

ELM98xxxxC CMOS Voltage regulator

<http://www.elm-tech.com>

■General description

ELM98xxxxC is CMOS voltage regulator, which mainly consists of reference voltage source, error amplifier, short-protected control transistor, thermal protection circuit, output voltage setting resistors. The standard output voltages are 1.8V, 3.3V, 5.0V, 12V; these output voltages are fixed internally with high accuracy. ELM98 series can also be made as semi-custom IC within the range of 1.2V to 15.0V by 0.1V step.

■Features

- Output voltage range : 1.2V to 15.0V (by 0.1V)
- Input voltage range : 2.2V to 18.0V
- Low current consumption : Typ.4.0μA(ELM98033xC)
- Input stability : Typ.0.05%/V(I_{out}=50mA)
- Load stability : Typ.5mV(1mA≤I_{out}≤50mA)
- Accuracy of output voltage : ±2.0%
- Output voltage temperature coefficient : ±100ppm/°C
- Short current limiter : Typ.30mA(V_{out}=0V)
- Thermal shutdown protection : Typ. 160°C
- Package : SOT-89, SOT-25, SOT-23

■Application

- Battery operated devices
- Digital cameras
- Video recorders
- Reference voltage source

■Maximum absolute ratings

Parameter	Symbol	Limit	Unit
Input voltage	V _{in}	20	V
Output voltage	V _{out}	V _{ss} -0.3 to V _{in} +0.3	V
Output current	I _{out}	200	mA
Power dissipation	P _d	500 (SOT-89)	mW
		250 (SOT-23, SOT-25)	
Operating temperature	T _{op}	-40 to +85	°C
Storage temperature	T _{stg}	-55 to +125	°C

* Output current must not exceed power dissipation specified in maximum absolute ratings.

■Selection guide

ELM98xxxxC-x

Symbol		
a, b, c	Output voltage	e.g. : 018: V _{out} =1.8V 033: V _{out} =3.3V 050: V _{out} =5.0V 120: V _{out} =12.0V
d	Package	A: SOT-89 (ELM98xxxAC) B: SOT-23 (ELM98xxxBC) 1B: SOT-25 (ELM98xxx1BC)
e	Product version	C
f	Taping direction	S: Refer to PKG file N: Refer to PKG file

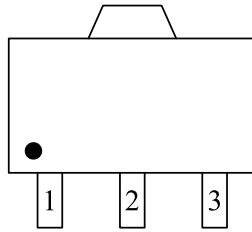
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↑ ↑ ↑ ↑ ↑ ↑
a b c d e f

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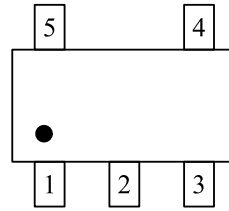
■Pin configuration

SOT-89(TOP VIEW)



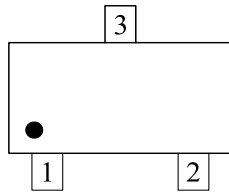
Pin No.	Pin name
ELM98xxxAC	
1	VSS
2	VIN
3	VOUT

SOT-25(TOP VIEW)



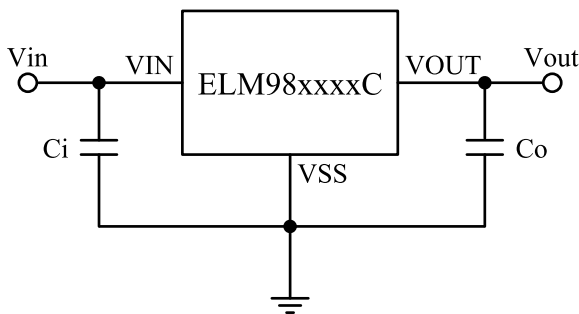
Pin No.	Pin name
ELM98xxx1BC	
1	VIN
2	VSS
3	NC
4	NC
5	VOUT

SOT-23(TOP VIEW)



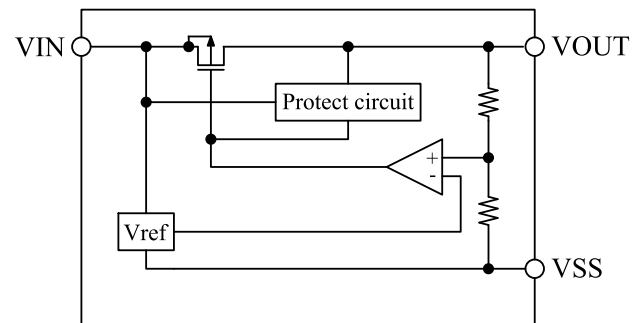
Pin No.	Pin name
ELM98xxxBC	
1	VSS
2	VOUT
3	VIN

■Standard circuit



* Regarding Ci and Co, ceramic capacitors with 1.0μF or greater are recommended for stability operation.

■Block diagram



■Electrical characteristics

Vout=1.8V(ELM98018xC)

Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=3.8V, Iout=1mA	1.764	1.800	1.836	V
Output current	Iout	Vin=2.4V	20			mA
Input stability	$\Delta V_{out}/\Delta V_{in}$	Iout=20mA, 2.8V≤Vin≤18.0V		0.050	0.275	%/V
Load stability	$\Delta V_{out}/\Delta I_{out}$	1mA≤Iout≤50mA, Vin=3.8V		5	20	mV
Input/output voltage differential	Vdif	Iout=10mA		200	380	mV
Current consumption	Iss	Vin=3.8V, No-load	0.4	3.0	7.0	μA
Input voltage	Vin		2.2		18.0	V
Ripple rejection ratio	RR	Vin=3.8V, Iout=10mA, f=100Hz		65		dB
Short circuit current	Ishort	Vin=3.8V, Vout=0V		30		mA
Thermal shutdown temperature	Tsd			160		°C
Output voltage temperature coefficient	$\Delta V_{out}/\Delta T_{op}$	Top=-40°C to +85°C Vin=3.8V, Iout=1mA		±100		ppm/°C

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Vout=3.3V(ELM98033xC)

Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=5.3V, Iout=1mA	3.234	3.300	3.366	V
Output current	Iout	Vin=3.9V	55			mA
Input stability	$\Delta V_{out}/\Delta V_{in}$	Iout=50mA, 4.3V≤Vin≤18.0V		0.050	0.275	%/V
Load stability	$\Delta V_{out}/\Delta I_{out}$	1mA≤Iout≤50mA, Vin=5.3V		5	20	mV
Input/output voltage differential	Vdif	Iout=10mA		75	145	mV
Current consumption	Iss	Vin=5.3V, No-load	1.0	4.0	8.0	μA
Input voltage	Vin		2.2		18.0	V
Ripple rejection ratio	RR	Vin=5.3V, Iout=10mA, f=100Hz		65		dB
Short circuit current	Ishort	Vin=5.3V, Vout=0V		30		mA
Thermal shutdown temperature	Tsd			160		°C
Output voltage temperature coefficient	$\Delta V_{out}/\Delta T_{op}$	Top=-40°C to +85°C Vin=5.3V, Iout=1mA		±100		ppm/°C

Vout=5.0V(ELM98050xC)

Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=7.0V, Iout=1mA	4.900	5.000	5.100	V
Output current	Iout	Vin=5.6V	70			mA
Input stability	$\Delta V_{out}/\Delta V_{in}$	Iout=50mA, 6.0V≤Vin≤18.0V		0.050	0.275	%/V
Load stability	$\Delta V_{out}/\Delta I_{out}$	1mA≤Iout≤50mA, Vin=7.0V		5	20	mV
Input/output voltage differential	Vdif	Iout=10mA		65	110	mV
Current consumption	Iss	Vin=7.0V, No-load	1.0	4.0	9.0	μA
Input voltage	Vin		2.2		18.0	V
Ripple rejection ratio	RR	Vin=7.0V, Iout=10mA, f=100Hz		65		dB
Short circuit current	Ishort	Vin=7.0V, Vout=0V		30		mA
Thermal shutdown temperature	Tsd			160		°C
Output voltage temperature coefficient	$\Delta V_{out}/\Delta T_{op}$	Top=-40°C to +85°C Vin=7.0V, Iout=1mA		±100		ppm/°C

Vout=12.0V(ELM98120xC)

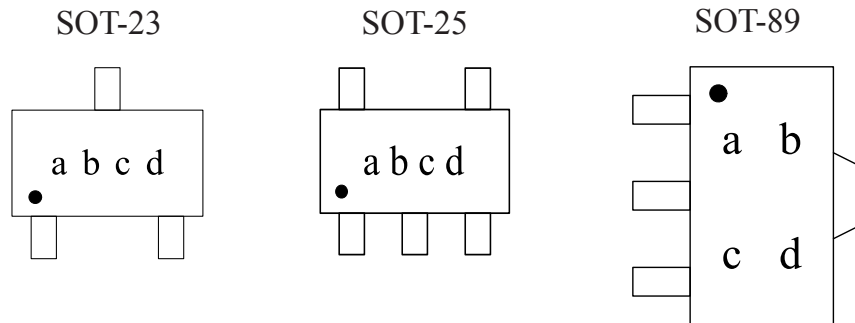
Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=14.0V, Iout=1mA	11.760	12.000	12.240	V
Output current	Iout	Vin=12.6V	85			mA
Input stability	$\Delta V_{out}/\Delta V_{in}$	Iout=50mA, 13.0V≤Vin≤18.0V		0.050	0.275	%/V
Load stability	$\Delta V_{out}/\Delta I_{out}$	1mA≤Iout≤50mA, Vin=14.0V		5	20	mV
Input/output voltage differential	Vdif	Iout=10mA		55	95	mV
Current consumption	Iss	Vin=14.0V, No-load	1.0	4.5	11.0	μA
Input voltage	Vin		2.2		18.0	V
Ripple rejection ratio	RR	Vin=14.0V, Iout=10mA, f=100Hz		60		dB
Short circuit current	Ishort	Vin=14.0V, Vout=0V		30		mA
Thermal shutdown temperature	Tsd			160		°C
Output voltage temperature coefficient	$\Delta V_{out}/\Delta T_{op}$	Top=-40°C to +85°C Vin=14.0V, Iout=1mA		±100		ppm/°C

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■Marking



a, b : Output voltage range and Package type

Mark	Output voltage range (V)	Package	Mark	Output voltage range (V)	Package
6W	1.2 to 4.0	SOT-89	75	10.1 to 13.0	SOT-23
6Y	4.1 to 7.0	SOT-89	76	13.1 to 15.0	SOT-23
6Z	7.1 to 10.0	SOT-89	7G	1.2 to 4.0	SOT-25
70	10.1 to 13.0	SOT-89	7H	4.1 to 7.0	SOT-25
71	13.1 to 15.0	SOT-89	7J	7.1 to 10.0	SOT-25
72	1.2 to 4.0	SOT-23	7K	10.1 to 13.0	SOT-25
73	4.1 to 7.0	SOT-23	7L	13.1 to 15.0	SOT-25
74	7.1 to 10.0	SOT-23			

c : Output voltage

Mark	Output voltage (V)					Mark	Output voltage (V)				
1		4.1	7.1	10.1	13.1	F	2.6	5.6	8.6	11.6	14.6
2	1.2	4.2	7.2	10.2	13.2	G	2.7	5.7	8.7	11.7	14.7
3	1.3	4.3	7.3	10.3	13.3	H	2.8	5.8	8.8	11.8	14.8
4	1.4	4.4	7.4	10.4	13.4	J	2.9	5.9	8.9	11.9	14.9
5	1.5	4.5	7.5	10.5	13.5	K	3.0	6.0	9.0	12.0	15.0
6	1.6	4.6	7.6	10.6	13.6	L	3.1	6.1	9.1	12.1	
7	1.7	4.7	7.7	10.7	13.7	M	3.2	6.2	9.2	12.2	
8	1.8	4.8	7.8	10.8	13.8	N	3.3	6.3	9.3	12.3	
9	1.9	4.9	7.9	10.9	13.9	P	3.4	6.4	9.4	12.4	
0	2.0	5.0	8.0	11.0	14.0	Q	3.5	6.5	9.5	12.5	
A	2.1	5.1	8.1	11.1	14.1	R	3.6	6.6	9.6	12.6	
B	2.2	5.2	8.2	11.2	14.2	S	3.7	6.7	9.7	12.7	
C	2.3	5.3	8.3	11.3	14.3	T	3.8	6.8	9.8	12.8	
D	2.4	5.4	8.4	11.4	14.4	U	3.9	6.9	9.9	12.9	
E	2.5	5.5	8.5	11.5	14.5	V	4.0	7.0	10.0	13.0	

d : Assembly lot numbe.

