ELM86xxxxBxA CMOS 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 is managed by positive logic. The standby current is designed to be Typ.0.1μA. ELM86 series is available only in SOT-26 PKG, while the output voltage is fixed within the range of 1.2 to 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 to 4.0V (by 0.1V)
- Input-output voltage difference : Typ.120mV(Vout=3.0V, Iout=100mA)
- Standby current consumption : Typ.0.1μA
- Current consumption : Typ.25μA
- Input stability : Typ.0.02%/V(Iout=40mA)
- Load stability : Typ.5mV(1mA≤Iout≤100mA)
- Accuracy of output voltage : ±2.0%(Vout>1.5V),
  ±30mV(Vout≤1.5V)
- Short circuit current limiter : Typ.40mA(Vout=0V)
- Thermal shutdown protection : Typ.165°C
- Package : SOT-26

■Application

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

■Maximum absolute ratings

Parameter	Symbol	Limit	Unit
Input voltage	Vin	Vss-0.3 to 10.0	V
CE1,CE2 Input voltage	Vce	Vss-0.3 to Vin+0.3	V
Vout1,Vout2 voltage	Vout	Vss-0.3 to Vin+0.3	V
Output current Iout1+Iout2	Iout	800	mA
Power dissipation	Pd	300	mW
Thermal resistance junction to ambient	Rθja	400	°C/W
Operationg Temperature	Top	-40 to +85	°C
Storage Temperature	Tstg	-55 to +125	°C

■Selection guide

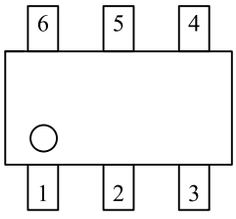
ELM86xxxxBxA-S

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

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

■Pin configuration

SOT-26(TOP VIEW)



ELM86xxxxB1A

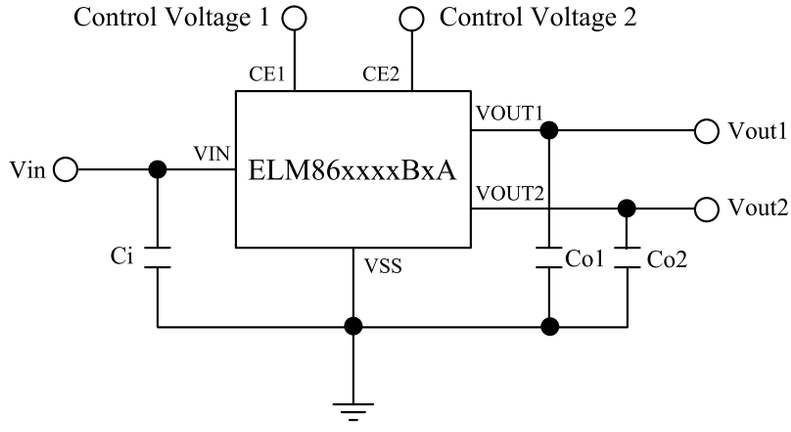
Pin No.	Pin name
1	VOUT2
2	VSS
3	CE2 *
4	CE1 *
5	VIN
6	VOUT1

ELM86xxxxB2A

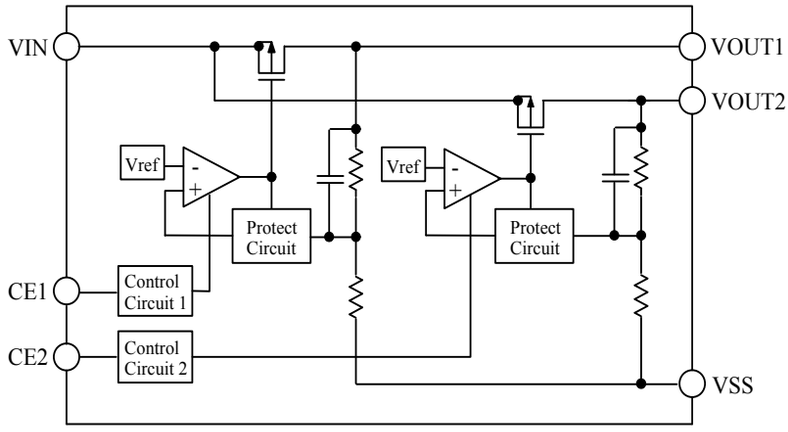
Pin No.	Pin name
1	CE1 *
2	VIN
3	CE2 *
4	VOUT2
5	VSS
6	VOUT1

* 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	ΔVout/ΔVin	Iout=40mA, 1.7V≤Vin≤6.0V		0.02	0.20	%/V
Load stability	ΔVout/ΔIout	1mA≤Iout≤100mA, Vin=2.2V		5	20	mV
Input-Output voltage differential	Vdif	Iout=100mA		380	620	mV
Current consumption	Iss	Vin=Vce=2.2V, No-load		15	50	μA
Standby current consumption	Istandby	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	ΔVout/ΔTop	-40°C≤Top≤+85°C, Iout=40mA, Vin=2.2V		±100		ppm/°C
Short circuit current	Ilim	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 to 100kHz		30		μVrms

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

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	ΔVout/ΔVin	Iout=40mA, 2.3V≤Vin≤6.0V		0.02	0.20	%/V
Load stability	ΔVout/ΔIout	1mA≤Iout≤100mA, Vin=2.8V		5	20	mV
Input-Output voltage differential	Vdif	Iout=100mA		145	230	mV
Current consumption	Iss	Vin=Vce=2.8V, No-load		15	50	μA
Standby current consumption	Istandby	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	ΔVout/ΔTop	-40°C≤Top≤+85°C, Iout=40mA, Vin=2.8V		±100		ppm/°C
Short circuit current	Ilim	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 to 100kHz		30		μVrms

