40~+85  | °C   |
| Storage temperature   | Tstg   | -55~+125   | °C   |

## ■ Selection guide

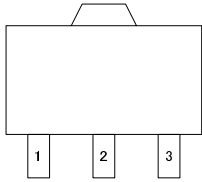
ELM87xxxA-x

| Symbol |                  |   |
|--------|------------------|---|
| a,b    | Output voltage   | e.g. :<br>18: Vout=1.8V    25: Vout=2.5V<br>30: Vout=3.0V    33: Vout=3.3V<br>50: Vout=5.0V |
| c      | Package          | A : SOT-89<br>B : SOT-23<br>C : SC-70(SOT-323)  |
| d      | Product version  | A   |
| e      | Taping direction | S : Refer to PKG file<br>N : Refer to PKG file  |

ELM87 x x x A - x  
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## Pin configuration

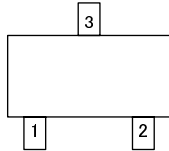
SOT-89 (TOP VIEW)



ELM87xxAA

| Pin NO. | Pin name |
|---------|----------|
| 1       | VSS      |
| 2       | VIN      |
| 3       | VOUT     |

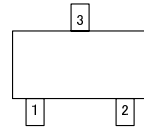
SOT-23 (TOP VIEW)



ELM87xxBA

| Pin NO. | Pin name |
|---------|----------|
| 1       | VSS      |
| 2       | VOUT     |
| 3       | VIN      |

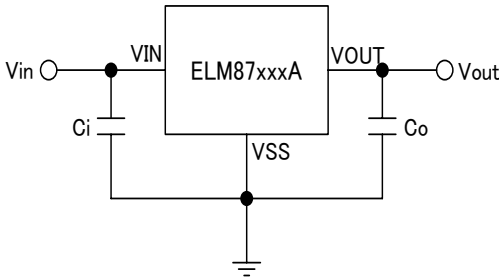
SC-70 (TOP VIEW)



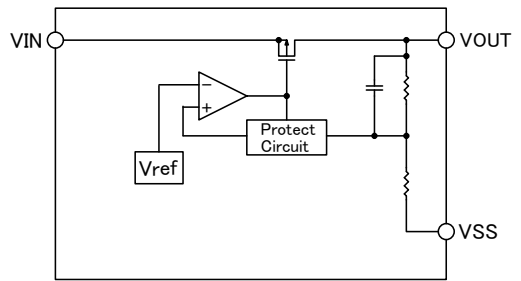
ELM87xxCA

| Pin NO. | Pin name |
|---------|----------|
| 1       | VSS      |
| 2       | VOUT     |
| 3       | VIN      |

## Standard circuit



## Block diagram



## Electrical characteristics

$V_{out}=1.8V$  (ELM8718xA)

$C_i=1.0\mu F$ ,  $C_o=1.0\mu F$ ,  $T_{op}=25^\circ C$

| Parameter                         | Symbol                          | Condition                                     | Min.  | Typ.  | Max.  | Unit       |
|-----------------------------------|---------------------------------|---|-------|-------|-------|------------|
| Output voltage                    | $V_{out}$                       | $V_{in}=2.8V$ , $I_{out}=40mA$                | 1.764 | 1.800 | 1.836 | V          |
| Output current                    | $I_{out}$                       | $V_{in}=2.8V$                                 | 200   |       |       | mA         |
| Input stability                   | $\Delta V_{out}/\Delta V_{in}$  | $I_{out}=40mA$ , $2.3V \leq V_{in} \leq 6.0V$ |       | 0.05  | 0.25  | %/V        |
| Load stability                    | $\Delta V_{out}/\Delta I_{out}$ | $1mA \leq I_{out} \leq 100mA$ , $V_{in}=2.8V$ |       | 10    | 20    | mV         |
| Input-Output voltage differential | $V_{dif}$                       | $I_{out}=100mA$                               |       | 180   | 280   | mV         |
| Current consumption               | $I_{ss}$                        | $V_{in}=2.8V$ , No-load                       |       | 1.0   | 3.0   | $\mu A$    |
| Input voltage                     | $V_{in}$                        |   | 1.8   |       | 6.0   | V          |
| Short circuit current             | $I_{lim}$                       | $V_{out}=0V$                                  |       | 50    |       | mA         |
| Thermal shutdown temperature      | $T_{sd}$                        |   |       | 160   |       | $^\circ C$ |