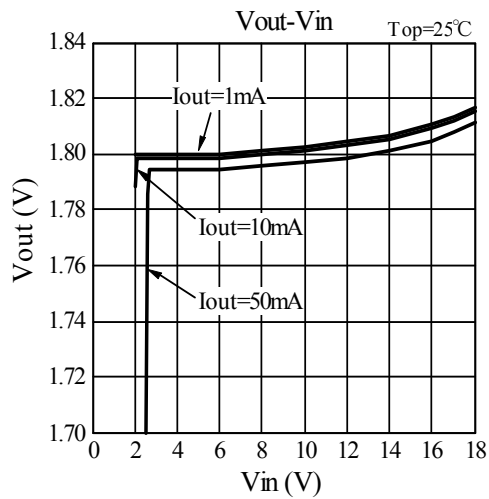
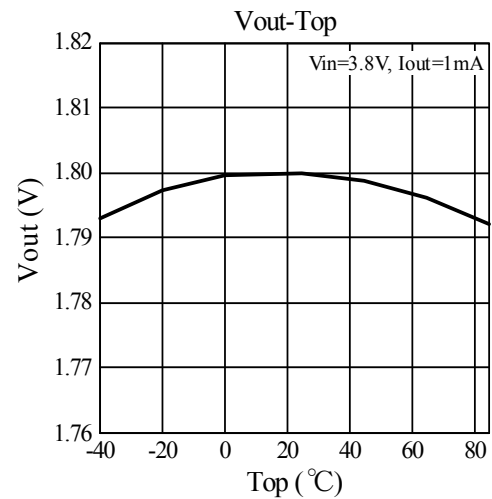
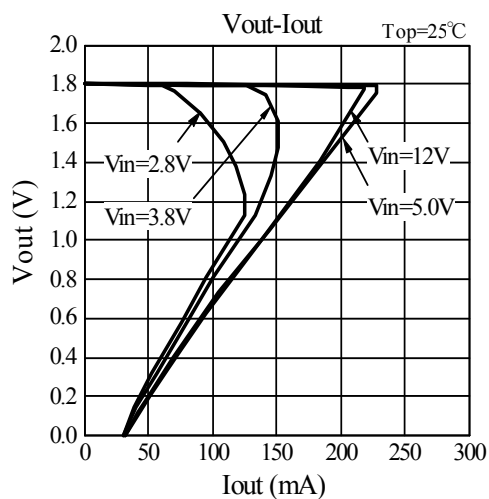
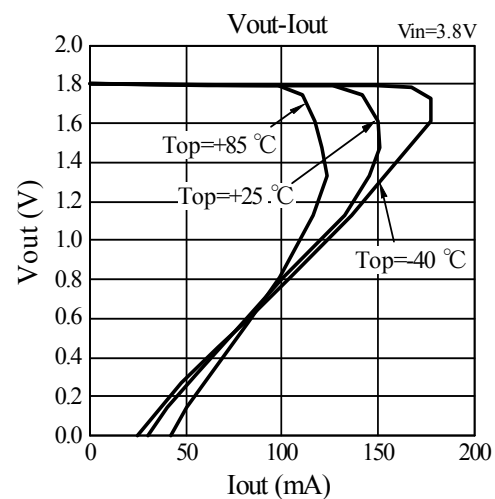
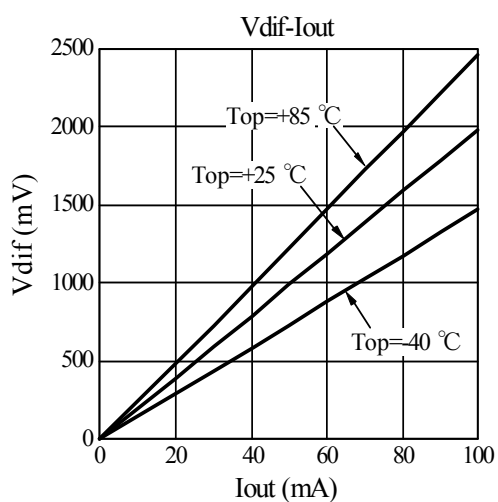
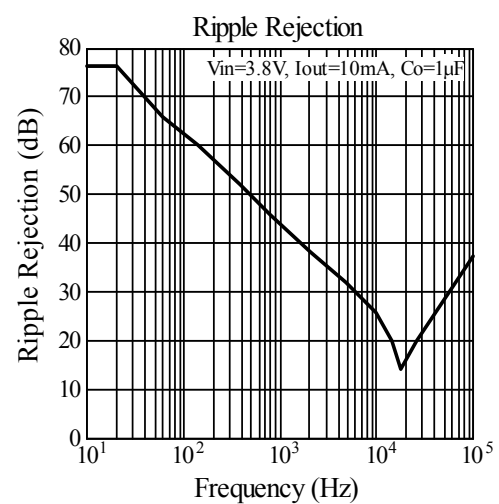
Symbol
1 to 0 and A to Z repeated (I, O, X excepted).

