ELM85xxxxA CMOS 600mA/800mA LDO voltage regulator

■General description

ELM85xxxxA is CMOS voltage regulator which is characterized with high current and low dropout (55mV at Iout=100mA). There are 2 types of CE selection of ELM85 series: non-chip enable function and "H" active. The standard output voltages are 3.0V, 3.3V, 5.0V. ELM85 series can also be made as semi-custom IC within the range of 0.8V to 5.0V by 0.1V step. This series also includes short circuit current limiter and thermal shutdown circuit. Ceramic capacitors with low ESR can be used as input and output ones.

■Features

- Output voltage range : 0.8V to 5.0V (by 0.1V)
- Output current : 600mA(Vout<3.0V)
  800mA(Vout≥3.0V)
- Current consumption : Typ.40μA
- Input stability : Typ.0.02%/V
- Load stability : Typ.20mV(1mA≤Iout≤300mA)
- Accuracy of output voltage : ±2.0%
- Input-output voltage difference : Typ.55mV(Vout=3.0V, Iout=100mA)
- Short circuit current limiter : Typ.70mA(Vout=0V)
- Package : SOT-223(0.8V to 5.0V), SON8-3x3(1.2V to 4.0V)
  SOT-89(1.2V to 4.0V), SOT-89-5(1.2V to 4.0V)
  SOT-23(1.2V to 4.0V), SOT-25(1.2V to 4.0V)
  (0.8V to 1.1V, 4.1V to 5.0V are available in SOT-223 package only.)

■Application

- Battery operated devices
- Portable AV equipments

■Maximum absolute ratings

Parameter	Symbol	Limit	Unit
Input voltage	Vin	Vss-0.3 to 7.0	V
Output voltage	Vout	Vss-0.3 to Vin+0.3	V
Output current	Iout	1000	mA
Power dissipation	Pd	500 (SOT-89)	mW
		500 (SOT-89-5)	
		250 (SOT-23)	
		300 (SOT-25)	
		500 (SON8-3x3)	
		625 (SOT-223)	
Operating temperature	Top	-40 to +85	°C
Storage temperature	Tstg	-55 to +125	°C

■Selection guide

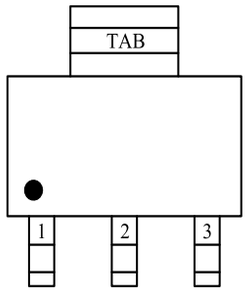
ELM85xxxxA-x

Symbol		
a, b	Output voltage	e.g. : 30: Vout=3.0V, 33: Vout=3.3V 50: Vout=5.0V
c	CE selection	1: NO CE 3: CE="H" active
d	Package	A: SOT-89, SOT-89-5 B: SOT-23, SOT-25 G: SON8-3x3 H: SOT-223
e	Product version	A
f	Taping direction	S: Refer to PKG file (SOT-223: S only) N: Refer to PKG file

ELM85 x x x x A - x
↑ ↑ ↑ ↑ ↑ ↑
a b c d e f

■Pin configuration

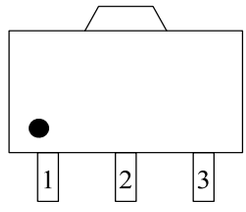
SOT-223(TOP VIEW)



ELM85xx1HA

Pin No.	Pin name
1	VSS
2/TAB	VIN
3	VOUT

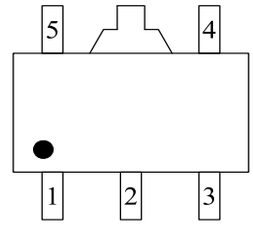
SOT-89(TOP VIEW)



ELM85xx1AA

Pin No.	Pin name
1	VSS
2	VIN
3	VOUT

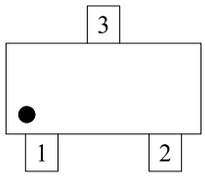
SOT-89-5(TOP VIEW)



ELM85xx3AA

Pin No.	Pin name
1	VSS
2	VIN
3	VOUT
4	NC
5	CE

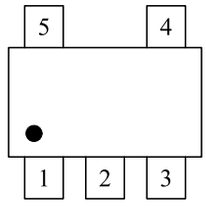
SOT-23(TOP VIEW)



ELM85xx1BA

Pin No.	Pin name
1	VSS
2	VOUT
3	VIN

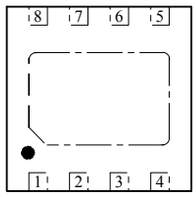
SOT-25(TOP VIEW)



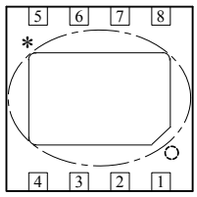
ELM85xx3BA

Pin No.	Pin name
1	VIN
2	VSS
3	CE
4	NC
5	VOUT

SON8-3x3(TOP VIEW)



SON8-3x3(BOTTOM VIEW)

