ELM98xxxA VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

ELM98xxxA Series is a CMOS Voltage Regulator. It consists of reference voltage, error amplifier, short-protected control transistor, output voltage setting resistor, and so on. Output voltage is fixed internally with high accuracy.

Two package types are available, SOT-89 and SOT-23.

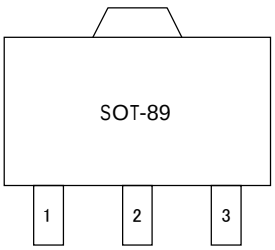
■ FEATURES

・High accuracy	: ± 2.0%
・Load stability	: TYP. 10mV (1mA ≦ IOUT ≦ 50mA)
・Input stability	: TYP. 0.1%/V at IOUT=50mA
・Output voltage temperature coefficient	: ± 100ppm/℃
・Very low power operation	: TYP. 4.0 μ A (ELM9830xA)
・Very small package	: SOT-89, SOT-23

■ APPLICATION

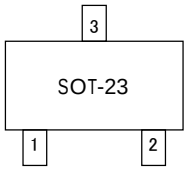
・Battery-operated devices
・Palmtops
・Cameras and Video recorders
・Reference voltage sources

■ PIN CONFIGURATION



(TOP VIEW)

Pin No.	Pin Name
1	VSS
2	VIN
3	VOUT



(TOP VIEW)

Pin No.	Pin Name
1	VSS
2	VOUT
3	VIN

VOLTAGE REGULATOR ELM98xxxA

■ SELECTION GUIDE

Symbol		
a, b	Output Voltage	Ex 27 : VOUT = 2.7V 30 : VOUT = 3.0V 50 : VOUT = 5.0V
c	Package	A : SOT-89 B : SOT-23
d	Product Version	A : A Version

ELM98 x x x A
↑ ↑ ↑ ↑
a b c d

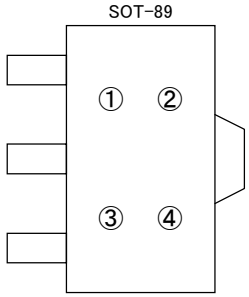
■ SERIES

Model	Output Voltage	Package	Model	Output Voltage	Package
ELM9827BA-S(N)	2.7V	SOT-23	ELM9827AA-S(N)	2.7V	SOT-89
ELM9830BA-S(N)	3.0V	SOT-23	ELM9830AA-S(N)	3.0V	SOT-89
ELM9833BA-S(N)	3.3V	SOT-23	ELM9833AA-S(N)	3.3V	SOT-89
ELM9850BA-S(N)	5.0V	SOT-23	ELM9850AA-S(N)	5.0V	SOT-89

S type : Standard, N type : Reverse

* Available 1.2V～6.0V output voltage at 0.1V step as semi-custom-made IC

■ MARKING



① : Represents the decimal digit of the Output Voltage

Symbol	Output Voltage	Symbol	Output Voltage
0	*.0V	5	*.5V
1	*.1V	6	*.6V
2	*.2V	7	*.7V
3	*.3V	8	*.8V
4	*.4V	9	*.9V

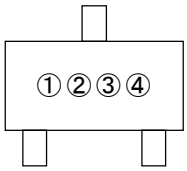
② : Represents the integer digit of the Output Voltage

Symbol	Output Voltage	Symbol	Output Voltage
A	2.*V	D	5.*V
B	3.*V	E	6.*V
C	4.*V	F	1.*V

③ : Represents the assembly lot number
A ～ Z repeated (I,O,X excepted)

④ : Represents the assembly lot number
0 ～ 9 repeated

SOT-23



①: Represents the integer digit of the Output Voltage

Symbol	Output Voltage	Symbol	Output Voltage
2	2.*V	5	5.*V
3	3.*V	6	6.*V
4	4.*V	1	1.*V

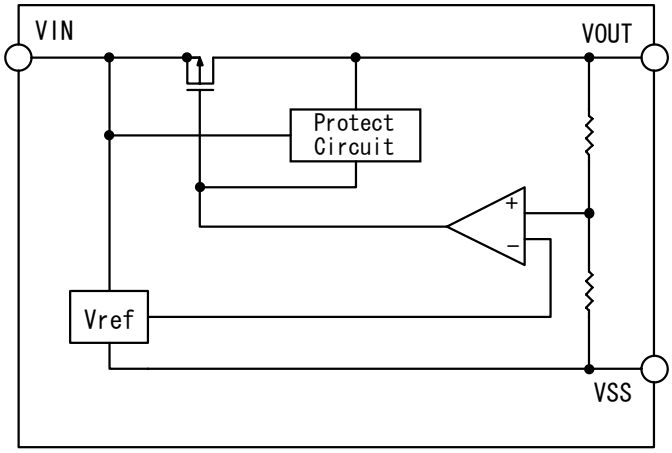
②: Represents the decimal digit of the Output Voltage