∗ 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	ΔVout/ΔVin	Iout=40mA, 3.5V≤Vin≤6.0V		0.02	0.20	%/V
Load stability	ΔVout/ΔIout	1mA≤Iout≤100mA, Vin=4.0V		5	20	mV
Input-Output voltage differential	Vdif	Iout=100mA		110	175	mV
Current consumption	Iss	Vin=Vce=4.0V, No-load		15	50	μA
Standby current consumption	Istandby	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	ΔVout/ΔTop	-40°C≤Top≤+85°C, Iout=40mA, Vin=4.0V		±100		ppm/°C
Short circuit current	Ilim	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 to 100kHz		30		μVrms

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

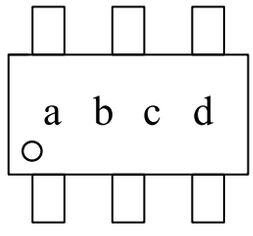
Vout1=Vout2=3.3V(ELM863333BxA) Top=25°C

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	ΔVout/ΔVin	Iout=40mA, 3.8V≤Vin≤6.0V		0.02	0.20	%/V
Load stability	ΔVout/ΔIout	1mA≤Iout≤100mA, Vin=4.3V		5	20	mV
Input-Output voltage differential	Vdif	Iout=100mA		110	175	mV
Current consumption	Iss	Vin=Vce=4.3V, No-load		15	50	μA
Standby current consumption	Istandby	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	ΔVout/ΔTop	-40°C≤Top≤+85°C, Iout=40mA, Vin=4.3V		±100		ppm/°C
Short circuit current	Ilim	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 to 100kHz		30		μVrms

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

■Marking

SOT-26



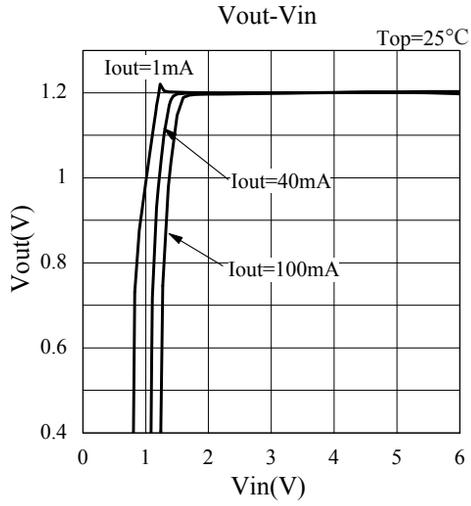
a to d : Assembly lot No. ——
A to Z (I, O, X excepted) and 0 to 9

■Typical characteristics

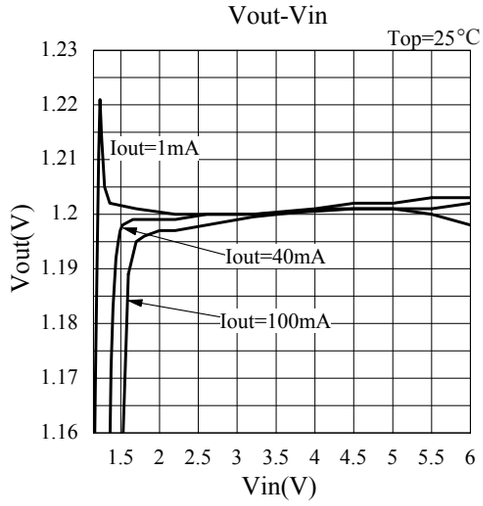
(Electrical characteristics of both channels are identical and the following graphs represent typical characteristics of one channel.)