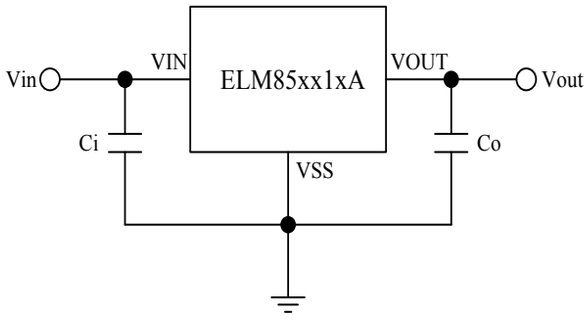


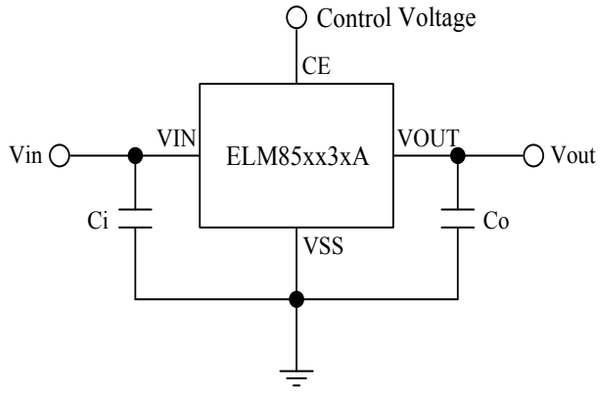
ELM85xx3GA

Pin No.	Pin name	Pin No.	Pin name
1	VOUT	5	NC
2	VOUT	6	CE
3	VIN	7	NC
4	VIN	8	VSS

* The potential of the tab on the back is the circuit one (VIN). Please set it to be open or connect to VIN pin(recommended).

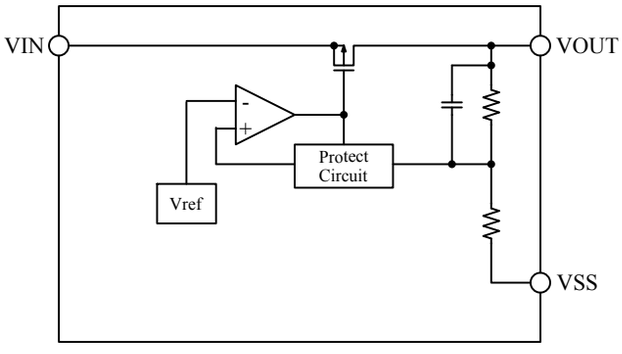
■Standard circuit



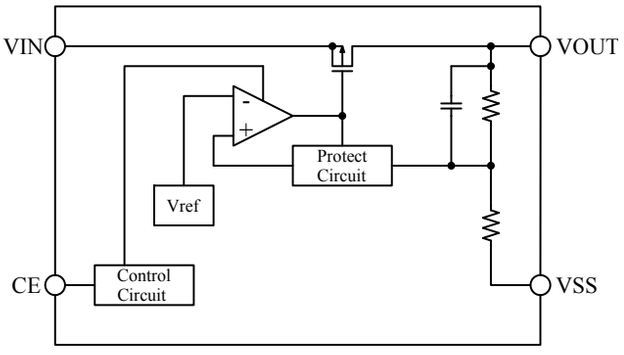


■Block diagram

ELM85xx1xA



ELM85xx3xA



■Electrical characteristics (ELM85xx1xA)

Vout=3.0V(ELM85301xA), No CE pin — Ci=1.0μF, Co=4.7μF, 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	800			mA
Input stability	ΔVout/ΔVin	3.5V≤Vin≤6.0V, Iout=100mA		0.02	0.20	%/V
Load stability	ΔVout/ΔIout	Vin=4.0V, 1mA≤Iout≤300mA		20	60	mV
Input-Output voltage differential	Vdif	Iout=100mA		55	90	mV
Current consumption	Iss	Vin=4.0V		40	100	μA
Input voltage	Vin		1.4		6.0	V
Output voltage temperature coefficient	ΔVout/ΔTop	-40°C≤Top≤+85°C, Vin=4.0V, Iout=40mA		±100		ppm/°C
Short circuit current	Ilim	Vout=0V		70		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

Vout=3.3V(ELM85331xA), No CE pin — Ci=1.0μF, Co=4.7μF, 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	800			mA
Input stability	ΔVout/ΔVin	3.8V≤Vin≤6.0V, Iout=100mA		0.02	0.20	%/V
Load stability	ΔVout/ΔIout	Vin=4.3V, 1mA≤Iout≤300mA		20	60	mV
Input-Output voltage differential	Vdif	Iout=100mA		55	90	mV
Current consumption	Iss	Vin=4.3V		40	100	μA
Input voltage	Vin		1.4		6.0	V
Output voltage temperature coefficient	ΔVout/ΔTop	-40°C≤Top≤+85°C, Vin=4.3V, Iout=40mA		±100		ppm/°C
Short circuit current	Ilim	Vout=0V		70		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

Vout=5.0V(ELM85501HA), No CE pin Ci=1.0μF, Co=4.7μF, 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	800			mA
Input stability	ΔVout/ΔVin	5.5V≤Vin≤6.0V, Iout=100mA		0.02	0.20	%/V
Load stability	ΔVout/ΔIout	Vin=6.0V, 1mA≤Iout≤300mA		20	60	mV
Input-Output voltage differential	Vdif	Iout=100mA		52	85	mV
Current consumption	Iss	Vin=6.0V		40	100	μA
Input voltage	Vin		1.4		6.0	V
Output voltage temperature coefficient	ΔVout/ΔTop	-40°C≤Top≤+85°C, Vin=6.0V, Iout=40mA		±100		ppm/°C
Short circuit current	Ilim	Vout=0V		70		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

∗ ELM8550 is only available in SOT-223 package.