# ELM87xxxA Low power consumption CMOS 300mA V/R

Vout=2.5V (ELM8725xA)

Ci=1.0 μF, Co=1.0 μF, Top=25°C

| Parameter                         | Symbol                          | Condition                    | Min.  | Typ.  | Max.  | Unit |
|-----------------------------------|---------------------------------|------------------------------|-------|-------|-------|------|
| Output voltage                    | Vout                            | Vin=3.5V, Iout=40mA          | 2.450 | 2.500 | 2.550 | V    |
| Output current                    | Iout                            | Vin=3.5V                     | 200   |       |       | mA   |
| Input stability                   | $\Delta V_{out}/\Delta V_{in}$  | Iout=40mA, 3.0V ≤ Vin ≤ 6.0V |       | 0.05  | 0.25  | %/V  |
| Load stability                    | $\Delta V_{out}/\Delta I_{out}$ | 1mA ≤ Iout ≤ 100mA, Vin=3.5V |       | 10    | 20    | mV   |
| Input-Output voltage differential | Vdif                            | Iout=100mA                   |       | 150   | 220   | mV   |
| Current consumption               | I <sub>ss</sub>                 | Vin=3.5V, No-load            |       | 1.0   | 3.0   | μA   |
| Input voltage                     | Vin                             |                              | 1.8   |       | 6.0   | V    |
| Short circuit current             | I <sub>lim</sub>                | Vout=0V                      |       | 50    |       | mA   |
| Thermal shutdown temperature      | Tsd                             |                              |       | 160   |       | °C   |

Vout=3.0V (ELM8730xA)

Ci=1.0 μF, Co=1.0 μF, 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                     | 200   |       |       | mA   |
| Input stability                   | $\Delta V_{out}/\Delta V_{in}$  | Iout=40mA, 3.5V ≤ Vin ≤ 6.0V |       | 0.05  | 0.25  | %/V  |
| Load stability                    | $\Delta V_{out}/\Delta I_{out}$ | 1mA ≤ Iout ≤ 100mA, Vin=4.0V |       | 10    | 20    | mV   |
| Input-Output voltage differential | Vdif                            | Iout=100mA                   |       | 125   | 190   | mV   |
| Current consumption               | I <sub>ss</sub>                 | Vin=4.0V, No-load            |       | 1.0   | 3.0   | μA   |
| Input voltage                     | Vin                             |                              | 1.8   |       | 6.0   | V    |
| Short circuit current             | I <sub>lim</sub>                | Vout=0V                      |       | 50    |       | mA   |
| Thermal shutdown temperature      | Tsd                             |                              |       | 160   |       | °C   |

Vout=3.3V (ELM8733xA)

Ci=1.0 μF, Co=1.0 μF, 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                     | 200   |       |       | mA   |
| Input stability                   | $\Delta V_{out}/\Delta V_{in}$  | Iout=40mA, 3.8V ≤ Vin ≤ 6.0V |       | 0.05  | 0.25  | %/V  |
| Load stability                    | $\Delta V_{out}/\Delta I_{out}$ | 1mA ≤ Iout ≤ 100mA, Vin=4.3V |       | 10    | 20    | mV   |
| Input-Output voltage differential | Vdif                            | Iout=100mA                   |       | 125   | 190   | mV   |
| Current consumption               | I <sub>ss</sub>                 | Vin=4.3V, No-load            |       | 1.0   | 3.0   | μA   |
| Input voltage                     | Vin                             |                              | 1.8   |       | 6.0   | V    |
| Short circuit current             | I <sub>lim</sub>                | Vout=0V                      |       | 50    |       | mA   |
| Thermal shutdown temperature      | Tsd                             |                              |       | 160   |       | °C   |