• 1.2V Vout unit

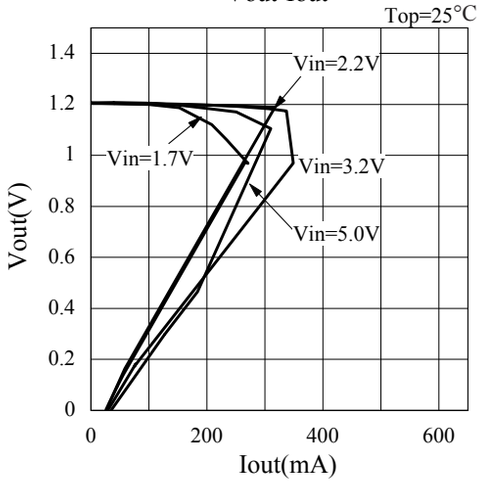
Vout-Vin



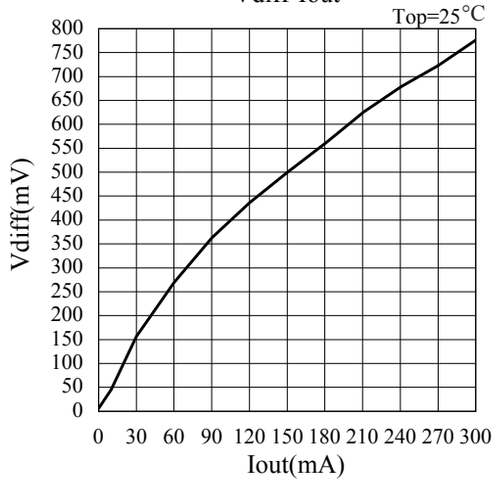
Vout-Vin



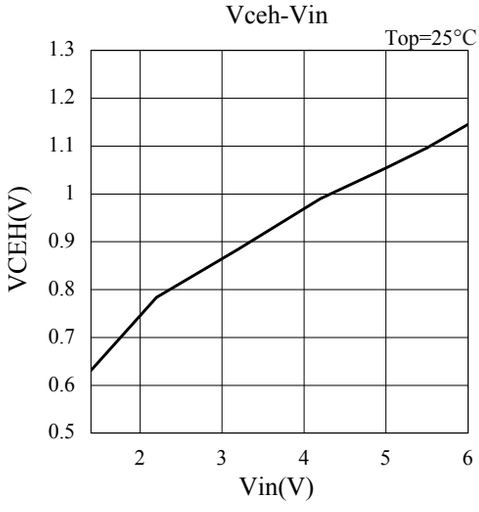
Vout-Iout



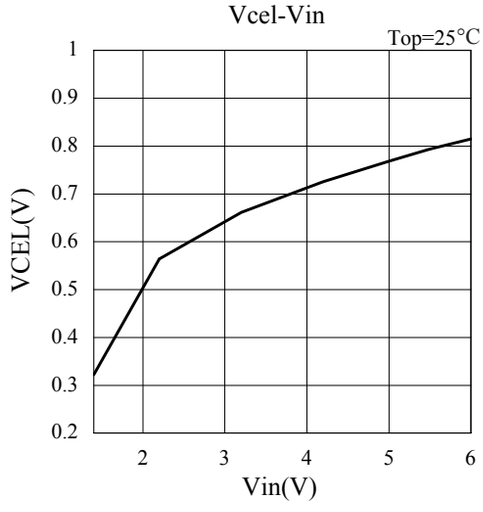
Vdiff-Iout

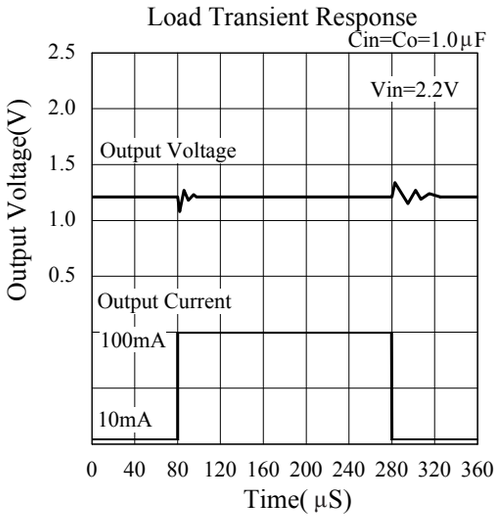


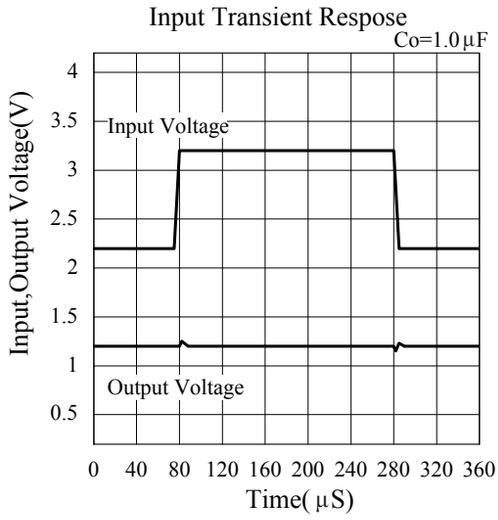
Vceh-Vin

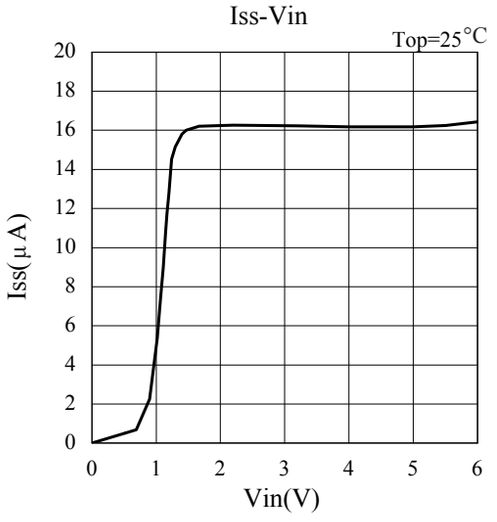


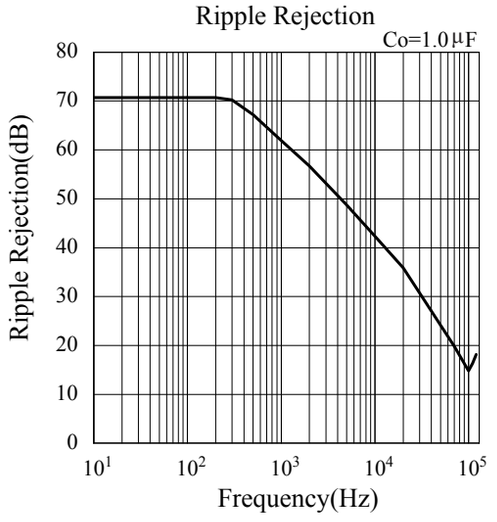
Vcel-Vin



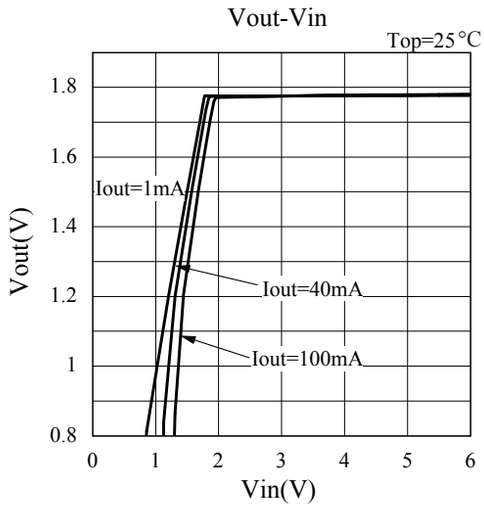

Load Transient Response
Cin=Co=1.0μF
Vin=2.2V
Output Voltage
Output Current
100mA
10mA
Output Voltage(V)
2.5
2.0
1.5
1.0
0.5
0 40 80 120 160 200 240 280 320 360
Time(μS)