■Electrical characteristics (ELM85xx3AA)

Vout=3.0V(ELM85303AA), CE="H" active Ci=1.0μF, Co=4.7μF, 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	800			mA
Input stability	ΔVout/ΔVin	3.5V≤Vin≤6.0V, Iout=100mA		0.02	0.20	%/V
Load stability	ΔVout/ΔIout	Vin=4.0V,1mA≤Iout≤300mA		20	60	mV
Input-Output voltage differential	Vdif	Iout=100mA		55	90	mV
Current consumption	Iss	Vin=4.0V		40	100	μA
Standby current consumption	Istandby	Vin=4.0V, Vce=0V			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	0.0		0.2	V
CE input current High	Iceh	Vce=Vin=6.0V	-0.2		0.2	μA
CE input current Low	Icel	Vce=Vss, Vin=6.0V	-0.2		0.2	μA
Output voltage temperature coefficient	ΔVout/ΔTop	-40°C≤Top≤+85°C, Vin=4.0V, Iout=40mA		±100		ppm/°C
Short circuit current	Ilim	Vout=0V		70		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

Vout=3.3V(ELM85333AA), CE="H" active Ci=1.0μF, Co=4.7μF, 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	800			mA
Input stability	ΔVout/ΔVin	3.8V≤Vin≤6.0V, Iout=100mA		0.02	0.20	%/V
Load stability	ΔVout/ΔIout	Vin=4.3V,1mA≤Iout≤300mA		20	60	mV
Input-Output voltage differential	Vdif	Iout=100mA		55	90	mV
Current consumption	Iss	Vin=4.3V		40	100	μA
Standby current consumption	Istandby	Vin=4.3V, Vce=0V			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	0.0		0.2	V
CE input current High	Iceh	Vce=Vin=6.0V	-0.2		0.2	μA
CE input current Low	Icel	Vce=Vss, Vin=6.0V	-0.2		0.2	μA
Output voltage temperature coefficient	ΔVout/ΔTop	-40°C≤Top≤+85°C, Vin=4.3V, Iout=40mA		±100		ppm/°C
Short circuit current	Ilim	Vout=0V		70		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

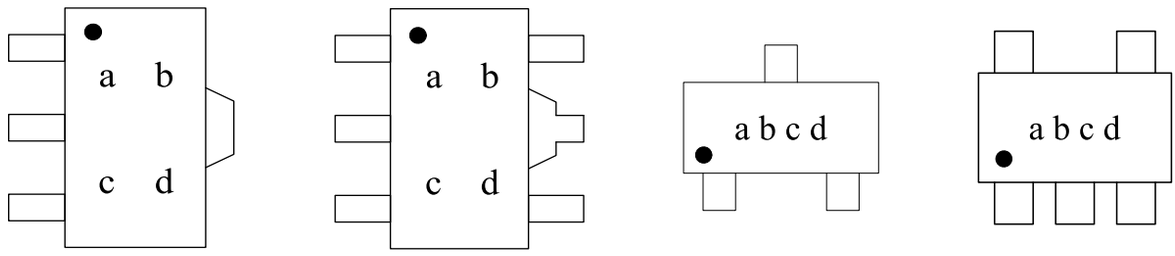
■Electrical characteristics (ELM8533xGA)

Vout=3.3V(ELM85333GA), CE="H" active Ci=1.0μF, Co=4.7μF, 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	800			mA
Input stability	ΔVout/ΔVin	3.8V≤Vin≤6.0V, Iout=100mA		0.02	0.20	%/V
Load stability	ΔVout/ΔIout	Vin=4.3V,1mA≤Iout≤300mA		20	60	mV
Input-Output voltage differential	Vdif	Iout=100mA		55	90	mV
Current consumption	Iss	Vin=4.3V		40	100	μA
Standby current consumption	Istandby	Vin=4.3V, Vce=0V			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	0.0		0.2	V
CE input current High	Iceh	Vce=Vin=6.0V	-0.2		0.2	μA
CE input current Low	Icel	Vce=Vss, Vin=6.0V	-0.2		0.2	μA
Output voltage temperature coefficient	ΔVout/ΔTop	-40°C≤Top≤+85°C, Vin=4.3V, Iout=40mA		±100		ppm/°C
Short circuit current	Ilim	Vout=0V		70		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

■Marking

SOT-89 SOT-89-5 SOT-23 SOT-25



a, b : Represents Output voltage range , Package type and CE type.

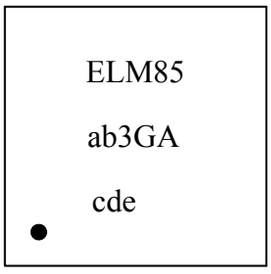
Symbol	Output voltage range (V)	Package	CE Type
00	1.2~3.0	SOT-89	No CE
01	3.1~4.0	SOT-89	No CE
02	1.2~3.0	SOT-89-5	CE=High
03	3.1~4.0	SOT-89-5	CE=High
54	1.2~3.0	SOT-23	No CE
55	3.1~4.0	SOT-23	No CE
5Y	1.2~3.0	SOT-25	CE=High
5Z	3.1~4.0	SOT-25	CE=High

c : Represents Output voltage.