Symbol	Detection Voltage	Symbol	Detection Voltage
0	*.0V	5	*.5V
1	*.1V	6	*.6V
2	*.2V	7	*.7V
3	*.3V	8	*.8V
4	*.4V	9	*.9V

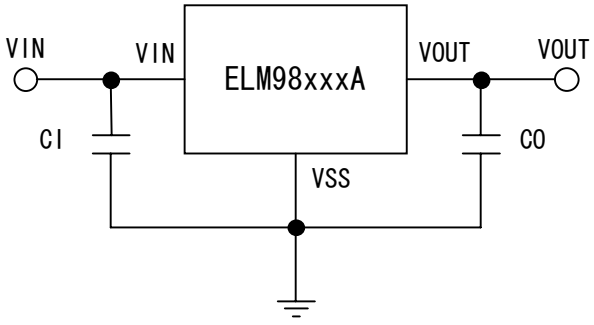
③: Represents the assembly lot number
A ～ Z repeated (I,O,X excepted)

④: Represents the assembly lot number
0 ～ 9 repeated

■ BLOCK DIAGRAM



■ STANDARD CIRCUIT



■ MAXIMUM ABSOLUTE RATINGS

Parameter	Symbol		Limits	Units
Input Voltage	VIN		12	V
Output Voltage	VOUT		VIN+0.3～VSS-0.3	V
Output Current	IOUT		200	mA
Power Dissipation	Pd	SOT-89	300	mW
		SOT-23	200	
Operating Temperature	Top		-30～+80	℃
Storage Temperature	Tstg		-40～+125	

＊ Output current must not exceed power dissipation specified in Maximum Absolute Ratings.

■ ELECTRICAL CHARACTERISTICS

ELM9827xA (Top=25℃)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	VOUT	VIN=4.7V, IOUT=1mA	2.646	2.700	2.754	V
Output Current	IOUT	VIN=3.3V	40			mA
Load Stability	$\frac{\triangle VOUT}{\triangle IOUT}$	VIN=4.7V 1mA≦IOUT≦50mA		10	20	mV
Input/Output Voltage Differential	Vdif	IOUT=10mA		90	120	mV
Current Consumption	ISS	VIN=4.7V, No-load		4.0	7.0	μA
Input Stability	$\frac{\triangle VOUT}{\triangle VIN}$	3.7V≦VIN≦6.7V IOUT=50mA		0.1	0.25	%/V
Input Voltage	VIN				10	V
Output Voltage Temperature Characteristics	$\frac{\triangle VOUT}{\triangle Top}$	VIN=4.7V, IOUT=1mA -30℃≦Top≦+80℃		±100		ppm/℃

ELM9830xA

(Top=25℃)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	VOUT	VIN=5.0V, IOUT=1mA	2.940	3.000	3.060	V
Output Current	IOUT	VIN=3.6V	50			mA
Load Stability	△VOUT / △IOUT	VIN=5.0V 1mA≦IOUT≦50mA		10	20	mV
Input/Output Voltage Differential	Vdif	IOUT=10mA		85	115	mV
Current Consumption	ISS	VIN=5.0V, No-load		4.0	7.0	μA
Input Stability	△VOUT / △VIN	4.0V≦VIN≦7.0V IOUT=50mA		0.1	0.25	%/V
Input Voltage	VIN				10	V
Output Voltage Temperature Characteristics	△VOUT / △Top	VIN=5.0V, IOUT=1mA -30℃≦Top≦+80℃		±100		ppm/℃

ELM9833xA

(Top=25℃)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	VOUT	VIN=5.3V, IOUT=1mA	3.234	3.300	3.366	V
Output Current	IOUT	VIN=3.9V	55			mA
Load Stability	△VOUT / △IOUT	VIN=5.3V 1mA≦IOUT≦50mA		10	20	mV
Input/Output Voltage Differential	Vdif	IOUT=10mA		80	110	mV
Current Consumption	ISS	VIN=5.3V, No-load		4.5	8.0	μA
Input Stability	△VOUT / △VIN	4.3V≦VIN≦7.3V IOUT=50mA		0.1	0.25	%/V
Input Voltage	VIN				10	V
Output Voltage Temperature Characteristics	△VOUT / △Top	VIN=5.3V, IOUT=1mA -30℃≦Top≦+80℃		±100		ppm/℃

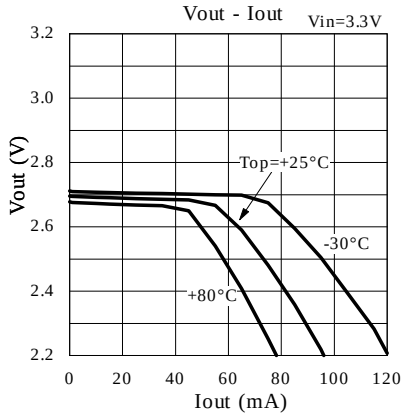
ELM9850xA

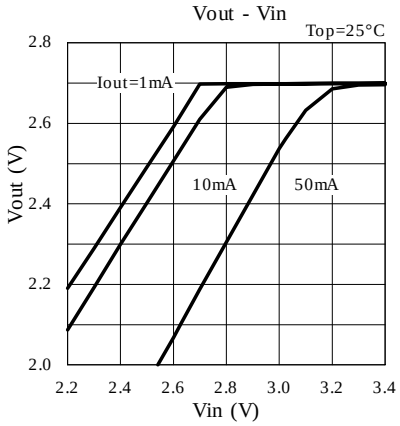
(Top=25℃)

