ELM85xxxxA CMOS 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～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～5.0V (by 0.1V)
- Maximum output current : 800mA
- 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～5.0V)
  SOT-89 (1.2V～4.0V)
  SOT-89-5 (1.2V～4.0V)
  (0.8V～1.1V, 4.1V～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-0.3～7.0	V
Output voltage	Vout	Vss-0.3～Vin+0.3	V
Output current	Iout	1000	mA
Power dissipation	Pd	300 (SOT-89) 500 (SOT-89-5) 625 (SOT-223)	mW
Thermal resistance junction toambient	Rθja	160 (SOT-223) 200 (SOT-89) 200 (SOT-89-5)	℃/W
Operating temperature	Top	-40～+85	℃
Storage temperature	Tstg	-55～+125	℃

■Selection guide

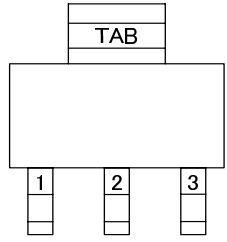
ELM85xxxxA-x

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	H : SOT-223 A : SOT-89, SOT-89-5
e	Product version	A
f	Taping direction	S : SOT-223, SOT-89, SOT-89-5 N : SOT-89, SOT-89-5 Refer to PKG file

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

■Pin configuration

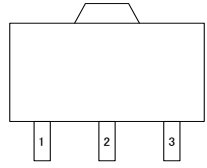
SOT-223 (TOP VIEW)



ELM85xx1HA

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

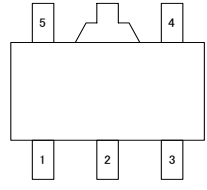
SOT-89 (TOP VIEW)



ELM85xx1AA

Pin No.	Pin name
1	VSS
2	VIN
3	VOUT

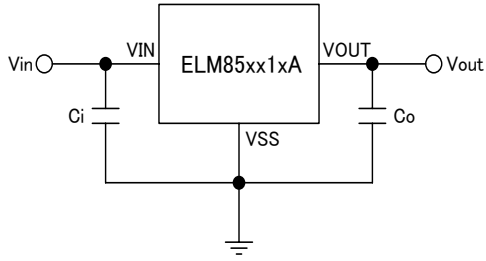
SOT-89-5 (TOP VIEW)

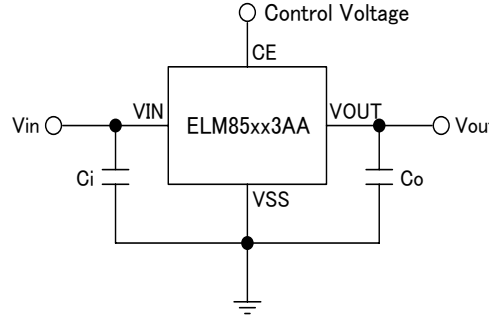


ELM85xx3AA

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

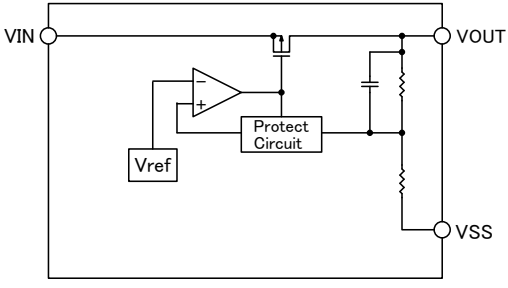
■Standard curcuit



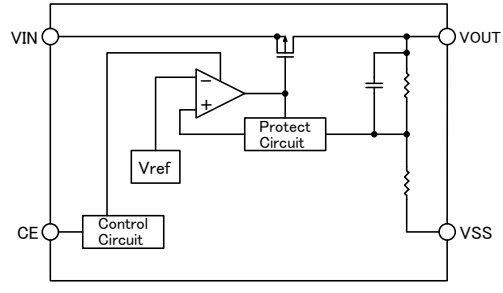


■Block diagram

ELM85xx1xA



ELM85xx3AA



■Electrical characteristics (ELM85xx1xA)