Symbol	Output voltage(V)		Symbol	Output voltage(V)	
1		3.1	F	1.6	
2		3.2	G	1.7	
3		3.3	H	1.8	
4		3.4	J	1.9	
5		3.5	K	2.0	
6		3.6	L	2.1	
7		3.7	M	2.2	
8		3.8	N	2.3	
9		3.9	P	2.4	
0		4.0	Q	2.5	
A			R	2.6	
B	1.2		S	2.7	
C	1.3		T	2.8	
D	1.4		U	2.9	
E	1.5		V	3.0	

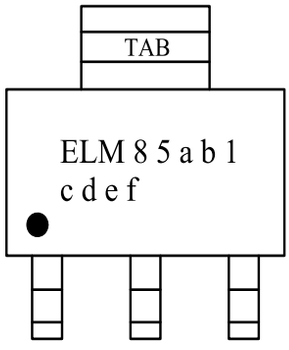
d : Represents the assembly lot number
1~0, A~Z repeated (I,O,X excepted)

SON8-3x3



a, b : Output voltage. e.g. : 33(Vout=3.3V)
c to e : Assembly lot No. —— 000 to 999

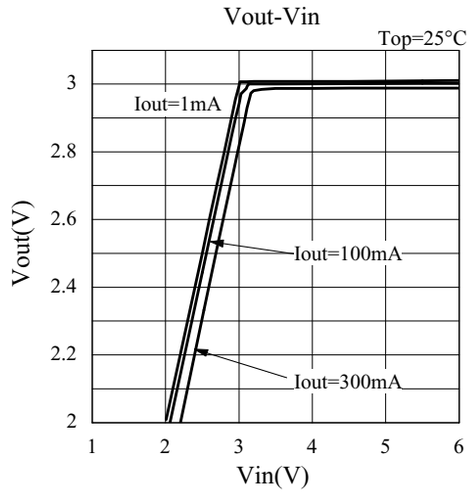
SOT-223

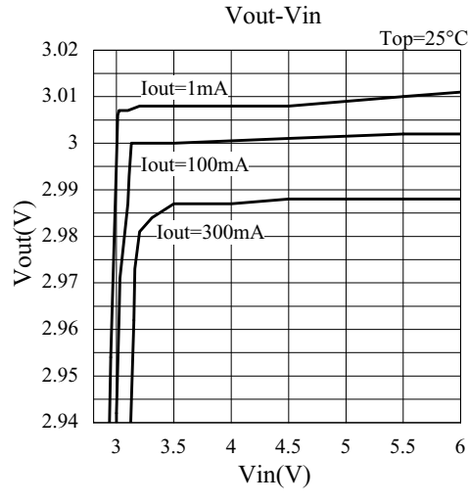


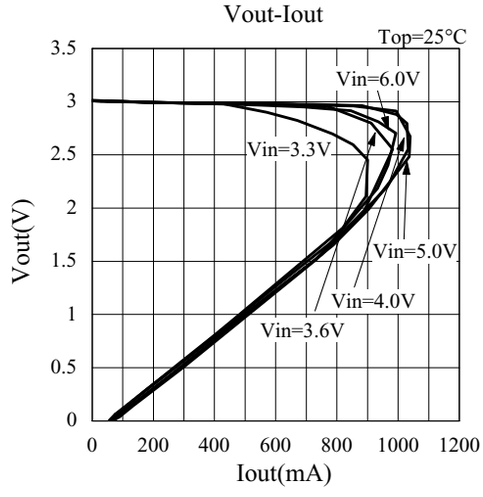
a, b : Output voltage. e.g. : 33(Vout=3.3V)
c : Product version
d to f : Assembly lot No. ——
A to Z (I, O, X excepted) and 0 to 9

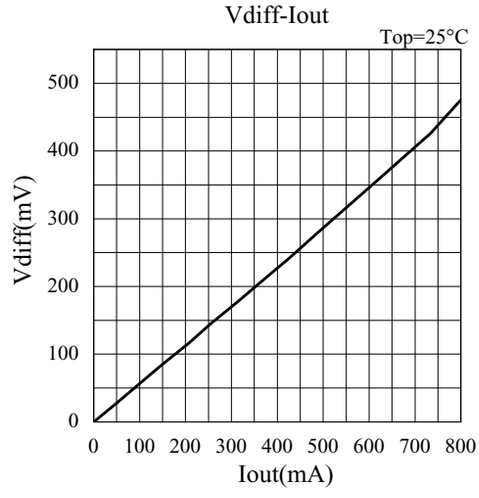
■Typical characteristics

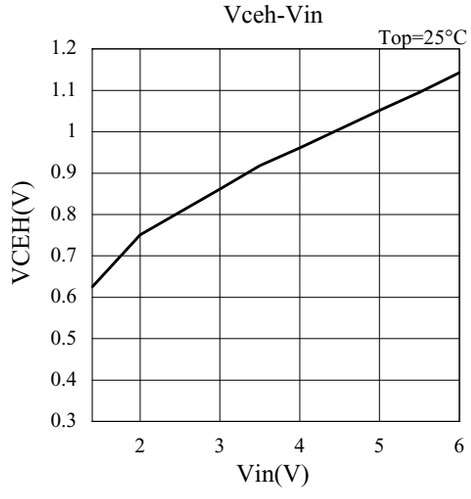
- 3.0V Vout unit (ELM8530xxA)