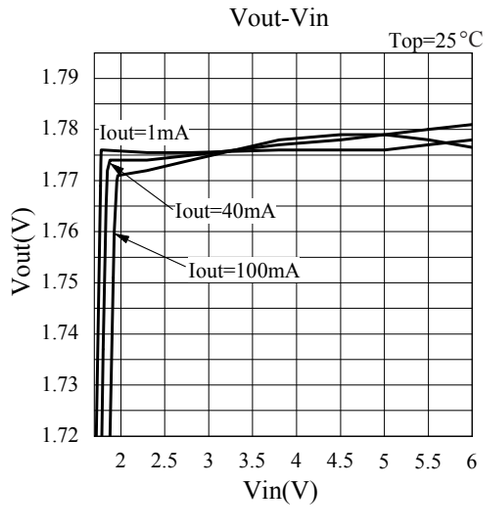

Input Transient Respose
Co=1.0μF
Input Voltage
Output Voltage
Input,Output Voltage(V)
4
3.5
3
2.5
2
1.5
1
0.5
0 40 80 120 160 200 240 280 320 360
Time(μS)

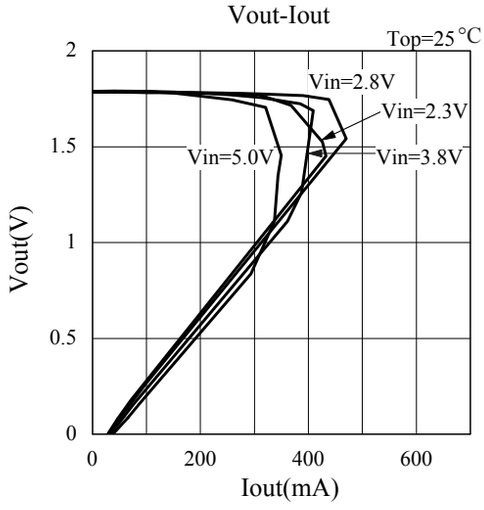

Iss-Vin
Top=25°C
Iss(μA)
20
18
16
14
12
10
8
6
4
2
0
0 1 2 3 4 5 6
Vin(V)

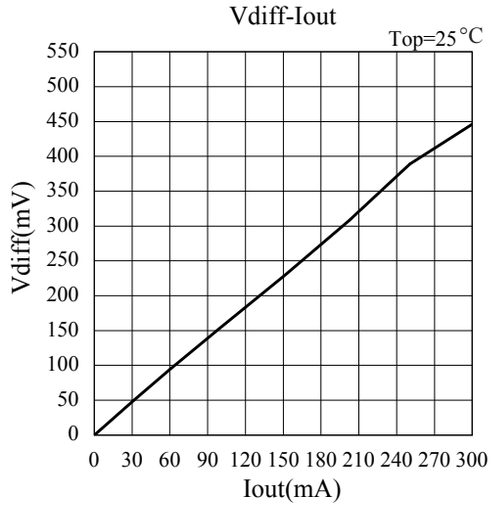

Ripple Rejection
Co=1.0μF
Ripple Rejection(dB)
80
70
60
50
40
30
20
10
0
10^1 10^2 10^3 10^4 10^5
Frequency(Hz)