# ELM87xxxA Low power consumption CMOS 300mA V/R

Vout=5.0V (ELM8750xA)

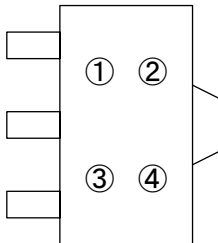
Ci=1.0 μF, Co=1.0 μF, Top=25°C

| Parameter                         | Symbol      | Condition                    | Min.  | Typ.  | Max.  | Unit |
|-----------------------------------|-------------|------------------------------|-------|-------|-------|------|
| Output voltage                    | Vout        | Vin=6.0V, Iout=40mA          | 4.900 | 5.000 | 5.100 | V    |
| Output current                    | Iout        | Vin=6.0V                     | 300   |       |       | mA   |
| Input stability                   | ΔVout/ΔVin  | Iout=40mA, 5.5V ≤ Vin ≤ 6.0V |       | 0.05  | 0.25  | %/V  |
| Load stability                    | ΔVout/ΔIout | 1mA ≤ Iout ≤ 100mA, Vin=6.0V |       | 10    | 20    | mV   |
| Input-Output voltage differential | Vdif        | Iout=100mA                   |       | 110   | 170   | mV   |
| Current consumption               | Iss         | Vin=6.0V, No-load            |       | 1.0   | 3.0   | μA   |
| Input voltage                     | Vin         |                              | 1.8   |       | 6.0   | V    |
| Short circuit current             | Ilim        | Vout=0V                      |       | 50    |       | mA   |
| Thermal shutdown temperature      | Tsd         |                              |       | 160   |       | °C   |

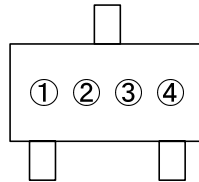
## ■ Marking

- SOT-89 package : ELM87xxAA
- SOT-23 package : ELM87xxBA

SOT-89



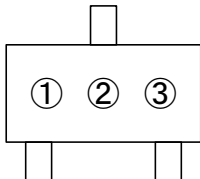
SOT-23



No. ①~④ : Assembly lot No.  
A~Z (I, O, X excepted) and 0~9

- SC-70 package : ELM87xxCA

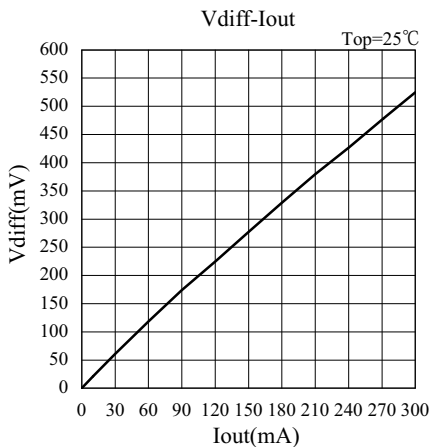
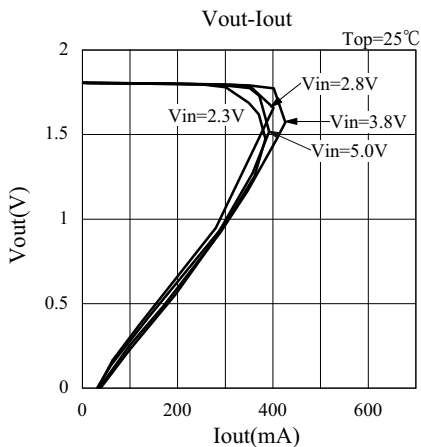
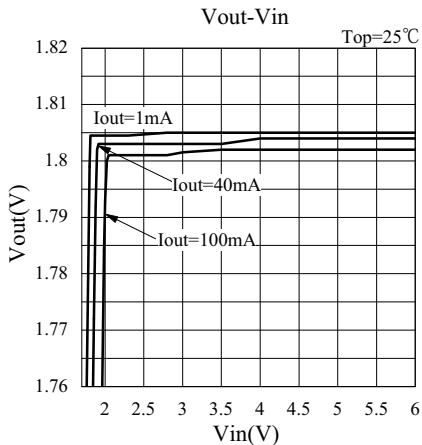
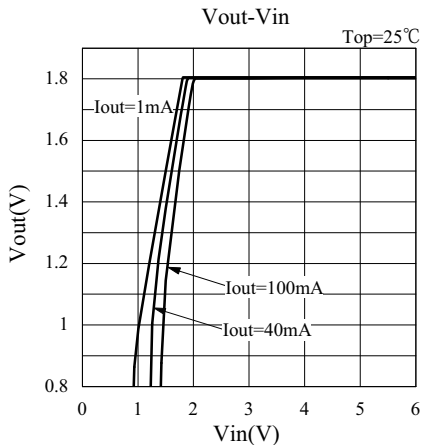
SC-70