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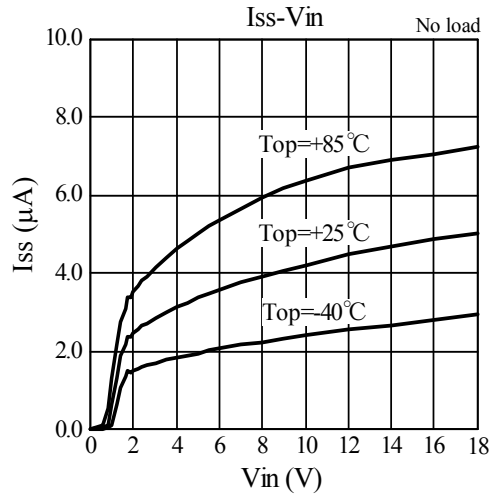
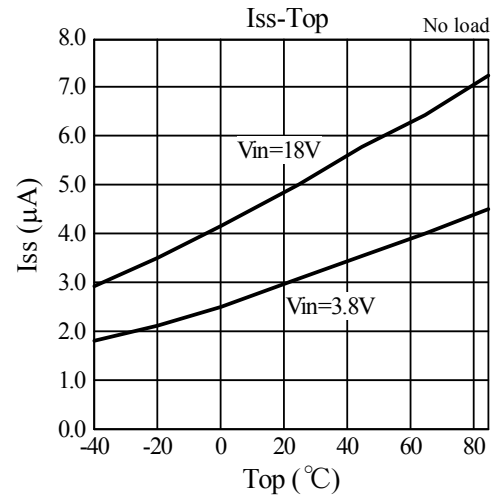
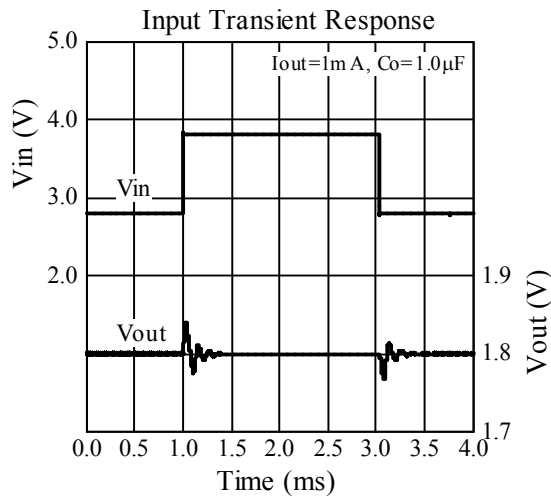
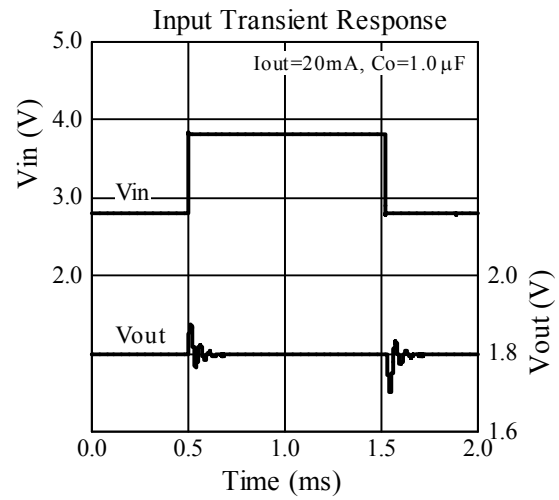
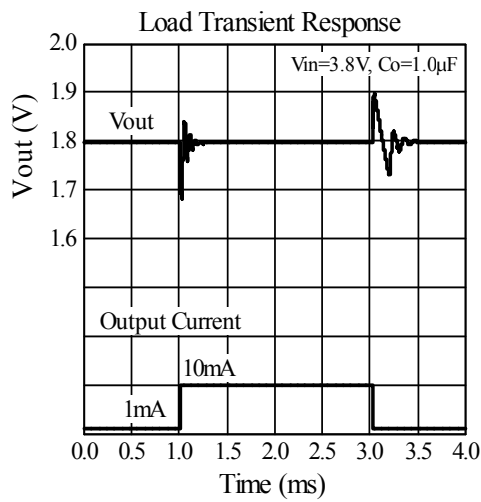
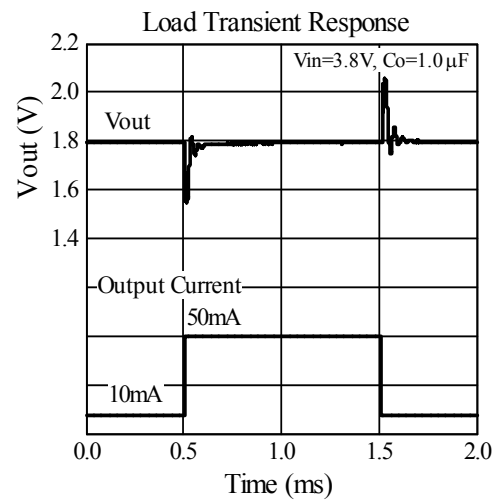
■ Typical characteristics

- $V_{out}=1.8V$ (ELM98018xC)