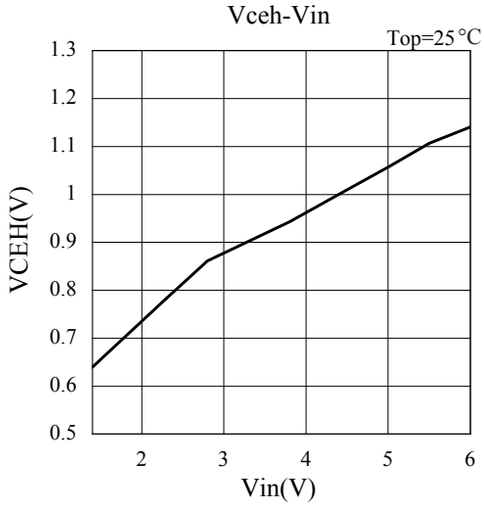
• 1.8V Vout unit

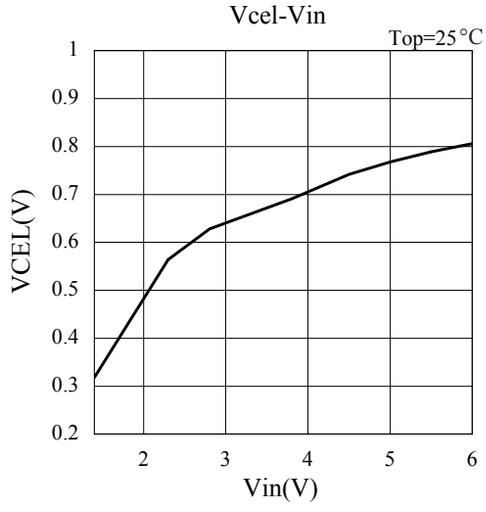




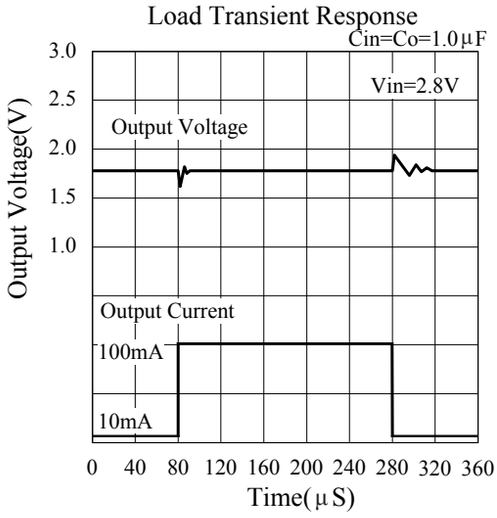




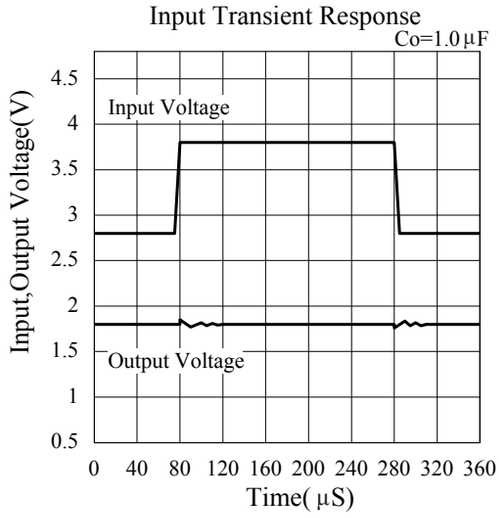




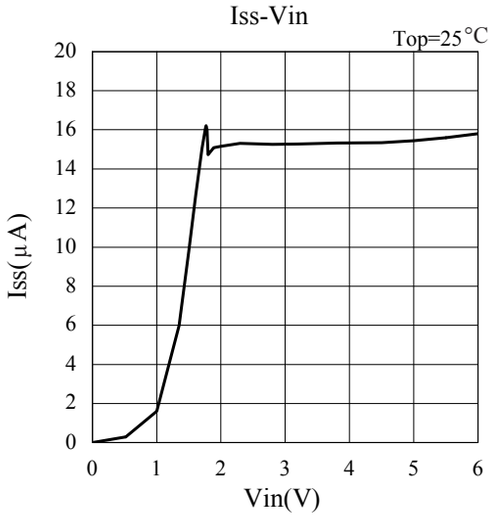
Load Transient Response



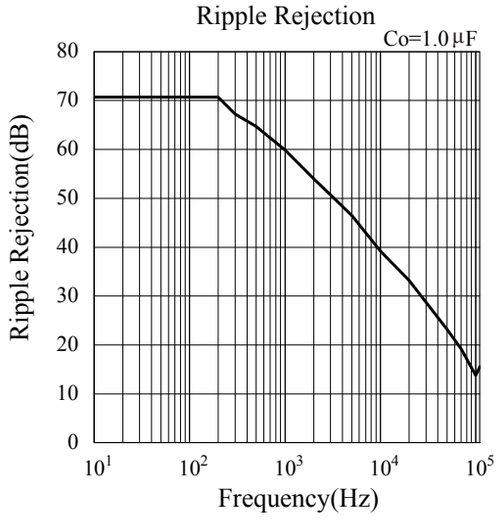
Input Transient Response



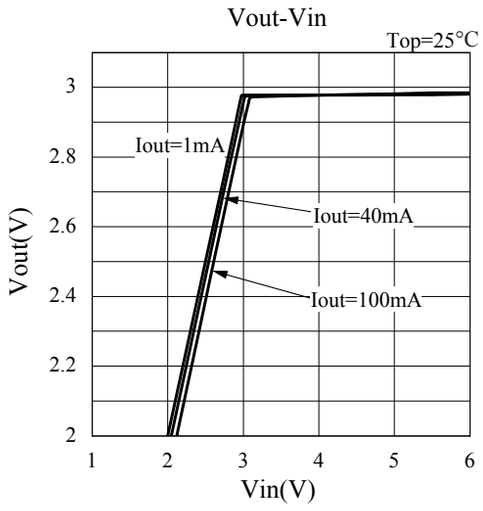
Iss-Vin

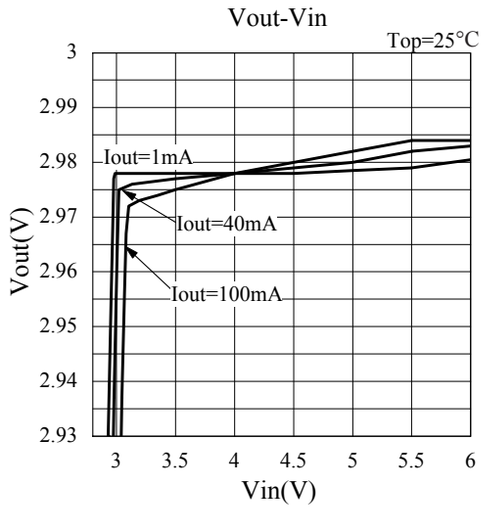


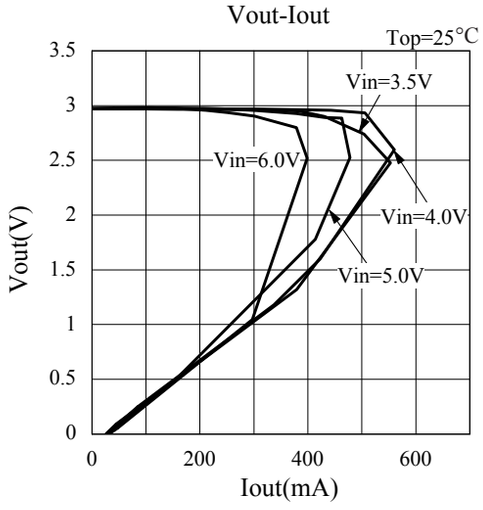
Ripple Rejection

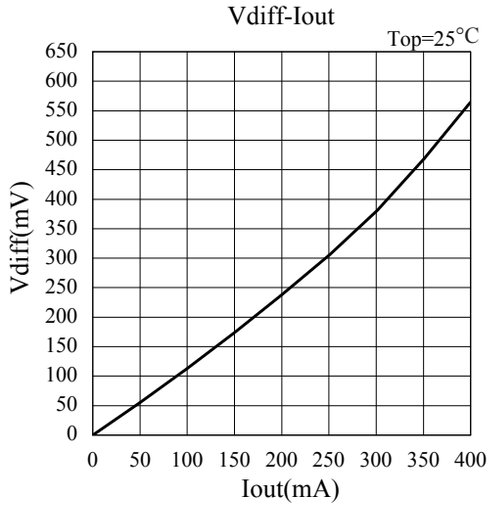