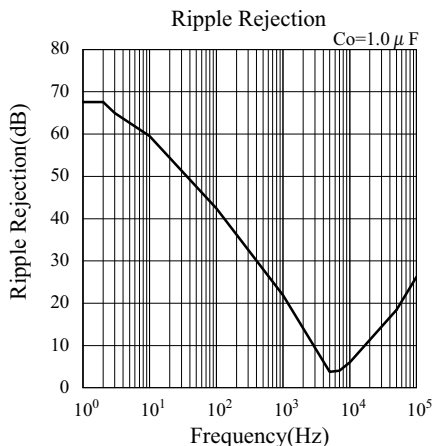
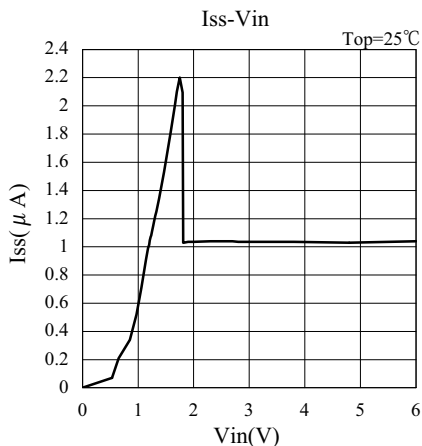
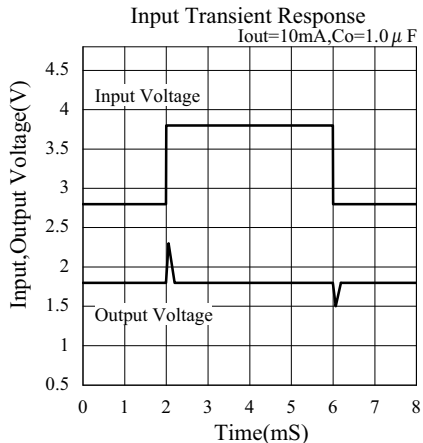
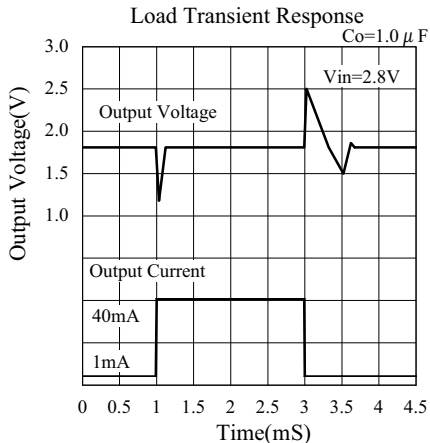