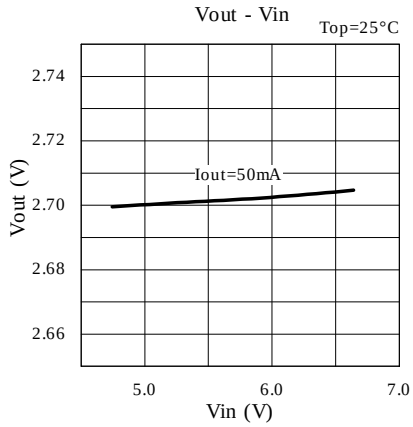
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	VOUT	VIN=7.0V, IOUT=1mA	4.900	5.000	5.100	V
Output Current	IOUT	VIN=5.6V	70			mA
Load Stability	△VOUT / △IOUT	VIN=7.0V 1mA≦IOUT≦50mA		10	20	mV
Input/Output Voltage Differential	Vdif	IOUT=10mA		55	85	mV
Current Consumption	ISS	VIN=7.0V, No-load		5.0	9.0	μA
Input Stability	△VOUT / △VIN	6.0V≦VIN≦9.0V IOUT=50mA		0.1	0.25	%/V
Input Voltage	VIN				10	V
Output Voltage Temperature Characteristics	△VOUT / △Top	VIN=7.0V, IOUT=1mA -30℃≦Top≦+80℃		±100		ppm/℃