Vout=3.0V (ELM85301xA), No CE pin　　Ci=1.0μF, Co=4.7μF, Top=25℃

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℃≦Top≦+85℃, Vin=4.0V, Iout=40mA		± 100		ppm/℃
Short circuit current	Ilim	Vout=0V		70		mA
Ripple rejection ratio	RR	f=1kHz, Iout=40mA		60		dB
Thermal shutdown temperature	Tsd			165		℃
Output noise	Vno	BW=10Hz ～ 100kHz		30		μVrms

Vout=3.3V (ELM85331xA), No CE pin　　Ci=1.0μF, Co=4.7μF, Top=25℃

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℃≦Top≦+85℃, Vin=4.3V, Iout=40mA		± 100		ppm/℃
Short circuit current	Ilim	Vout=0V		70		mA
Ripple rejection ratio	RR	f=1kHz, Iout=40mA		60		dB
Thermal shutdown temperature	Tsd			165		℃
Output noise	Vno	BW=10Hz ～ 100kHz		30		μVrms

Vout=5.0V (ELM85501HA), No CE pin　　Ci=1.0μF, Co=4.7μF, Top=25℃

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℃≦Top≦+85℃, Vin=6.0V, Iout=40mA		± 100		ppm/℃
Short circuit current	Ilim	Vout=0V		70		mA
Ripple rejection ratio	RR	f=1kHz, Iout=40mA		60		dB
Thermal shutdown temperature	Tsd			165		℃
Output noise	Vno	BW=10Hz ～ 100kHz		30		μVrms

* ELM8550 is available in only SOT-223 package.

■Electrical characteristics (ELM85xx3AA)

Vout=3.0V (ELM85303AA), CE="H" active Ci=1.0μF, Co=4.7μF, Top=25℃

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℃≦Top≦+85℃, Vin=4.0V, Iout=40mA		± 100		ppm/℃
Short circuit current	Ilim	Vout=0V		70		mA
Ripple rejection ratio	RR	f=1kHz, Iout=40mA		60		dB
Thermal shutdown temperature	Tsd			165		℃
Output noise	Vno	BW=10Hz ～ 100kHz		30		μVrms

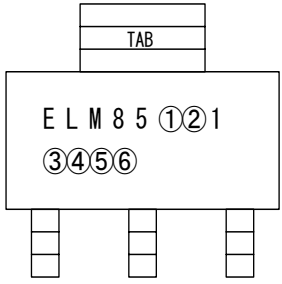
Vout=3.3V (ELM85333AA), CE="H" active Ci=1.0μF, Co=4.7μF, Top=25℃

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℃≦Top≦+85℃, Vin=4.3V, Iout=40mA		± 100		ppm/℃
Short circuit current	Ilim	Vout=0V		70		mA
Ripple rejection ratio	RR	f=1kHz, Iout=40mA		60		dB
Thermal shutdown temperature	Tsd			165		℃
Output noise	Vno	BW=10Hz ～ 100kHz		30		μVrms

■Marking

・SOT-223 package : ELM85xx1HA

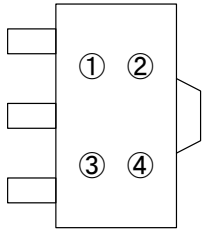
SOT-223



No. ① , ② : Output voltage. e.g. : 33 (Vout=3.3V)
③ : Product version
④～⑥ : Assembly lot No.
A～Z (I, O, X excepted) and 0～9