No. ①~③ : Assembly lot No.  
A~Z (I, O, X excepted) and 0~9

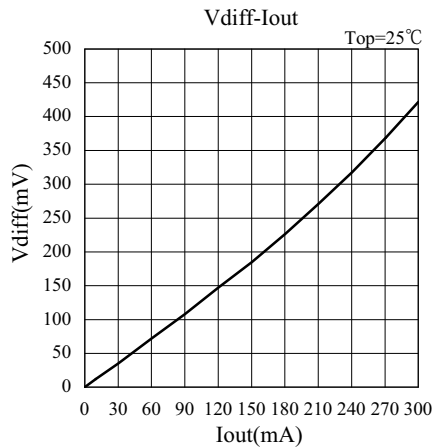
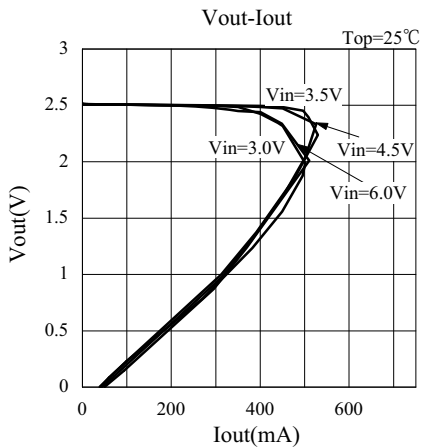
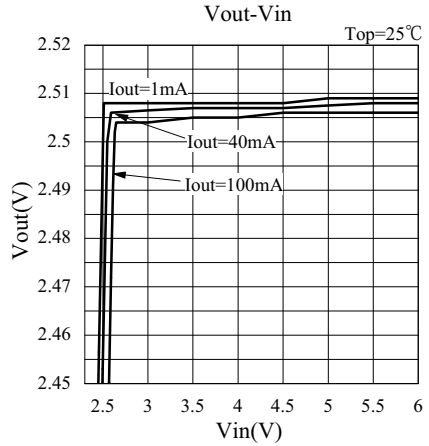
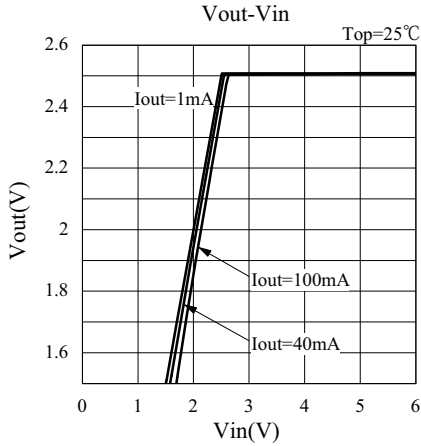
## ■ Typical characteristics

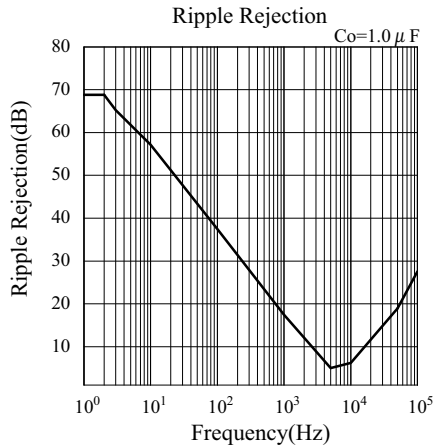
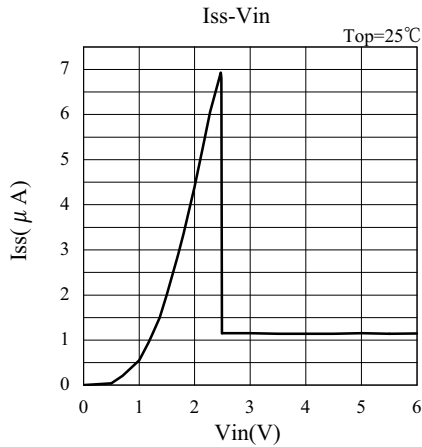
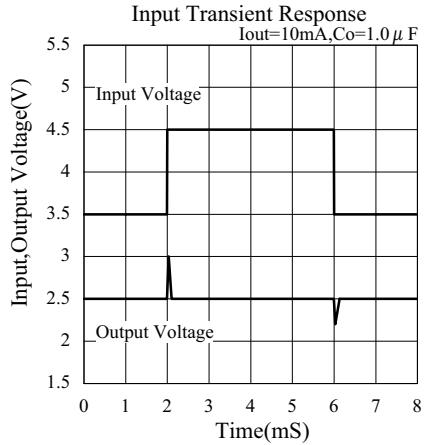
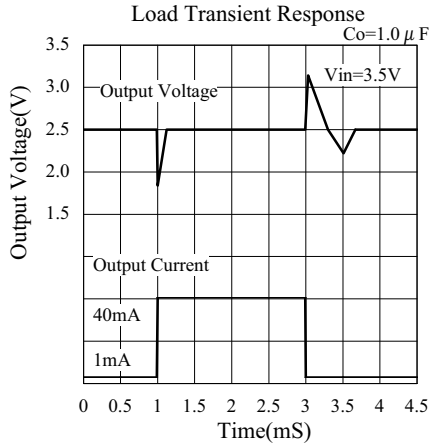
- 1.8V Vout unit (ELM8718xA)  $C_i=1.0\ \mu\text{F}$ ,  $C_o=1.0\ \mu\text{F}$ ,  $T_{op}=25^\circ\text{C}$





