

ELM85xxxxA CMOS 600mA/800mA LDO voltage regulator

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

■ General description

ELM85xxxxA is CMOS voltage regulator which is characterized with high current and low dropout (55mV at $I_{out}=100\text{mA}$). 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. ELM85 series can also be made as semi-custom IC within the range of 1.2V to 4.0V 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 : 1.2V to 4.0V (by 0.1V)
- Output current : 600mA($V_{out}<3.0\text{V}$), 800mA($V_{out}\geq 3.0\text{V}$)
- Current consumption : Typ.40 μA
- Input stability : Typ.0.02%/V
- Load stability : Typ.20mV($1\text{mA}\leq I_{out}\leq 300\text{mA}$)
- Accuracy of output voltage : $\pm 2.0\%$ ($V_{out}>1.5\text{V}$), $\pm 30\text{mV}$ ($V_{out}\leq 1.5\text{V}$)
- Input-output voltage difference : Typ.55mV($V_{out}=3.0\text{V}$, $I_{out}=100\text{mA}$)
- Short circuit current limiter : Typ.70mA($V_{out}=0\text{V}$)
- Package : SON8-3x3, SOT-89, SOT-89-5
SOT-23, SOT-25

■ Application

- Battery operated devices
- Portable AV equipments

■ Maximum absolute ratings

Parameter	Symbol	Limit	Unit	
Input voltage	V_{in}	$V_{ss}-0.3$ to 7.0	V	
Output voltage	V_{out}	$V_{ss}-0.3$ to $V_{in}+0.3$	V	
Output current	I_{out}	1000	mA	
Power dissipation ($T_a=25^\circ\text{C}$)	P_d	SON8-3x3	500 ^(*1)	mW
			1000 ^(*2)	
		SOT-89	500 ^(*1)	
			1000 ^(*2)	
		SOT-89-5	500 ^(*1)	
			1000 ^(*2)	
		SOT-23	250 ^(*1)	
			500 ^(*2)	
SOT-25	250 ^(*1)			
	600 ^(*2)			
Operating temperature	T_{op}	-40 to +85	$^\circ\text{C}$	
Storage temperature	T_{stg}	-55 to +125	$^\circ\text{C}$	

* 1. No mounted, IC alone.

* 2. When mounted on glass epoxy 2-layers PCB (EIJ/JEDEC standard size: 76.2 mm×114.3 mm×1.6 mm), Cu thickness 35 μm , copper foil area ratio 20% on the front side, back side 100% .

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■ Selection guide

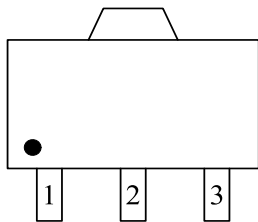
ELM85xxxxA-x

Symbol		
a, b	Output voltage	e.g. : 30: Vout=3.0V, 33: Vout=3.3V
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
e	Product version	A
f	Taping direction	S, N: Refer to PKG file

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

■ Pin configuration

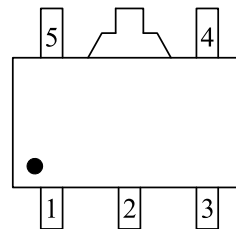
SOT-89(TOP VIEW)



ELM85xx1AA

Pin No.	Pin name
1	VSS
2	VIN
3	VOUT

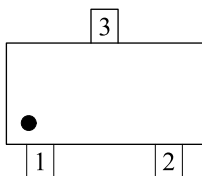
SOT-89-5(TOP VIEW)



ELM85xx3AA

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

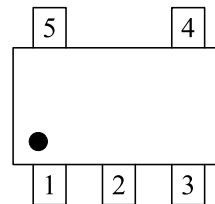
SOT-23(TOP VIEW)



ELM85xx1BA

Pin No.	Pin name
1	VSS
2	VOUT
3	VIN

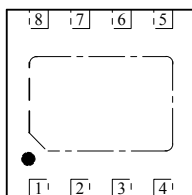
SOT-25(TOP VIEW)