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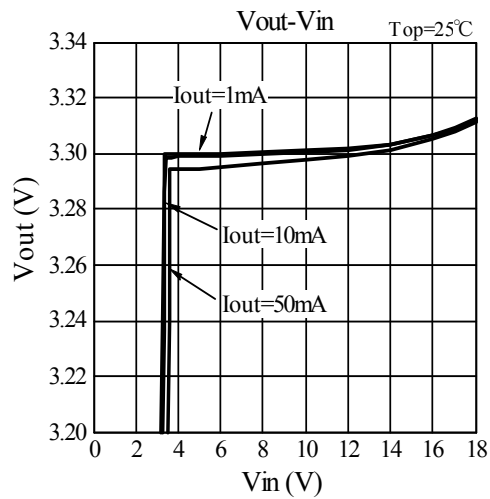
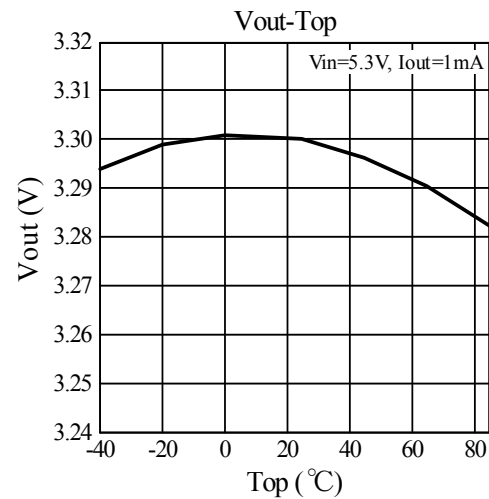
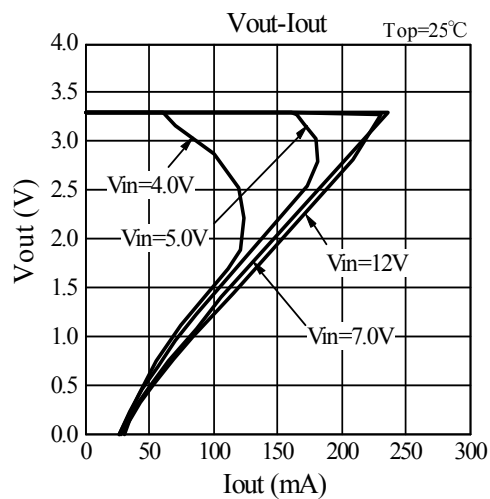
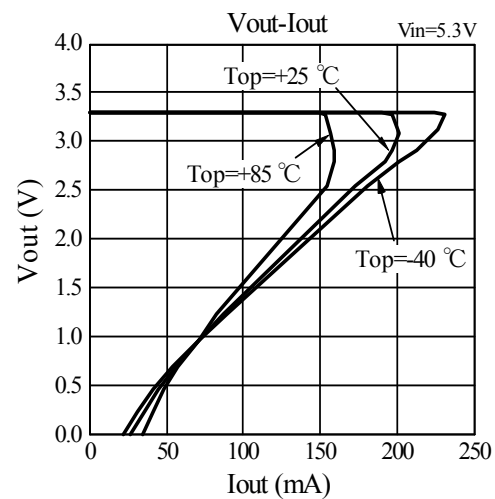
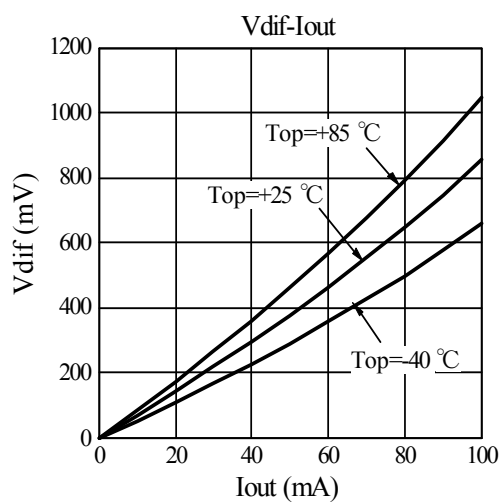
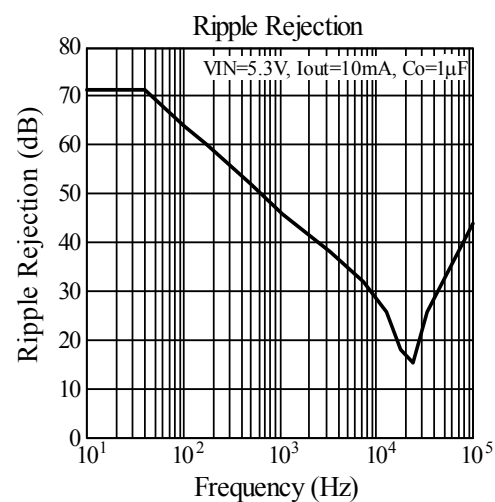
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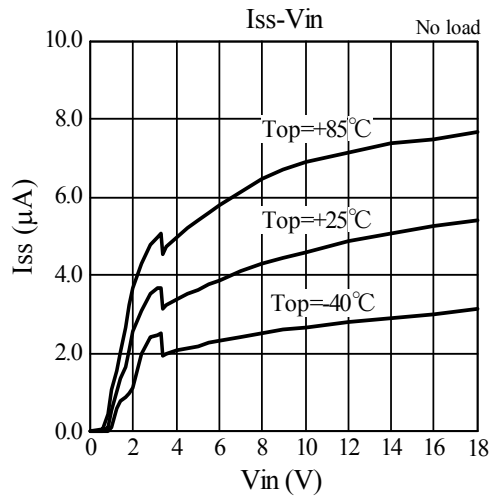
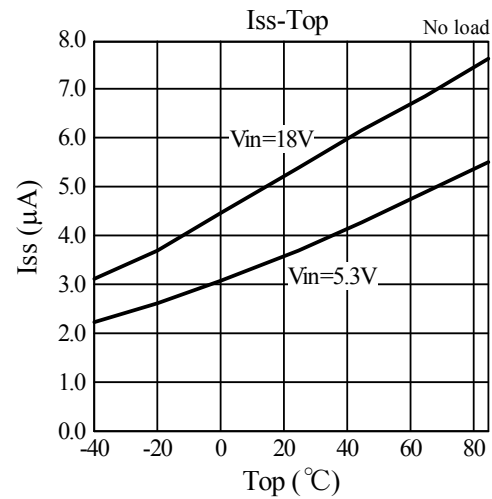
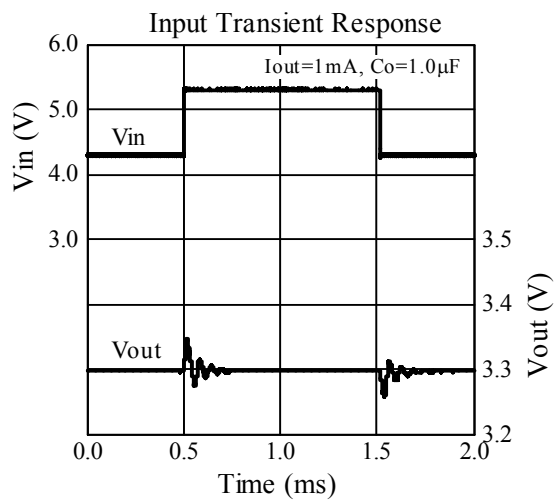
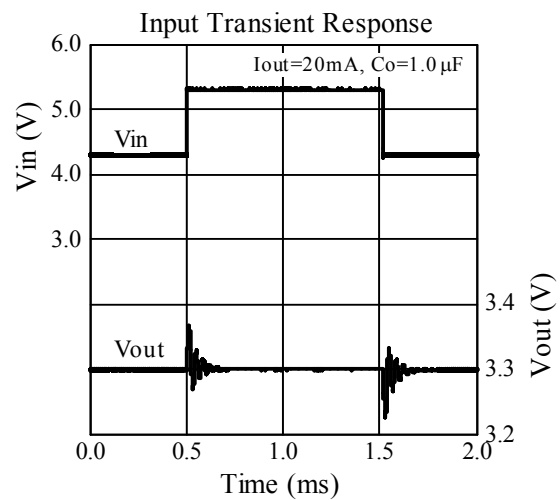
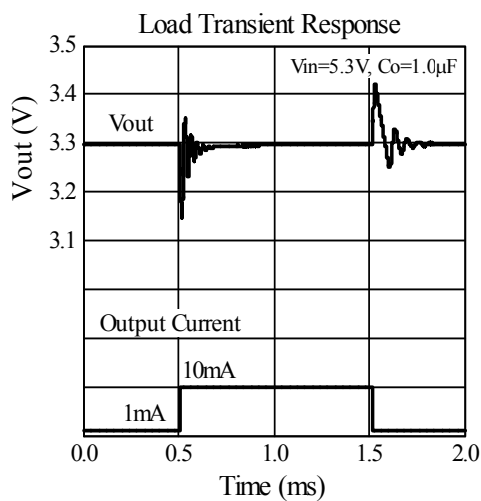
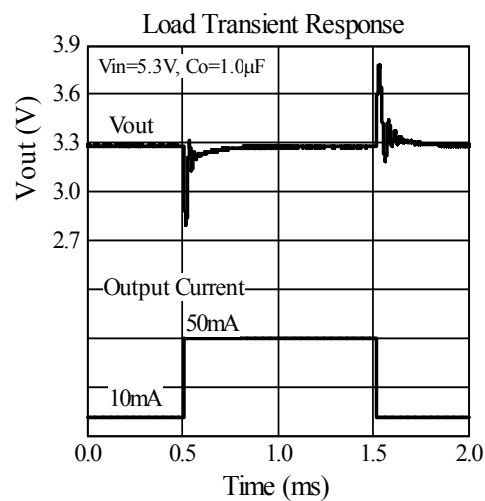
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- $V_{out}=3.3V$ (ELM98033xC)