・SOT-89 package : ELM85xx1AA

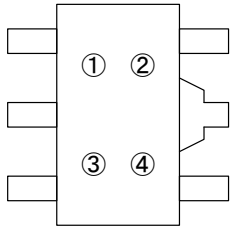
SOP-89



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

・SOT-89-5 package : ELM85xx3AA with CE

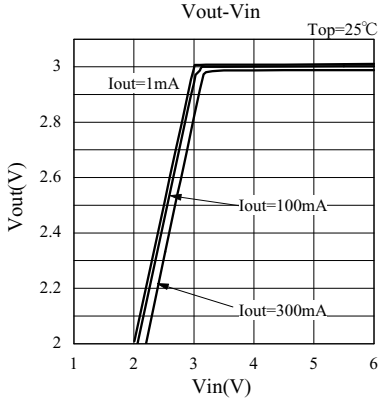
SOP-89-5

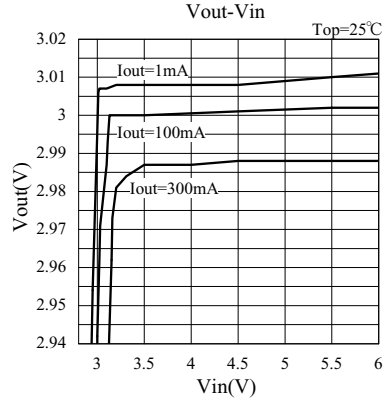


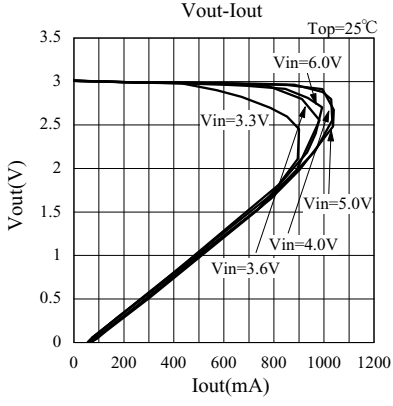
No. ①～④ : Assembly lot No.
A～Z (I, O, X excepted) and 0～9

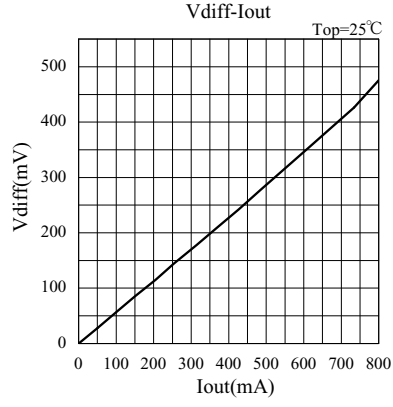
■Typical characteristics

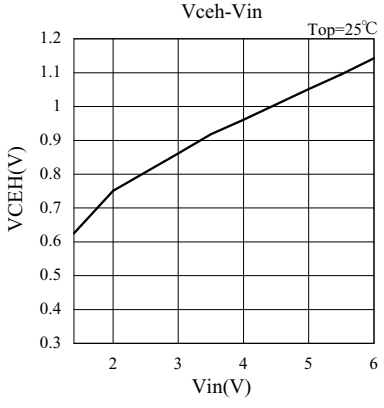
・3.0V Vout unit (ELM8530xxA)