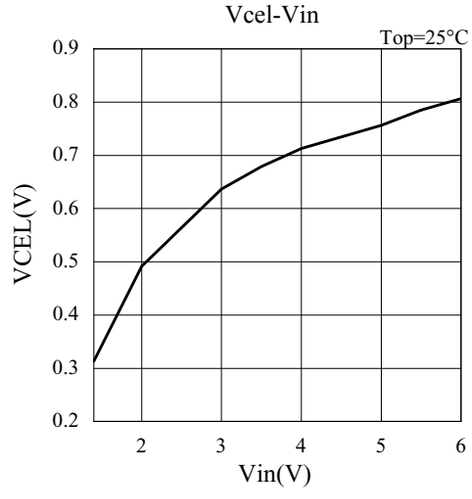


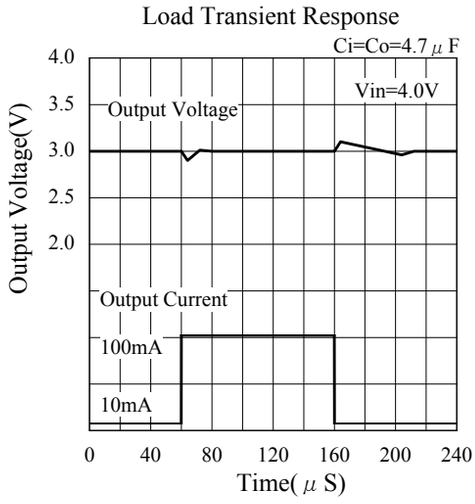


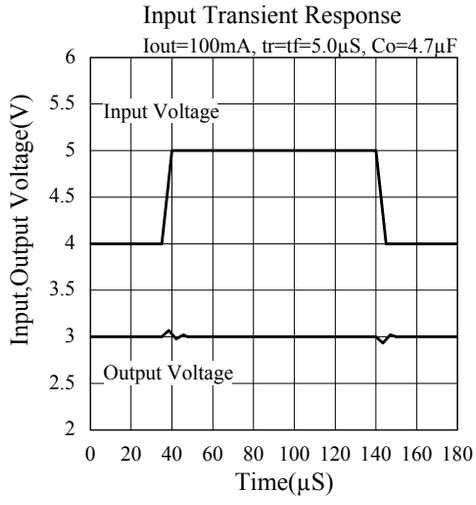


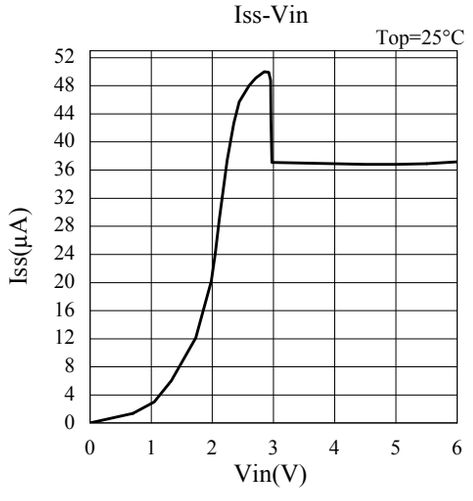


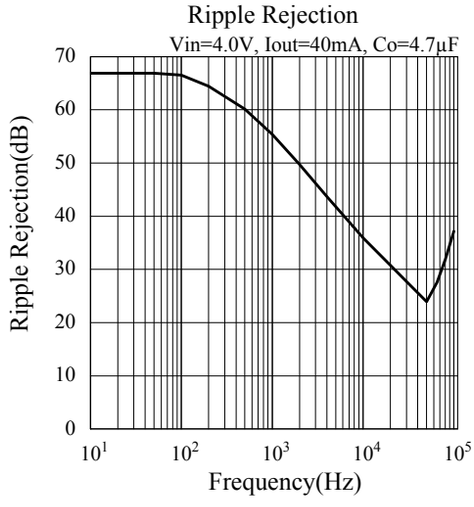




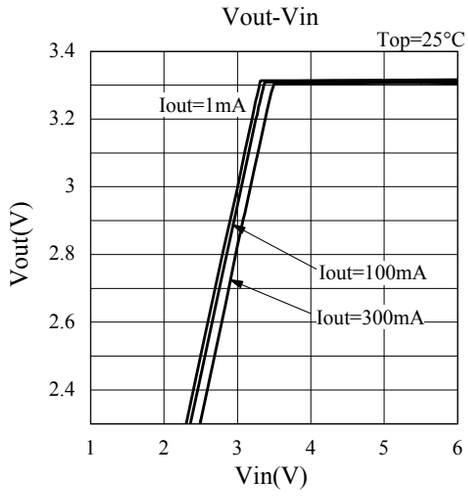

Load Transient Response
Ci=Co=4.7 μ F
Vin=4.0V
Output Voltage
Output Current
100mA
10mA
Output Voltage(V)
Time(μ S)
4.0
3.5
3.0
2.5
2.0
0
40
80
120
160
200
240