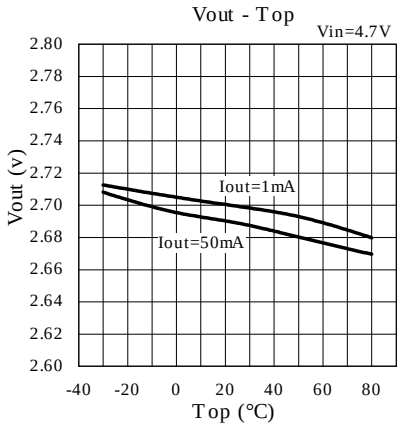
■ TYPICAL CHARACTERISTICS

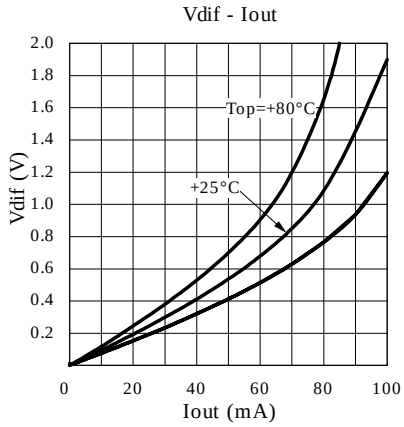
● ELM9827xA

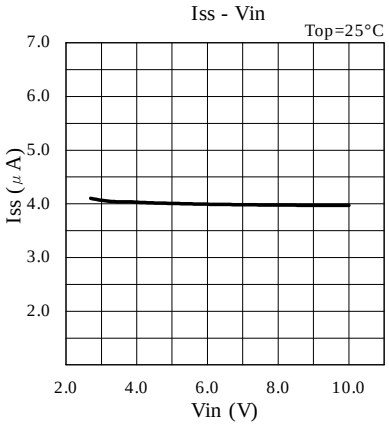


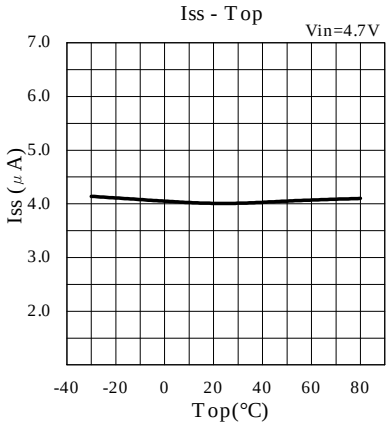


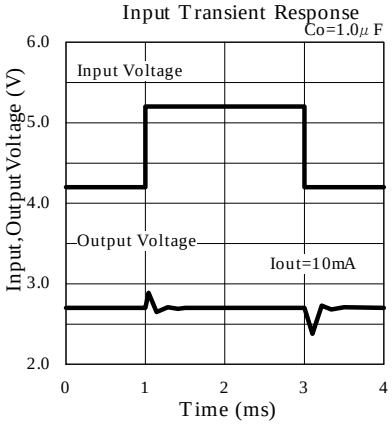


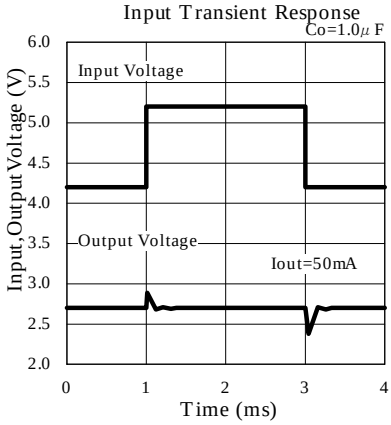


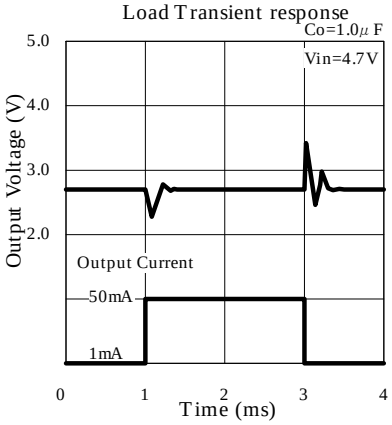



Iss - Vin
Top=25°C
Iss (μA)
7.0
6.0
5.0
4.0
3.0
2.0
2.0
4.0
6.0
8.0
10.0
Vin (V)

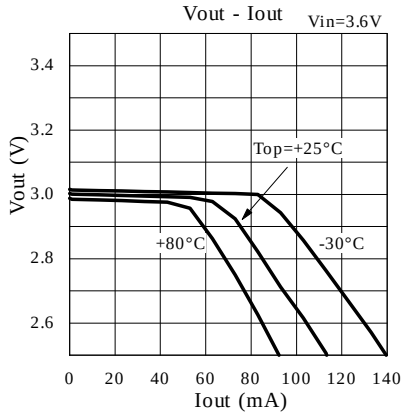

Iss - Top
Vin=4.7V
Iss (μA)
7.0
6.0
5.0
4.0
3.0
2.0
-40
-20
0
20
40
60
80
Top(°C)

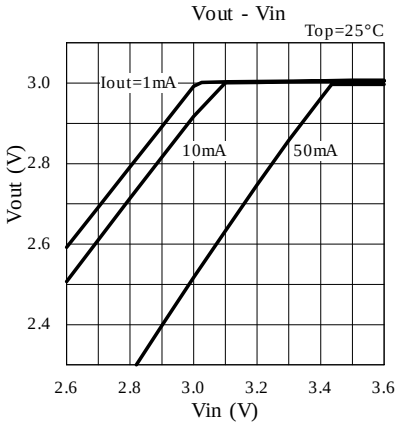

Input Transient Response
Co=1.0μF
Input Voltage
Output Voltage
Iout=10mA
Input,Output Voltage (V)
6.0
5.0
4.0
3.0
2.0
0
1
2
3
4
Time (ms)

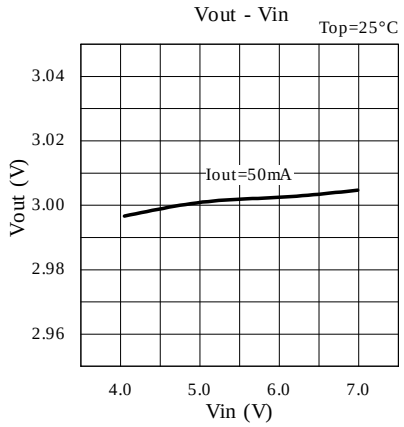

Input Transient Response
Co=1.0μF
Input Voltage
Output Voltage
Iout=50mA
Input,Output Voltage (V)
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
0
1
2
3
4
Time (ms)

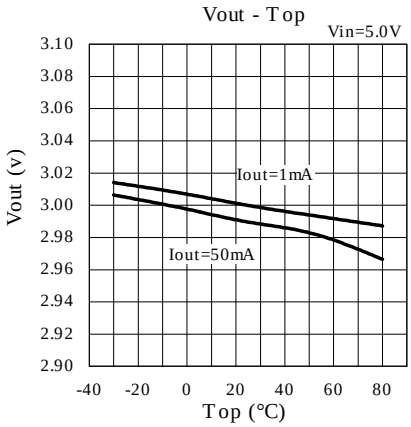

Load Transient response
Co=1.0μF
Vin=4.7V
Output Voltage (V)
5.0
4.0
3.0
2.0
Output Current
50mA
1mA
0
1
2
3
4
Time (ms)