ELM98xxxxC CMOS Voltage regulator

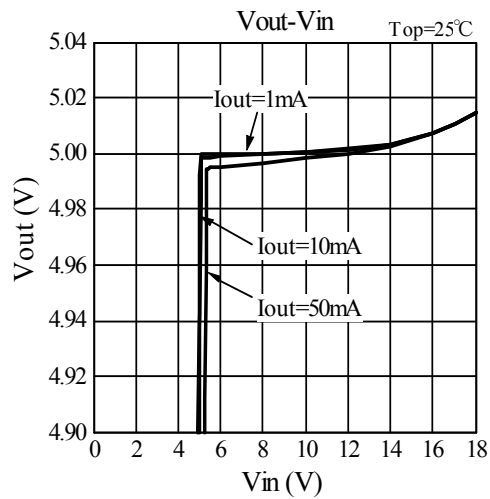
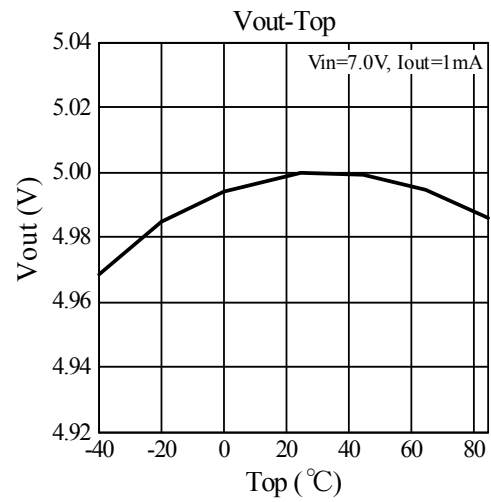
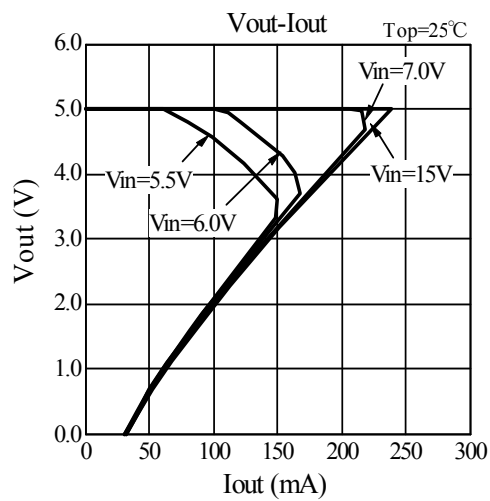
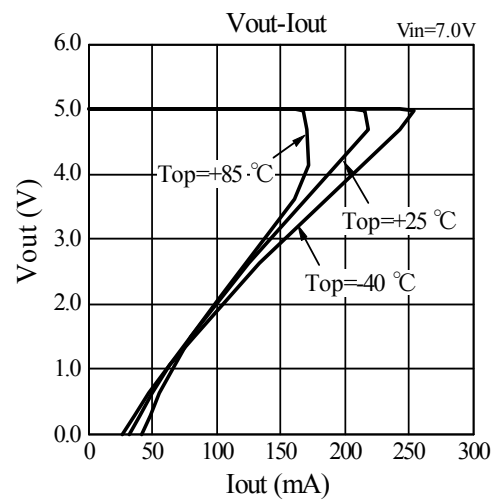
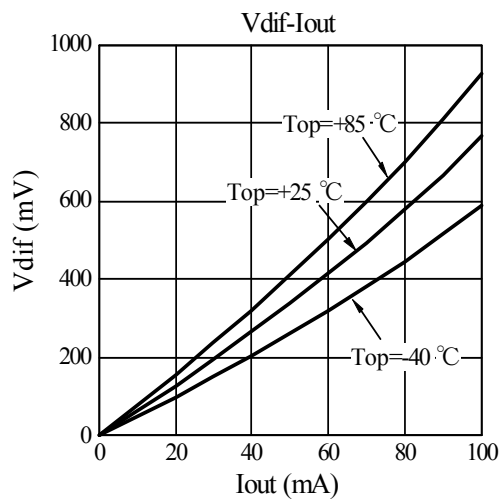
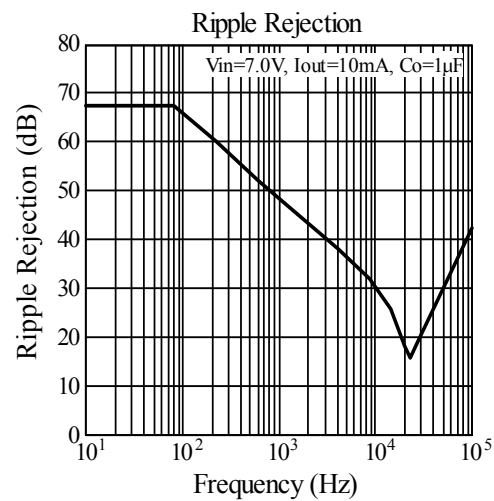
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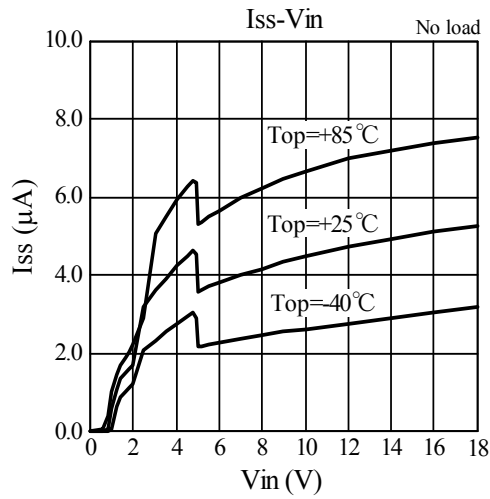