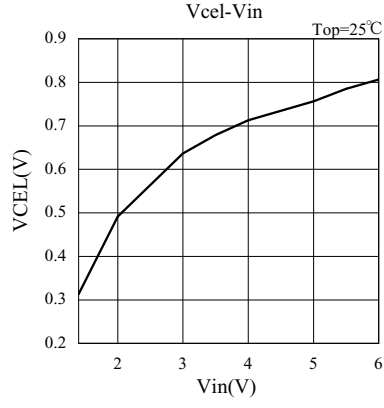




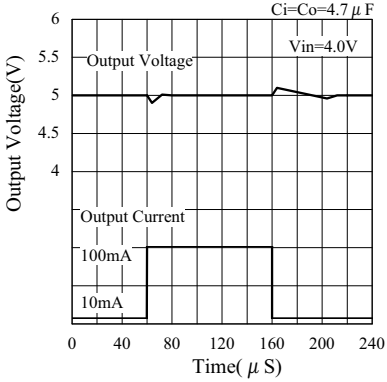




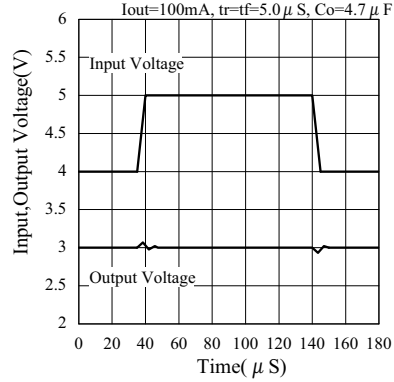




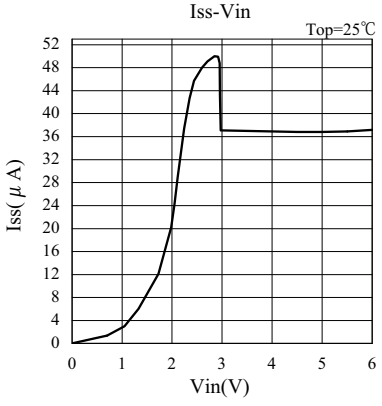
Load Transient Response



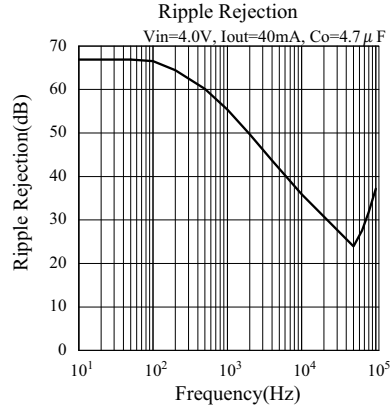
Input Transient Response



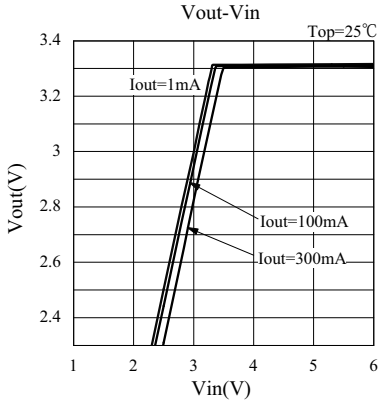
Iss-Vin

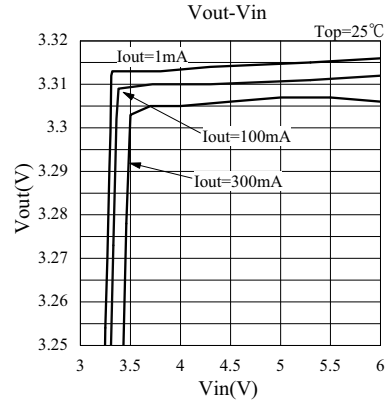


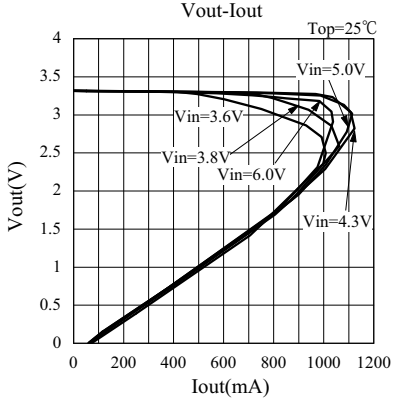
Ripple Rejection

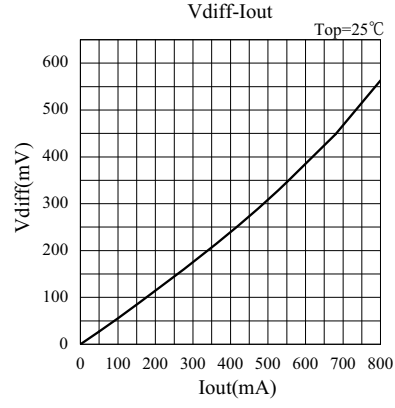


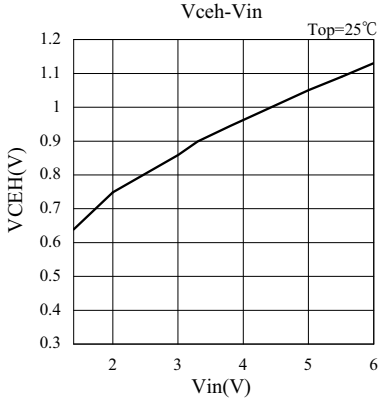
・3.3V Vout unit (ELM8533xxA)