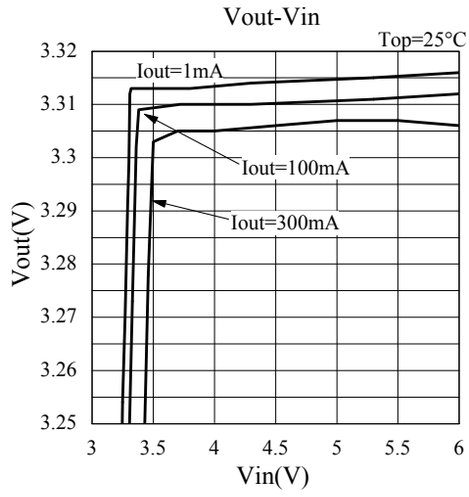

Input Transient Response
Iout=100mA, tr=tf=5.0μS, Co=4.7μF
Input Voltage
Output Voltage
Input,Output Voltage(V)
Time(μS)
6
5.5
5
4.5
4
3.5
3
2.5
2
0
20
40
60
80
100
120
140
160
180

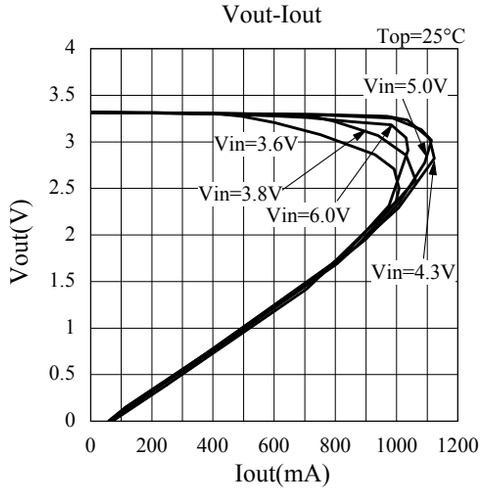

Iss-Vin
Top=25°C
Iss(μA)
Vin(V)
52
48
44
40
36
32
28
24
20
16
12
8
4
0
0
1
2
3
4
5
6

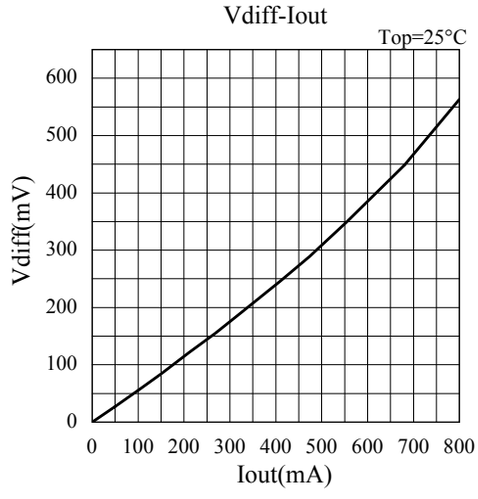

Ripple Rejection
Vin=4.0V, Iout=40mA, Co=4.7μF
Ripple Rejection(dB)
Frequency(Hz)
70
60
50
40
30
20
10
0
10^1
10^2
10^3
10^4
10^5

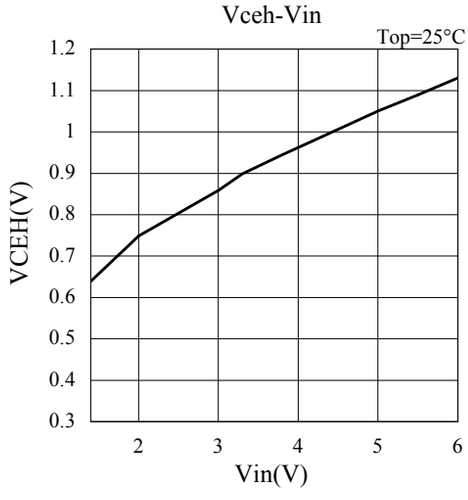
• 3.3V Vout unit (ELM8533xxA)