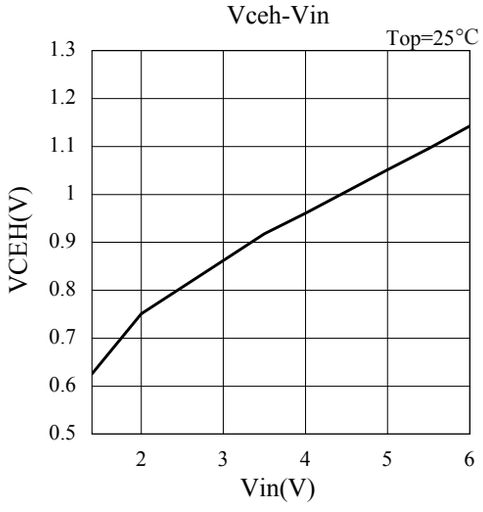
• 3.0V Vout unit

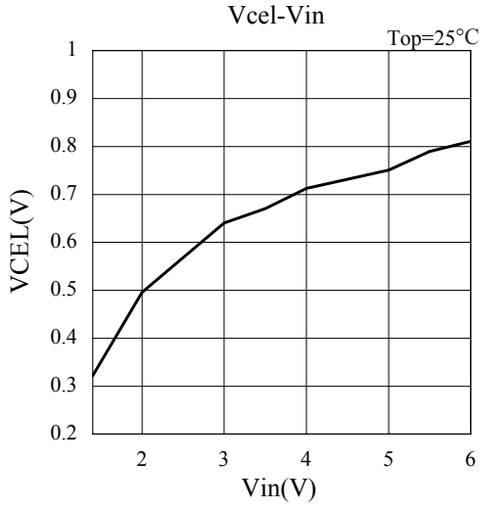


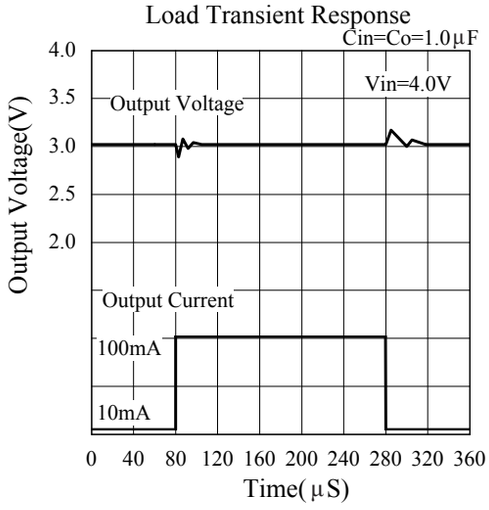


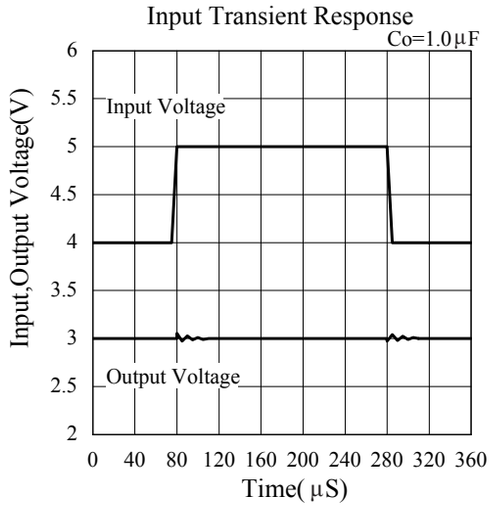


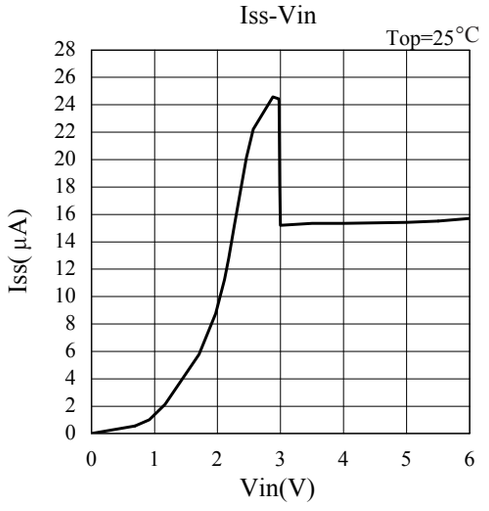


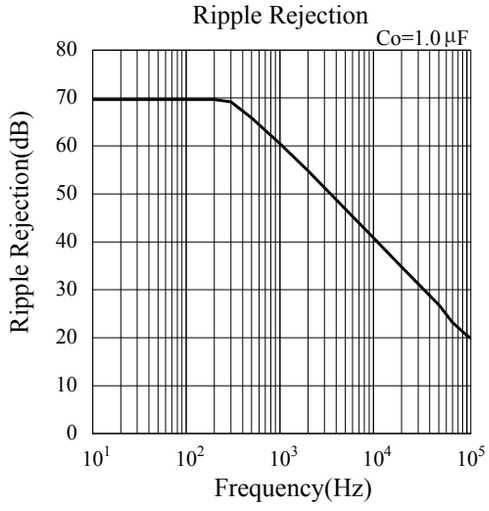




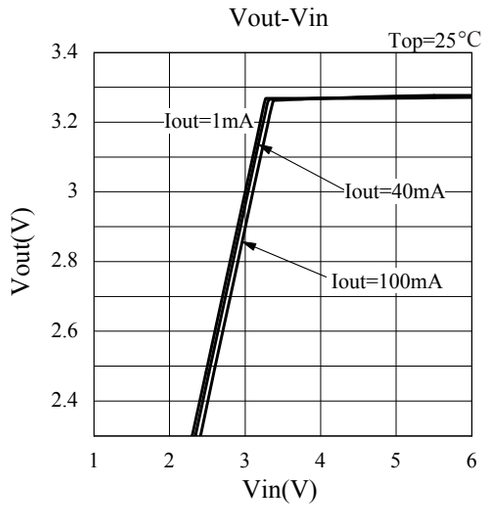

Load Transient Response
Cin=Co=1.0μF
Vin=4.0V
Output Voltage
Output Current
100mA
10mA
Output Voltage(V)
4.0
3.5
3.0
2.5
2.0
0 40 80 120 160 200 240 280 320 360