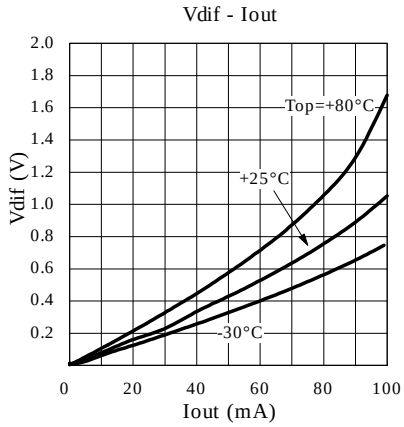
● ELM9830xA

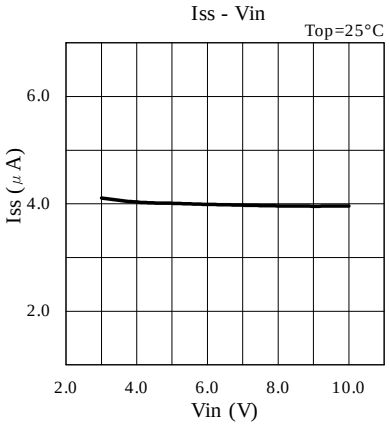

Vout - Iout
Vin=3.6V
Top=+25°C
+80°C
-30°C
Vout (V)
Iout (mA)
3.4
3.2
3.0
2.8
2.6
0
20
40
60
80
100
120
140

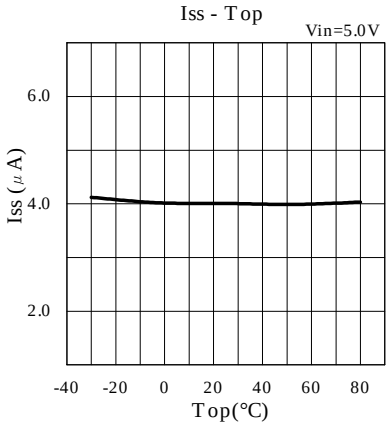

Vout - Vin
Top=25°C
Iout=1mA
10mA
50mA
Vout (V)
Vin (V)
3.0
2.8
2.6
2.4
2.6
2.8
3.0
3.2
3.4
3.6

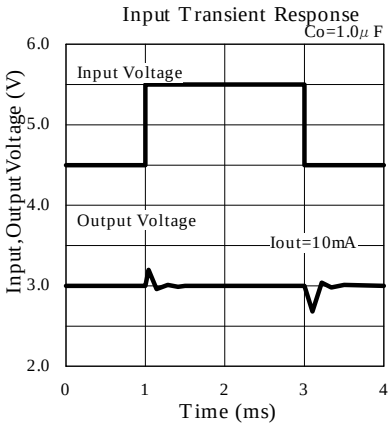

Vout - Vin
Top=25°C
Iout=50mA
Vout (V)
Vin (V)
3.04
3.02
3.00
2.98
2.96
4.0
5.0
6.0
7.0

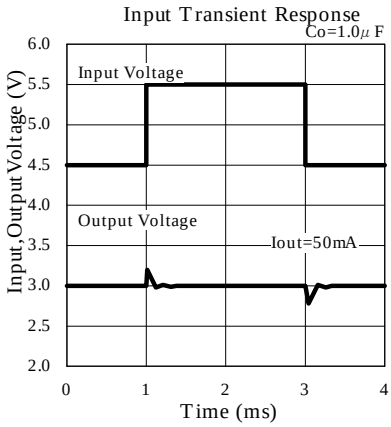

Vout - Top
Vin=5.0V
Iout=1mA
Iout=50mA
Vout (v)
Top (°C)
3.10
3.08
3.06
3.04
3.02
3.00
2.98
2.96
2.94
2.92
2.90
-40
-20
0
20
40
60
80

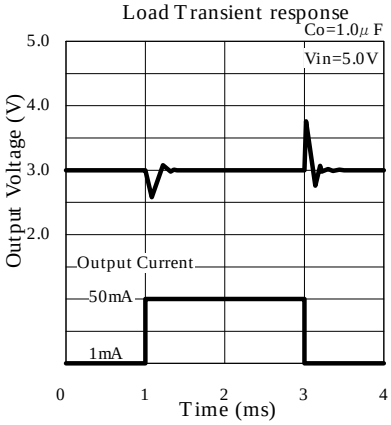

Vdif - Iout
Top=+80°C
+25°C
-30°C
Vdif (V)
Iout (mA)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
20
40
60
80
100


Iss - Vin
Top=25°C
Iss (μA)
6.0
4.0
2.0
2.0
4.0
6.0
8.0
10.0
Vin (V)

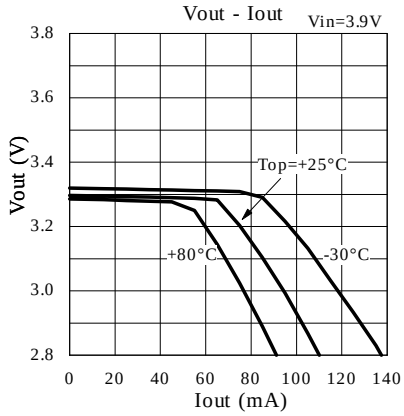

Iss - Top
Vin=5.0V
Iss (μA)
6.0
4.0
2.0
-40
-20
0
20
40
60
80
Top(°C)