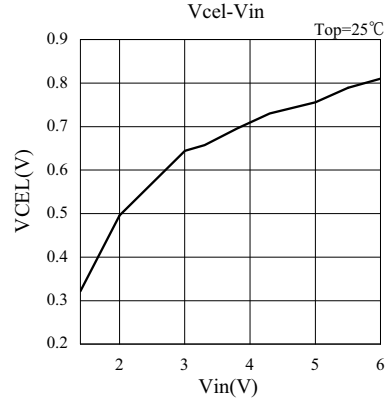


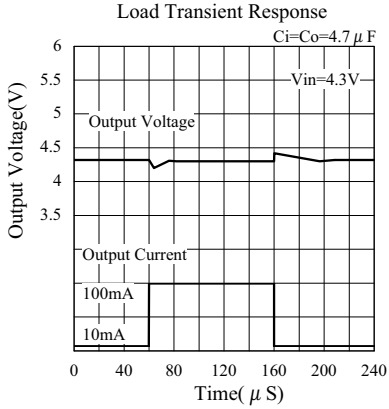


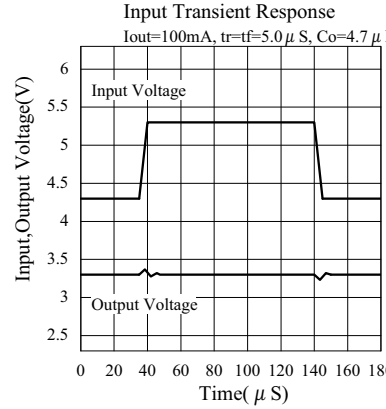


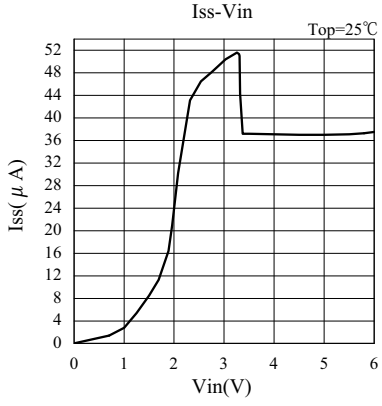


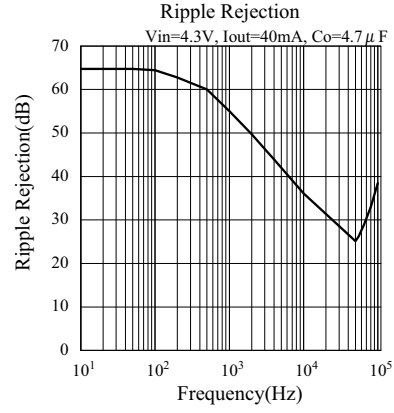




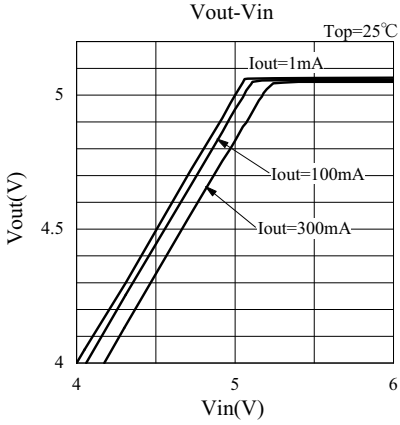

Load Transient Response
Ci=Co=4.7μF
Vin=4.3V
Output Voltage
Output Current
100mA
10mA
Output Voltage(V)
Time(μS)
6
5.5
5
4.5
4
3.5
0
40
80
120
160
200
240

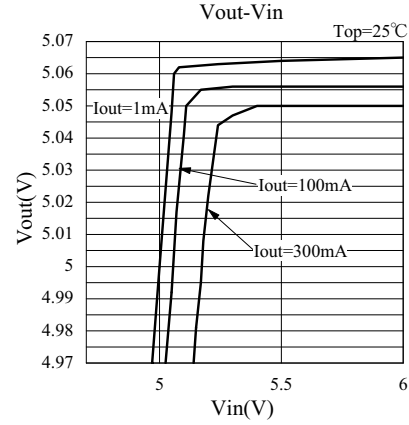

Input Transient Response
Iout=100mA, tr=tf=5.0μS, Co=4.7μF
Input Voltage
Output Voltage
Input,Output Voltage(V)
Time(μS)
6
5.5
5
4.5
4
3.5
3
2.5
0
20
40
60
80
100
120
140
160
180