Time(μS)

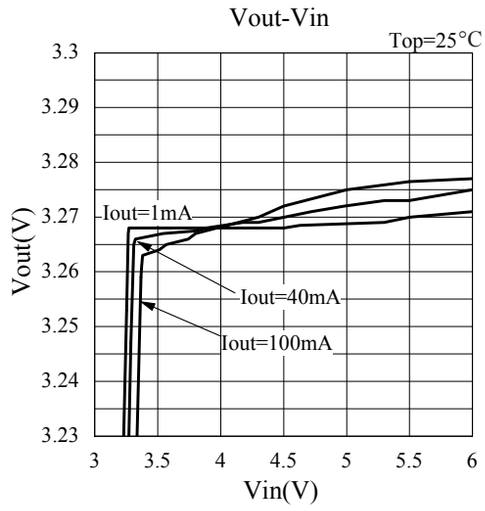

Input Transient Response
Co=1.0μF
Input Voltage
Output Voltage
Input,Output Voltage(V)
6
5.5
5
4.5
4
3.5
3
2.5
2
0 40 80 120 160 200 240 280 320 360
Time(μS)

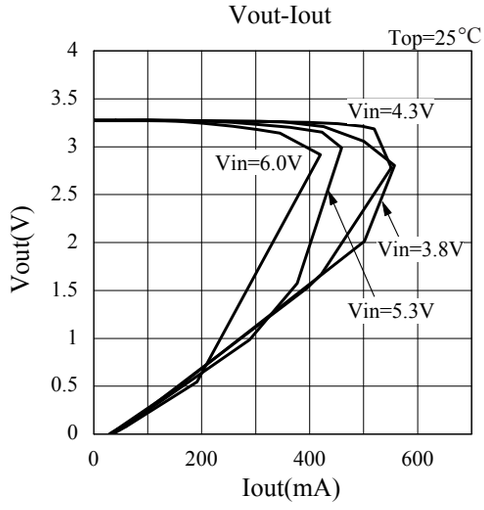

Iss-Vin
Top=25°C
Iss(μA)
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
0 1 2 3 4 5 6
Vin(V)

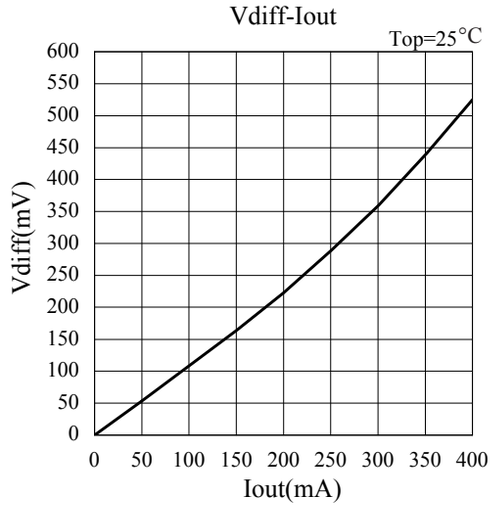

Ripple Rejection
Co=1.0μF
Ripple Rejection(dB)
80
70
60
50
40
30
20
10
0
10^1 10^2 10^3 10^4 10^5
Frequency(Hz)