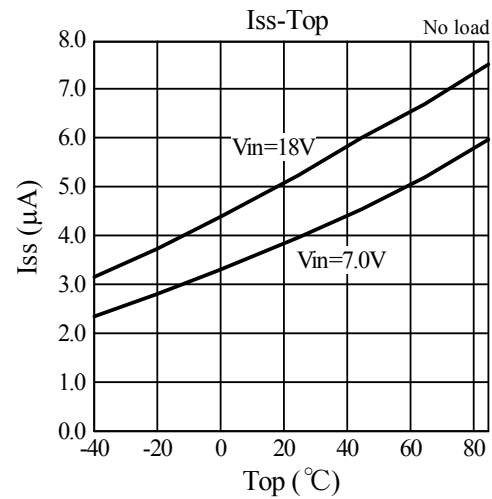
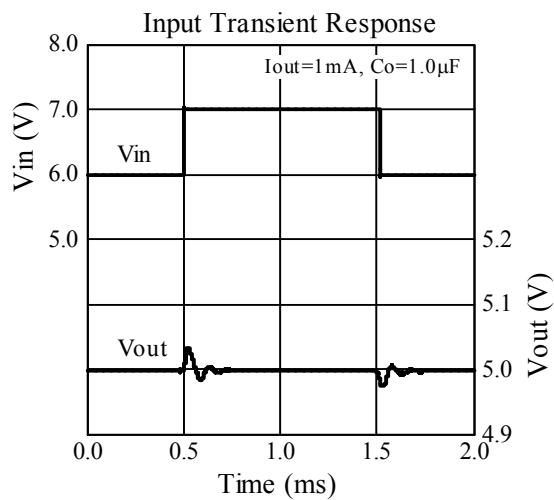
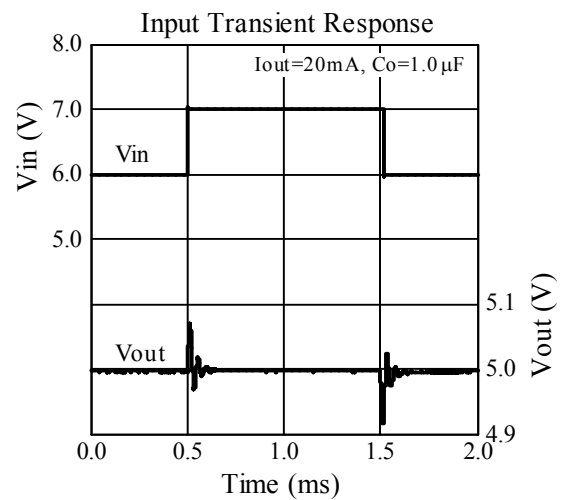
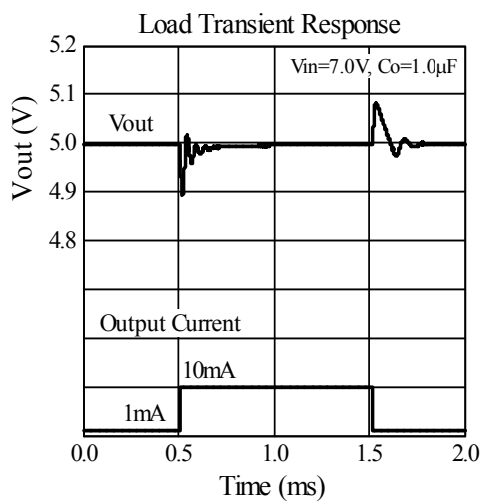
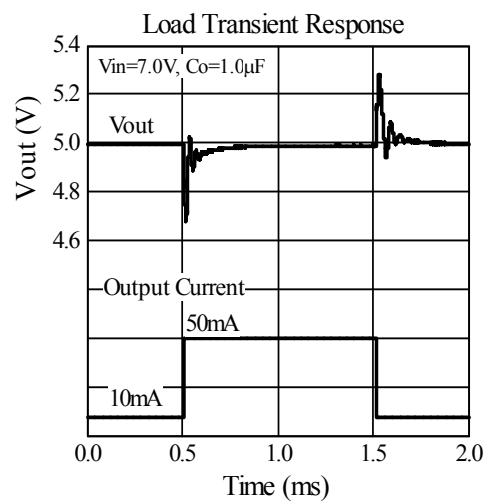
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- $V_{out}=5.0V$ (ELM98050xC)