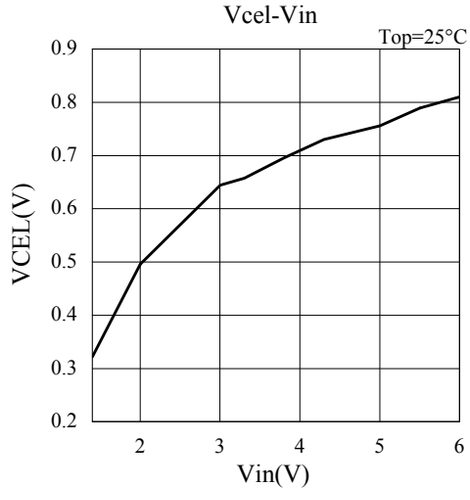


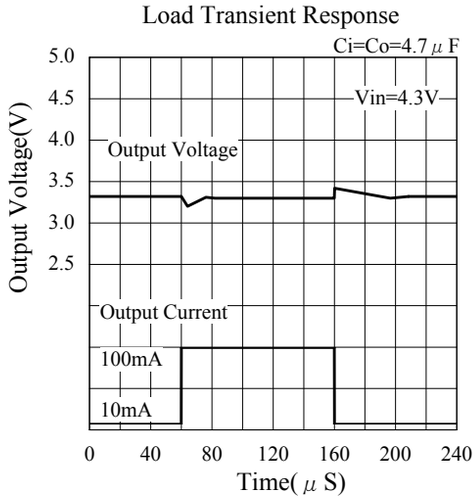


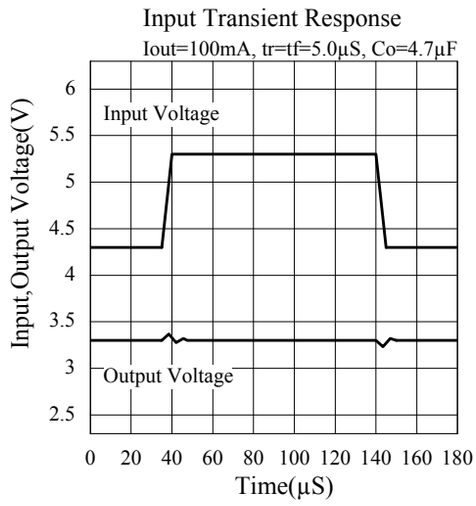


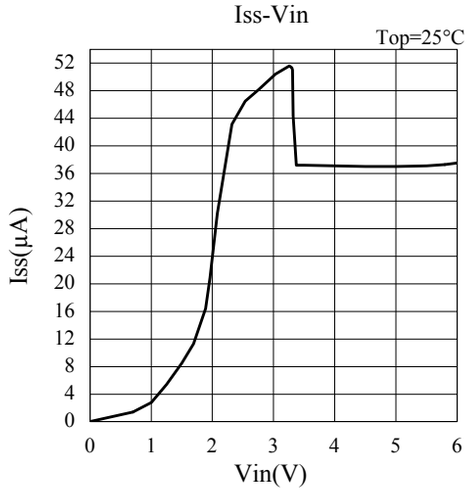


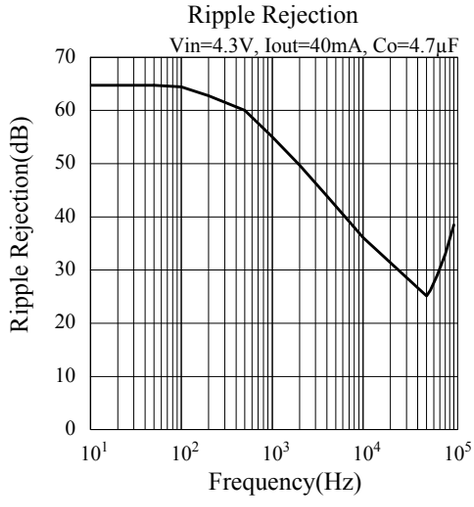




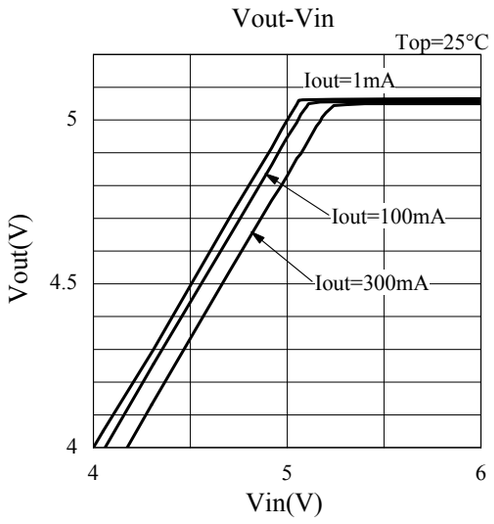

Load Transient Response
Ci=Co=4.7μF
Vin=4.3V
Output Voltage
Output Current
100mA
10mA
Output Voltage(V)
Time(μS)
5.0
4.5
4.0
3.5
3.0
2.5
0
40
80
120
160
200
240

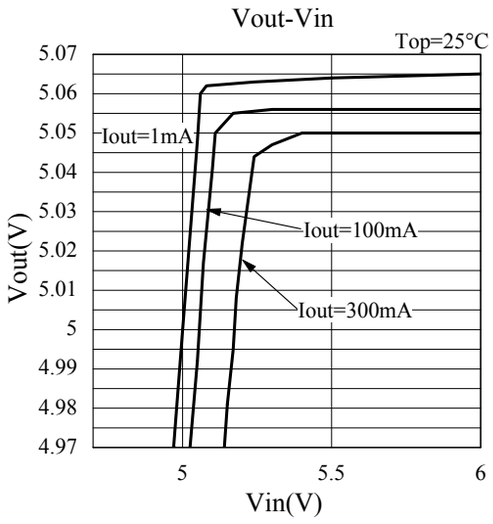

Input Transient Response
Iout=100mA, tr=tf=5.0μS, Co=4.7μF
Input Voltage
Output Voltage
Input,Output Voltage(V)
Time(μS)
6
5.5
5
4.5
4
3.5
3
2.5
0
20
40
60
80
100
120
140
160
180

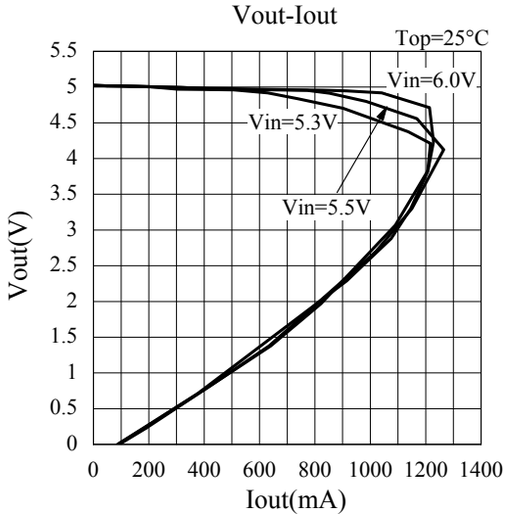

Iss-Vin
Top=25°C
Iss(μA)
Vin(V)
52
48
44
40
36
32
28
24
20
16
12
8
4
0
0
1
2
3
4
5
6