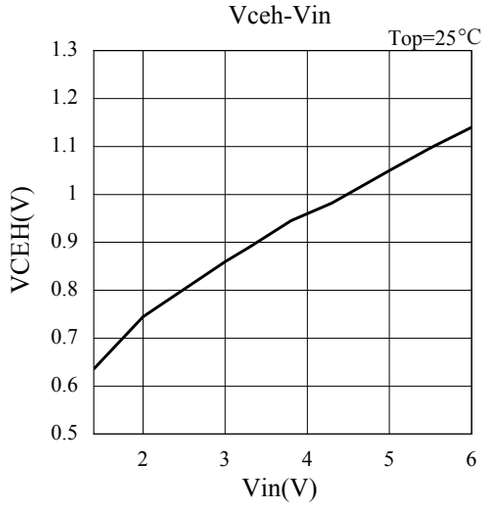
• 3.3V Vout unit

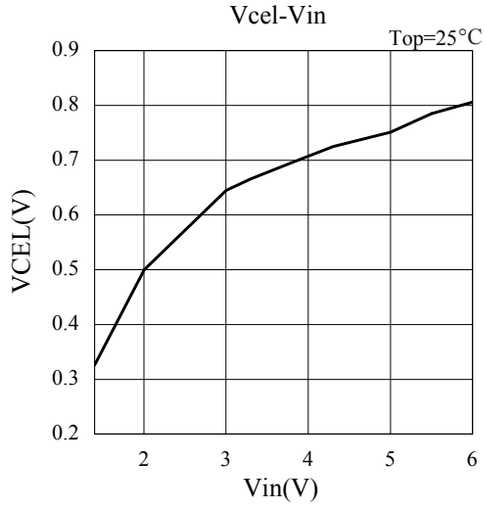


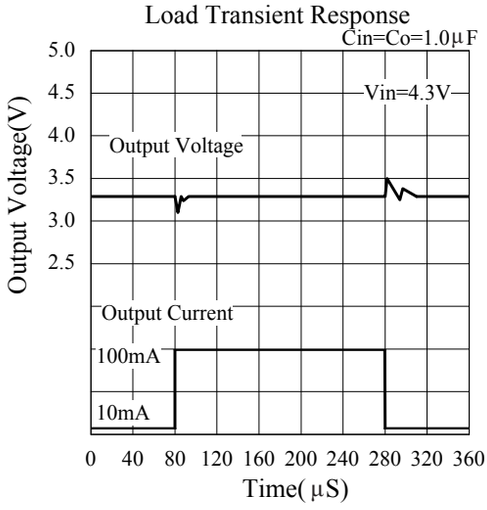


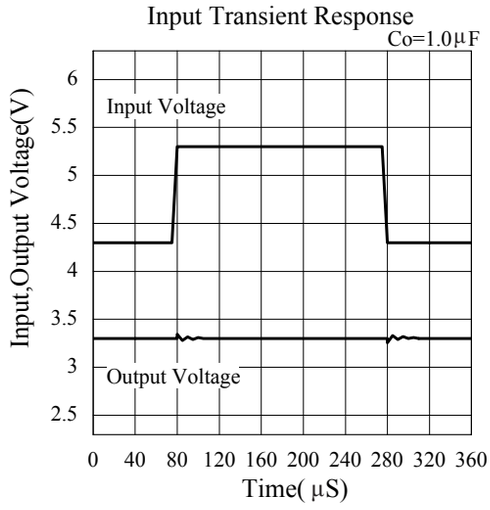


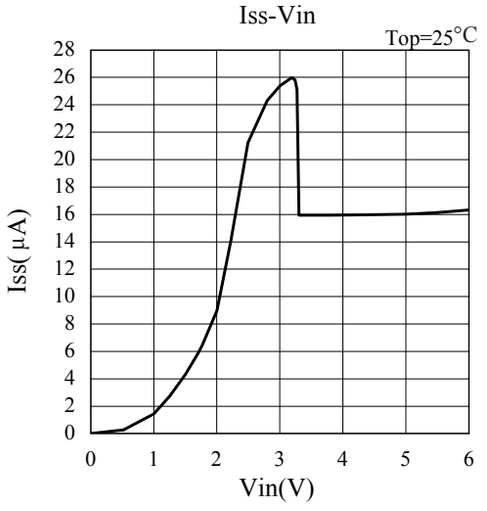


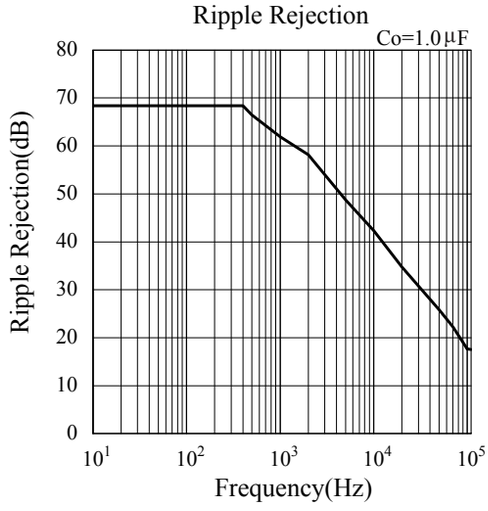





Load Transient Response
Cin=Co=1.0μF
Vin=4.3V
Output Voltage
Output Current
100mA
10mA
Output Voltage(V)
5.0
4.5
4.0
3.5
3.0
2.5
0 40 80 120 160 200 240 280 320 360
Time(μS)


Input Transient Response
Co=1.0μF
Input Voltage
Output Voltage
Input,Output Voltage(V)
6
5.5
5
4.5
4
3.5
3
2.5
0 40 80 120 160 200 240 280 320 360
Time(μS)


Iss-Vin
Top=25°C
Iss(μA)
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
0 1 2 3 4 5 6
Vin(V)


Ripple Rejection
Co=1.0μF
Ripple Rejection(dB)
80
70
60
50
40
30
20
10
0
10^1 10^2 10^3 10^4 10^5
Frequency(Hz)