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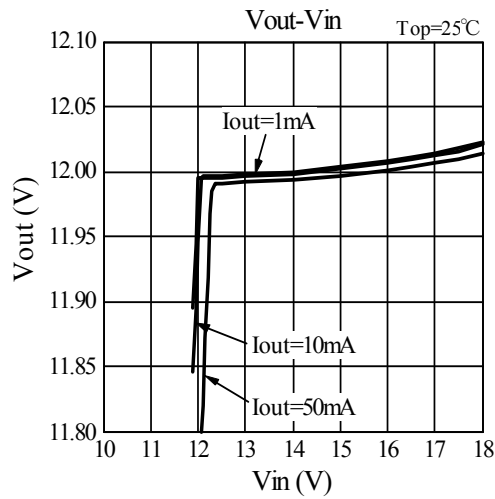
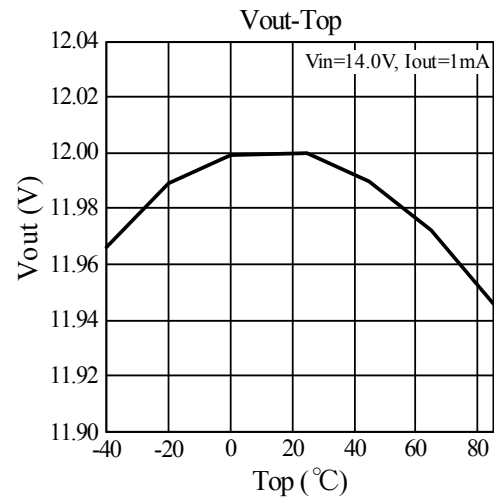
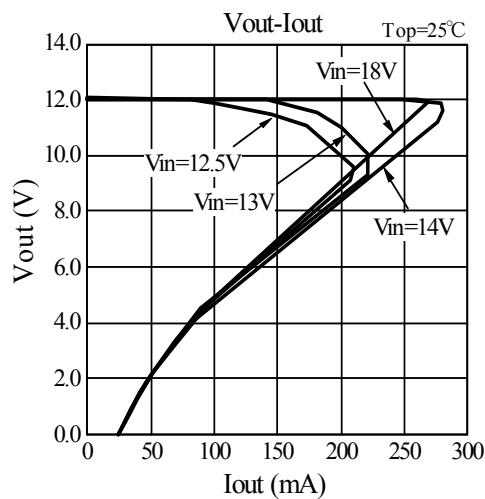
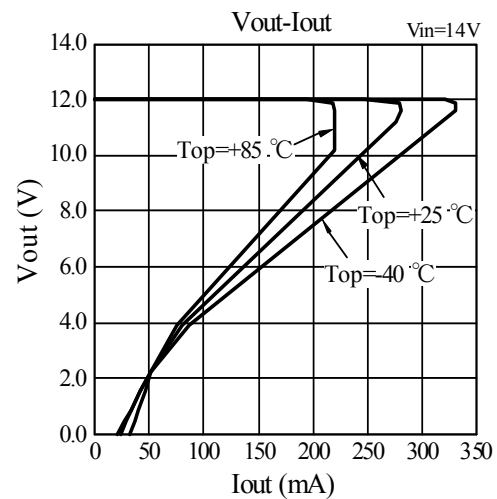
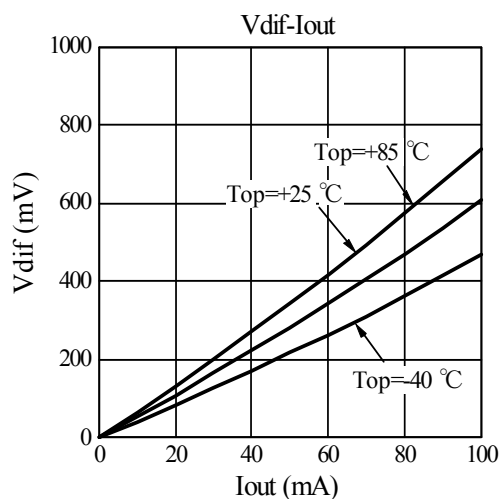
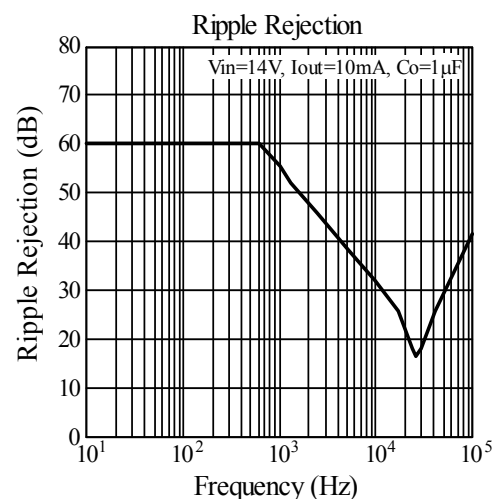
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- $V_{out}=12.0V$ (ELM98120xC)



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