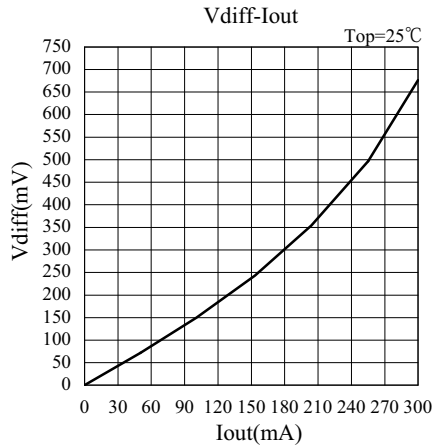
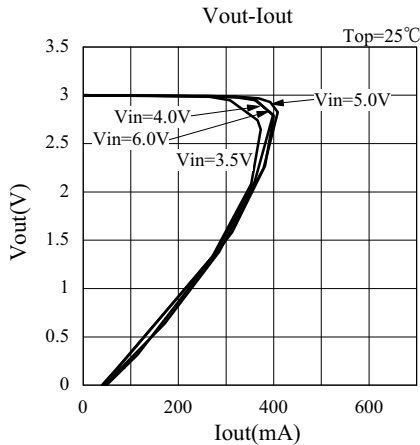
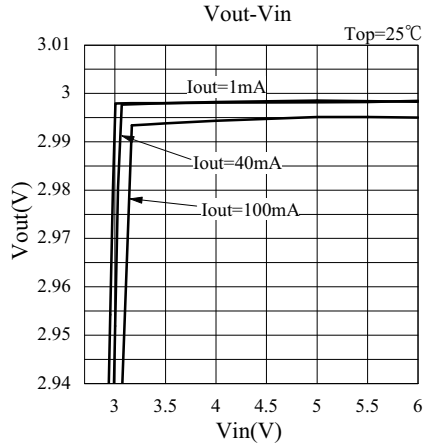
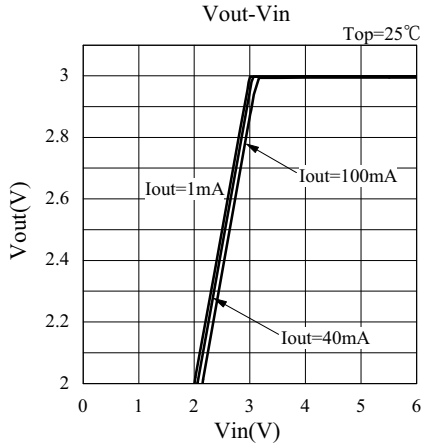
- 2.5V Vout unit (ELM8725xA)  $C_i=1.0\ \mu\text{F}$ ,  $C_o=1.0\ \mu\text{F}$ ,  $T_{op}=25^\circ\text{C}$