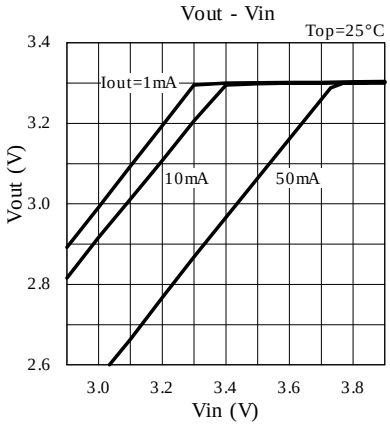

Input Transient Response
Co=1.0μF
Input Voltage
Output Voltage
Iout=10mA
Input,Output Voltage (V)
6.0
5.0
4.0
3.0
2.0
0
1
2
3
4
Time (ms)

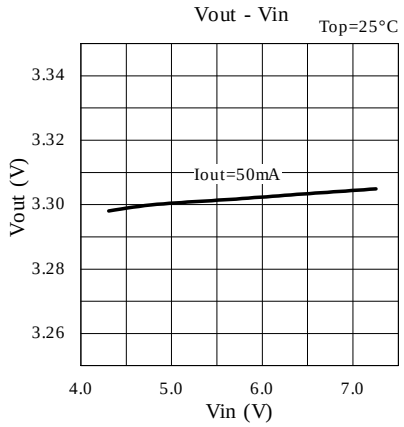

Input Transient Response
Co=1.0μF
Input Voltage
Output Voltage
Iout=50mA
Input,Output Voltage (V)
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
0
1
2
3
4
Time (ms)

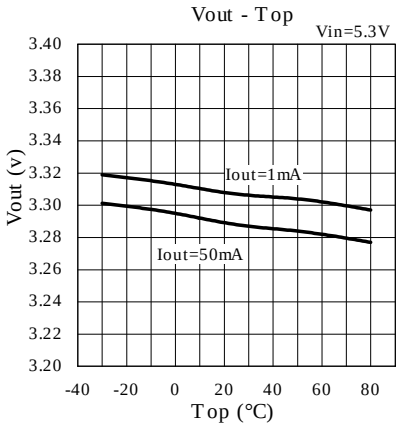

Load Transient response
Co=1.0μF
Vin=5.0V
Output Voltage (V)
5.0
4.0
3.0
2.0
Output Current
50mA
1mA
0
1
2
3
4
Time (ms)

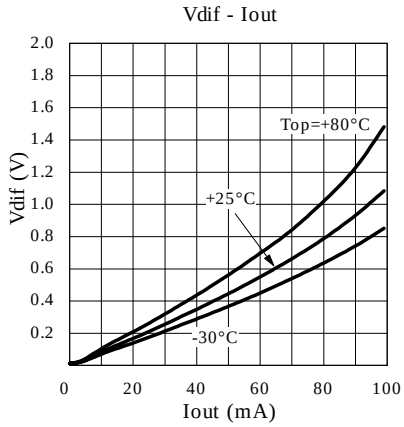
● ELM9833xA

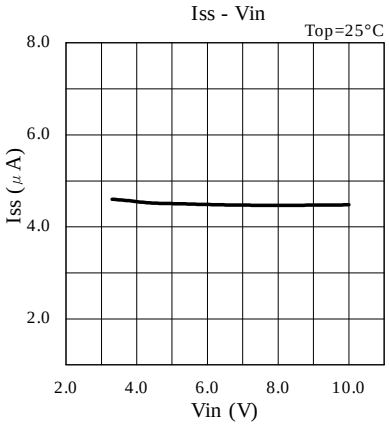

Vout - Iout
Vin=3.9V
Vout (V)
Iout (mA)
Top=+25°C
+80°C
-30°C

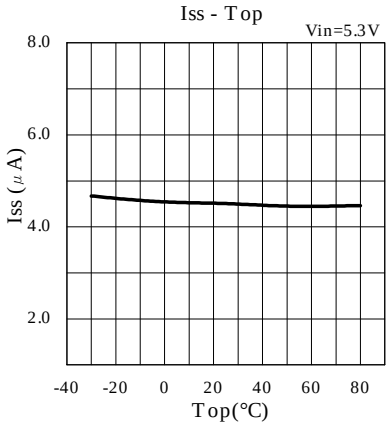

Vout - Vin
Top=25°C
Iout=1mA
10mA
50mA
Vout (V)
Vin (V)

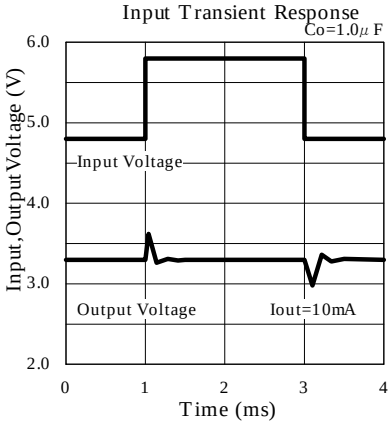

Vout - Vin
Top=25°C
Iout=50mA
Vout (V)
Vin (V)