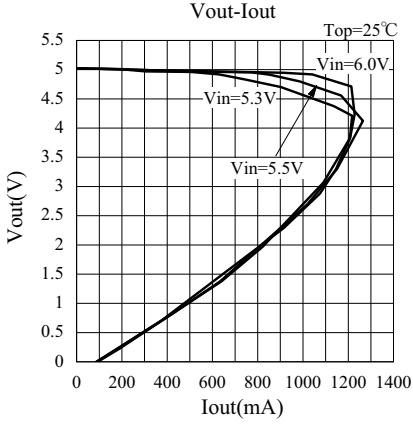

Iss-Vin
Top=25℃
Iss(μA)
Vin(V)
52
48
44
40
36
32
28
24
20
16
12
8
4
0
0
1
2
3
4
5
6

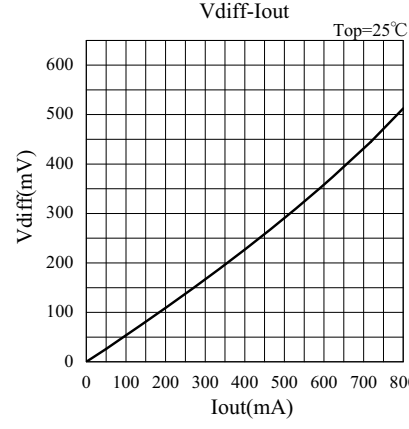

Ripple Rejection
Vin=4.3V, Iout=40mA, Co=4.7μF
Ripple Rejection(dB)
Frequency(Hz)
70
60
50
40
30
20
10
0
10¹
10²
10³
10⁴
10⁵

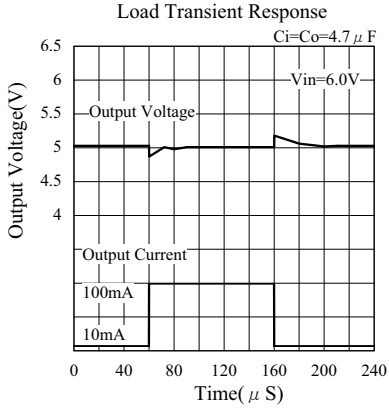
・5.0V Vout unit (ELM85501HA)

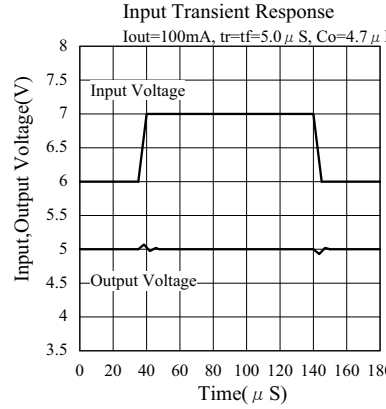


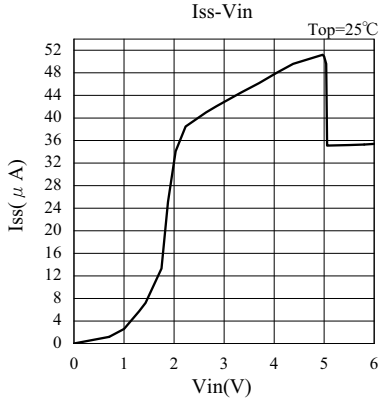


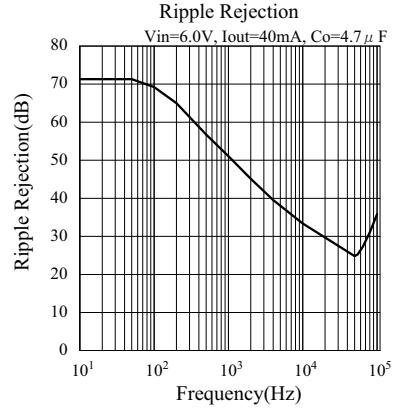





Load Transient Response
Ci=Co=4.7μF
Vin=6.0V
Output Voltage
Output Current
100mA
10mA
Output Voltage(V)
Time(μS)
6.5
6
5.5
5
4.5
4
0
40
80
120
160
200
240


Input Transient Response
Iout=100mA, tr=tf=5.0μS, Co=4.7μF
Input Voltage
Output Voltage
Input,Output Voltage(V)
Time(μS)
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
0
20
40
60
80
100
120
140
160
180


Iss-Vin
Top=25℃
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=6.0V, Iout=40mA, Co=4.7μF
Ripple Rejection(dB)
Frequency(Hz)
80
70
60
50
40
30
20
10
0
10¹
10²
10³
10⁴
10⁵