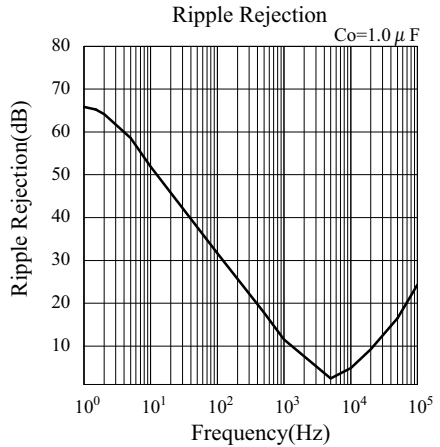
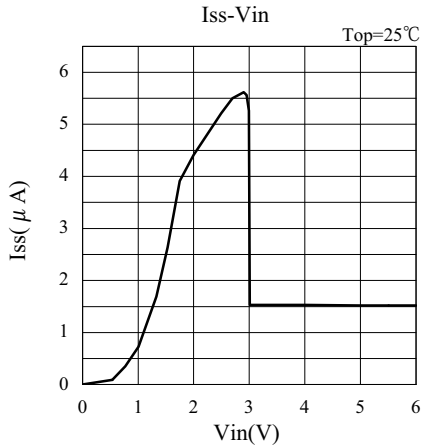
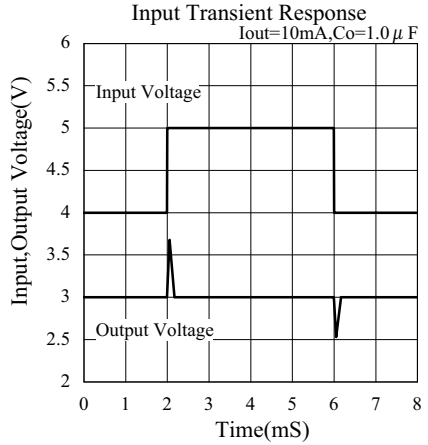
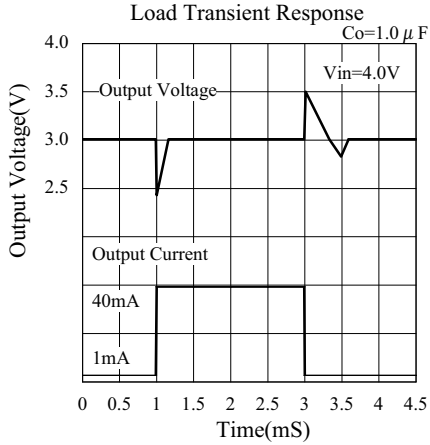




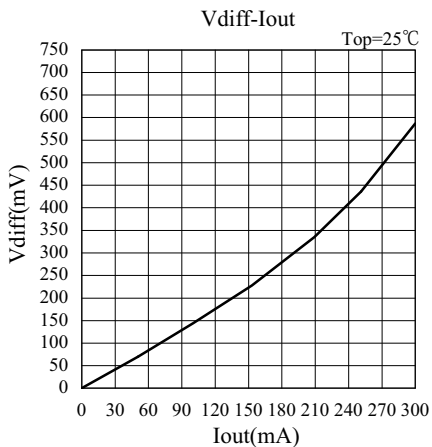
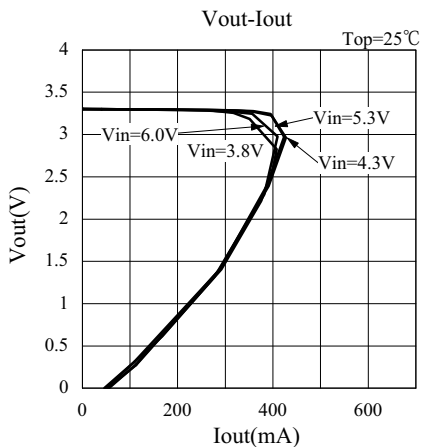
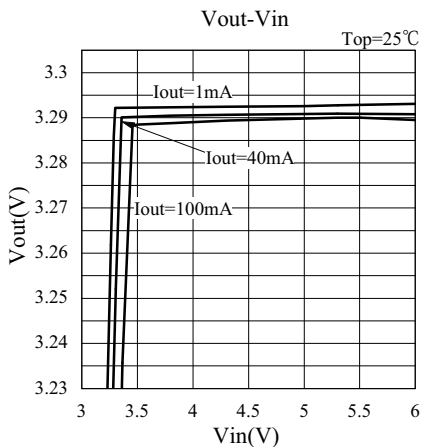
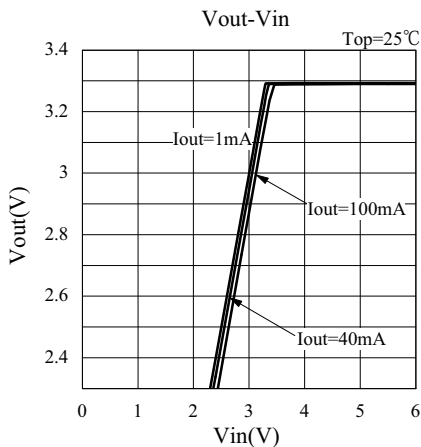