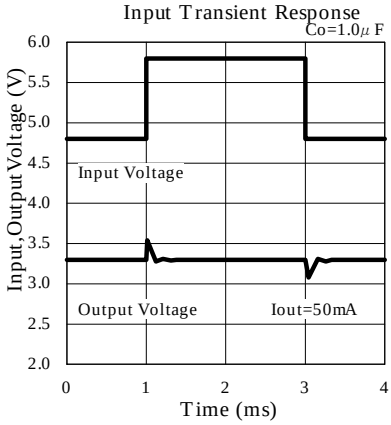

Vout - Top
Vin=5.3V
Iout=1mA
Iout=50mA
Vout (v)
Top (°C)

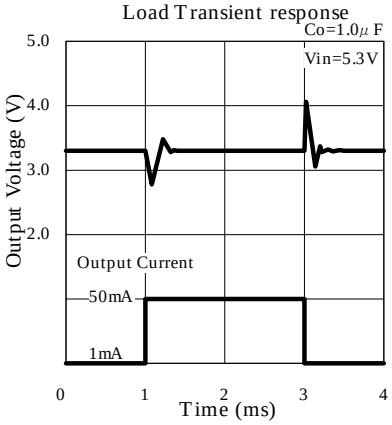

Vdif - Iout
Top=+80°C
+25°C
-30°C
Vdif (V)
Iout (mA)


Iss - Vin
Top=25°C
Iss (μA)
8.0
6.0
4.0
2.0
2.0
4.0
6.0
8.0
10.0
Vin (V)

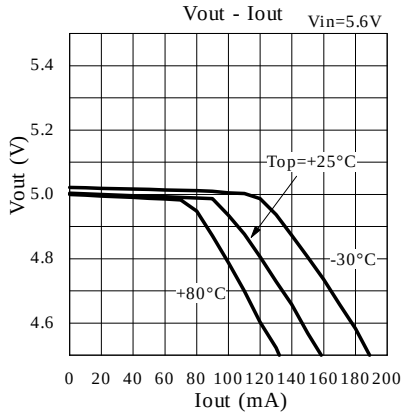

Iss - Top
Vin=5.3V
Iss (μA)
8.0
6.0
4.0
2.0
-40
-20
0
20
40
60
80
Top(°C)

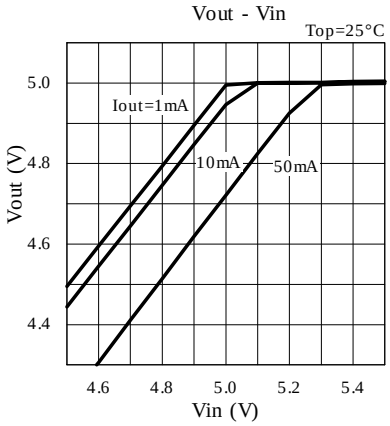

Input Transient Response
Co=1.0μF
Input,Output Voltage (V)
6.0
5.0
4.0
3.0
2.0
Input Voltage
Output Voltage
Iout=10mA
0
1
2
3
4
Time (ms)

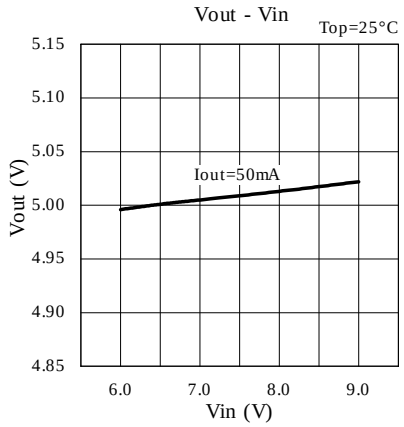

Input Transient Response
Co=1.0μF
Input,Output Voltage (V)
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
Input Voltage
Output Voltage
Iout=50mA
0
1
2
3
4
Time (ms)

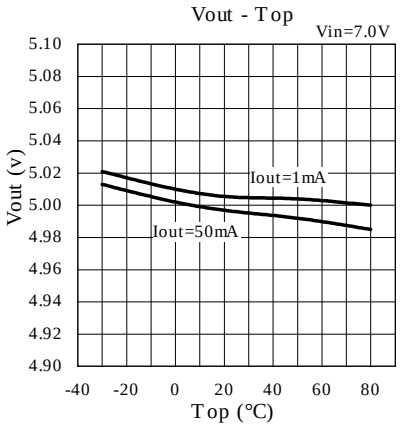

Load Transient response
Co=1.0μF
Vin=5.3V
Output Voltage (V)
5.0
4.0
3.0
2.0
Output Current
50mA
1mA
0
1
2
3
4
Time (ms)