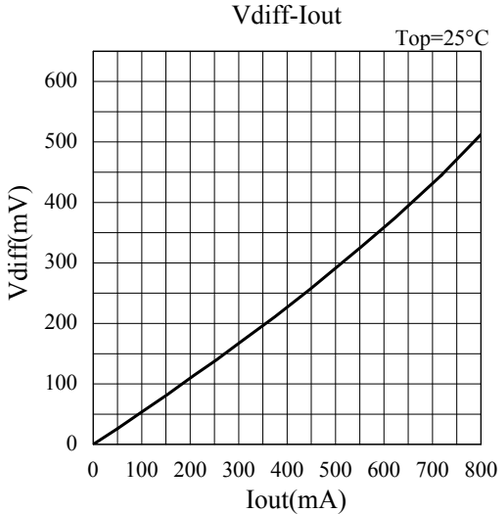

Ripple Rejection
Vin=4.3V, Iout=40mA, Co=4.7μF
Ripple Rejection(dB)
Frequency(Hz)
70
60
50
40
30
20
10
0
10¹
10²
10³
10⁴
10⁵

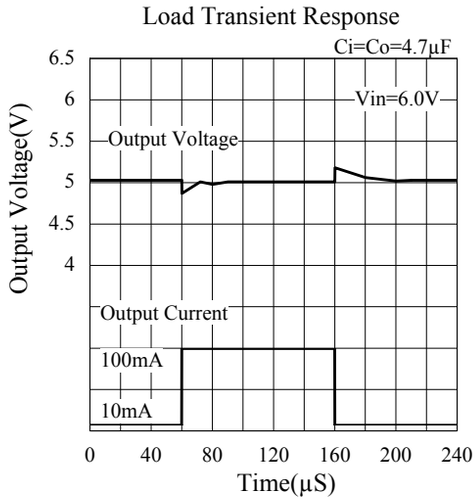
- 5.0V Vout unit (ELM85501HA)

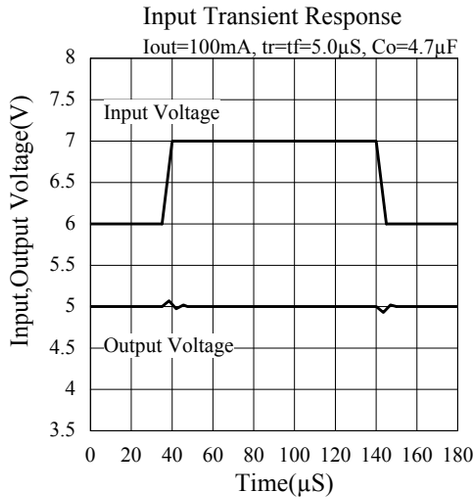


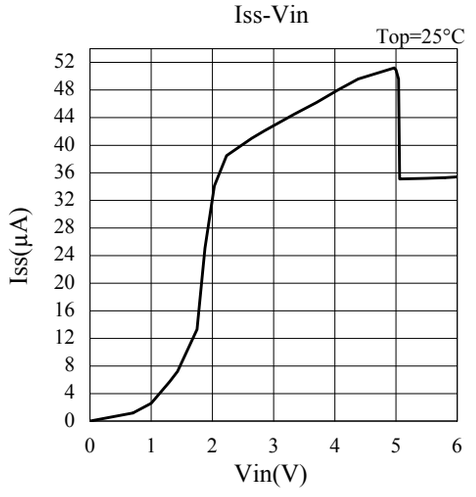


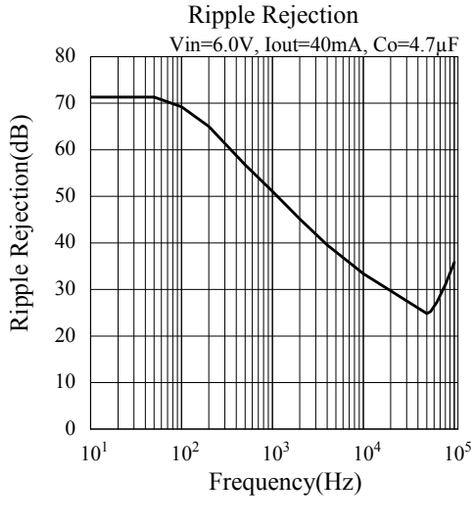





Load Transient Response
Ci=Co=4.7μF
Vin=6.0V
Output Voltage
Output Current
100mA
10mA
Output Voltage(V)
Time(μS)


Input Transient Response
Iout=100mA, tr=tf=5.0μS, Co=4.7μF
Input Voltage
Output Voltage
Input,Output Voltage(V)
Time(μS)


Iss-Vin
Top=25°C
Iss(μA)
Vin(V)


Ripple Rejection
Vin=6.0V, Iout=40mA, Co=4.7μF
Ripple Rejection(dB)
Frequency(Hz)