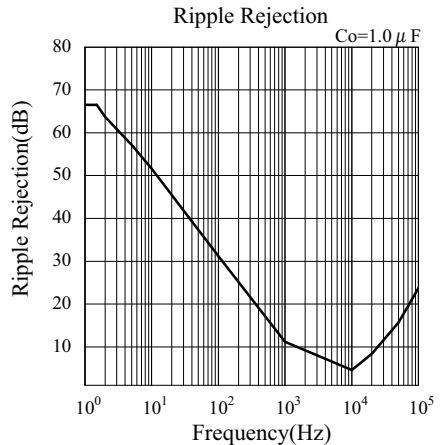
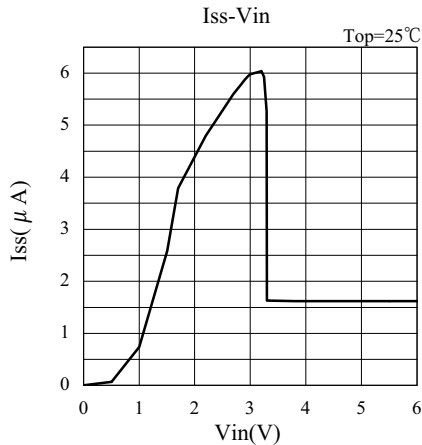
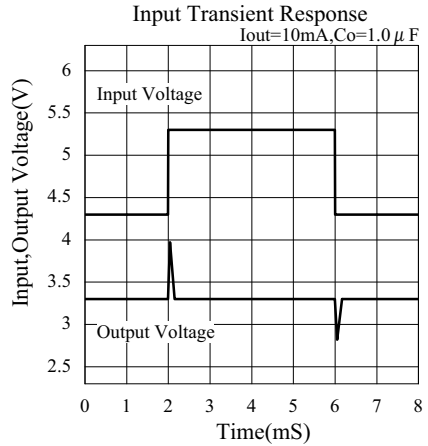
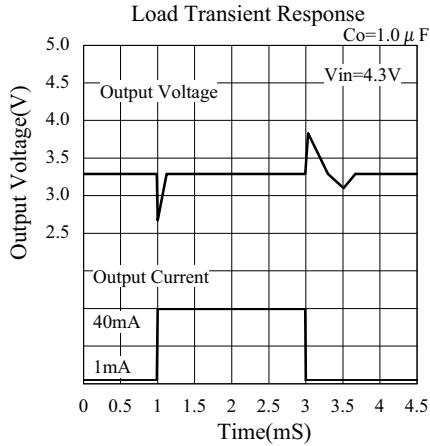
- 3.0V Vout unit (ELM8730xA)  $C_i=1.0\ \mu\text{F}$ ,  $C_o=1.0\ \mu\text{F}$ ,  $T_{op}=25^\circ\text{C}$





- 3.3V Vout unit (ELM8733xA)  $C_i=1.0\ \mu\text{F}$ ,  $C_o=1.0\ \mu\text{F}$ ,  $T_{op}=25^\circ\text{C}$





- 5.0V Vout unit (ELM8750xA)  $C_i=1.0 \mu F$ ,  $C_o=1.0 \mu F$ ,  $T_{op}=25^\circ C$