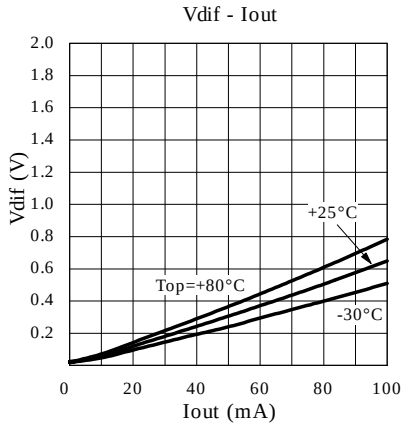
● ELM9850xA

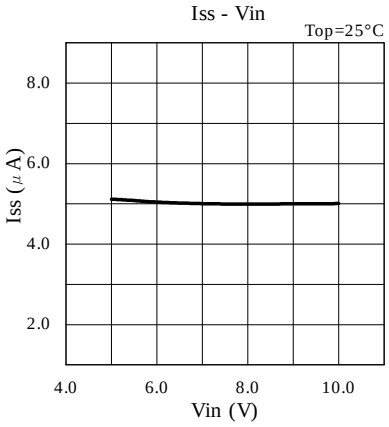

Vout - Iout
Vin=5.6V
Vout (V)
5.4
5.2
5.0
4.8
4.6
Top=+25°C
-30°C
+80°C
0 20 40 60 80 100 120 140 160 180 200
Iout (mA)

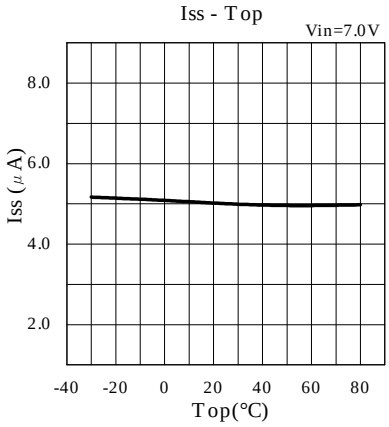

Vout - Vin
Top=25°C
Vout (V)
5.0
4.8
4.6
4.4
Iout=1mA
10mA
50mA
4.6 4.8 5.0 5.2 5.4
Vin (V)

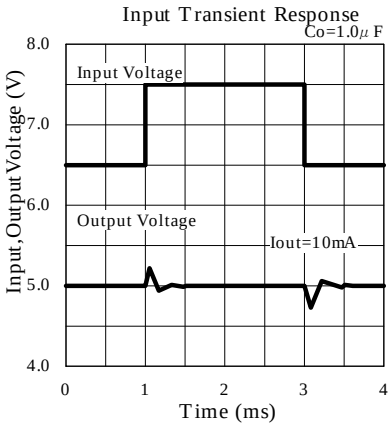

Vout - Vin
Top=25°C
Vout (V)
5.15
5.10
5.05
5.00
4.95
4.90
4.85
Iout=50mA
6.0 7.0 8.0 9.0
Vin (V)

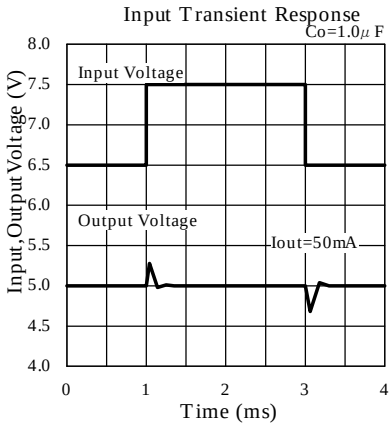

Vout - Top
Vin=7.0V
Vout (v)
5.10
5.08
5.06
5.04
5.02
5.00
4.98
4.96
4.94
4.92
4.90
Iout=1mA
Iout=50mA
-40 -20 0 20 40 60 80
Top (°C)

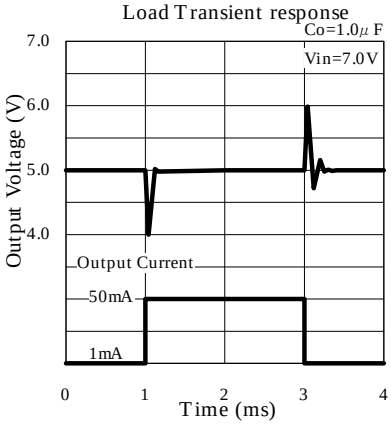

Vdif - Iout
Vdif (V)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
+25°C
Top=+80°C
-30°C
0 20 40 60 80 100
Iout (mA)


Iss - Vin
Top=25°C
Iss (μA)
8.0
6.0
4.0
2.0
4.0
6.0
8.0
10.0
Vin (V)


Iss - Top
Vin=7.0V
Iss (μA)
8.0
6.0
4.0
2.0
-40
-20
0
20
40
60
80
Top(°C)


Input Transient Response
Co=1.0μF
Input Voltage
Output Voltage
Iout=10mA
Input,Output Voltage (V)
8.0
7.0
6.0
5.0
4.0
0
1
2
3
4
Time (ms)


Input Transient Response
Co=1.0μF
Input Voltage
Output Voltage
Iout=50mA
Input,Output Voltage (V)
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
0
1
2
3
4
Time (ms)


Load Transient response
Co=1.0μF
Vin=7.0V
Output Voltage (V)
7.0
6.0
5.0
4.0
Output Current
50mA
1mA
0
1
2
3
4
Time (ms)