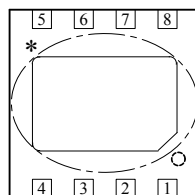
ELM85xx3BA

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

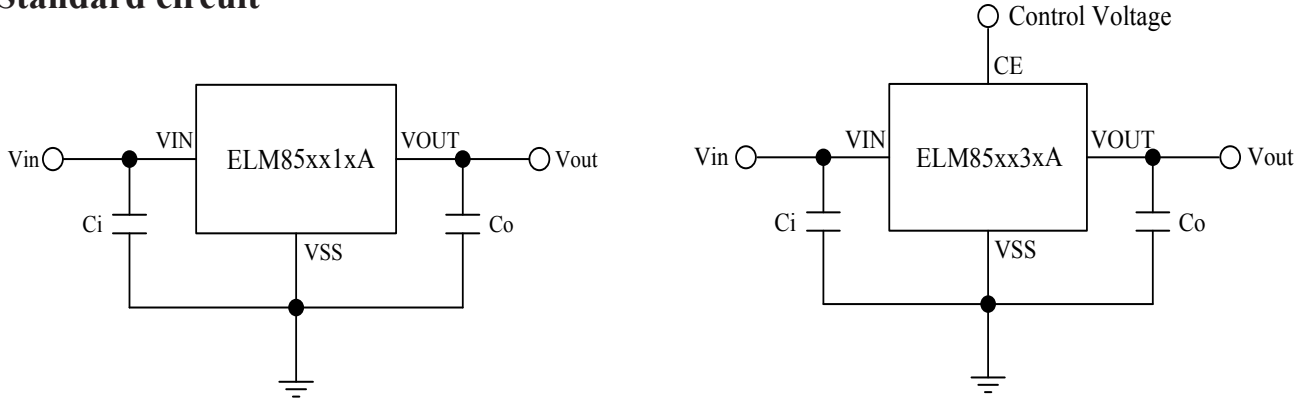
* The potential of E-PAD is VIN.

Please solder it to VIN or isolated copper pattern with thermal vias to make lower heat resistance.

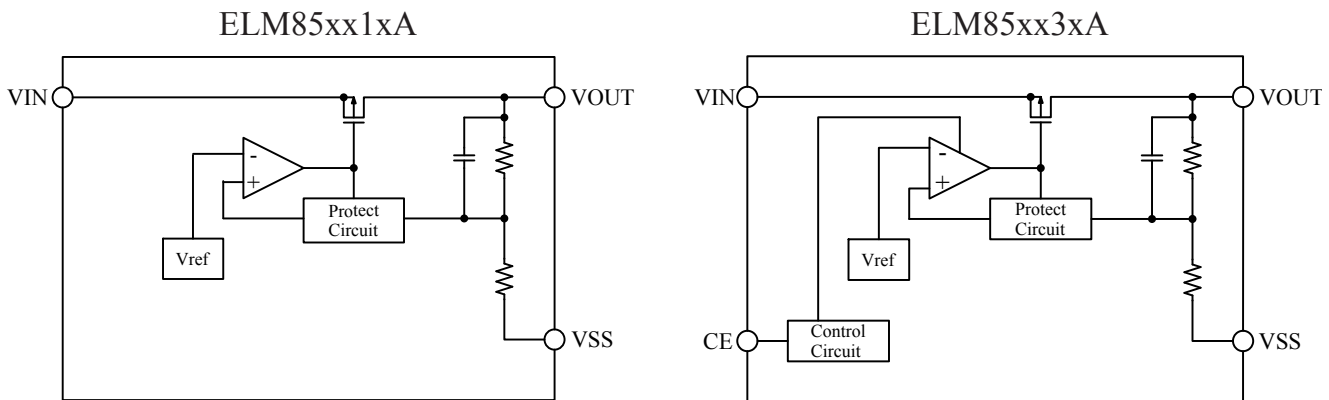
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■ Standard circuit



■ Block diagram



■ Electrical characteristics (ELM85xx1xA)

$V_{out}=3.0V$ (ELM85301xA), No CE pin

$C_i=1.0\mu F$, $C_o=4.7\mu F$, $T_{op}=25^\circ C$

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	V_{out}	$V_{in}=4.0V$, $I_{out}=40mA$	2.940	3.000	3.060	V
Output current	I_{out}	$V_{in}=4.0V$	800			mA
Input stability	$\Delta V_{out}/\Delta V_{in}$	$3.5V \leq V_{in} \leq 6.0V$, $I_{out}=100mA$		0.02	0.20	%/V
Load stability	$\Delta V_{out}/\Delta I_{out}$	$V_{in}=4.0V$, $1mA \leq I_{out} \leq 300mA$		20	60	mV
Input-Output voltage differential	V_{dif}	$I_{out}=100mA$		55	90	mV
Current consumption	I_{ss}	$V_{in}=4.0V$		40	100	μA
Input voltage	V_{in}		1.4		6.0	V
Output voltage temperature coefficient	$\Delta V_{out}/\Delta T_{op}$	$-40^\circ C \leq T_{op} \leq +85^\circ C$, $V_{in}=4.0V$, $I_{out}=40mA$		± 100		ppm/ $^\circ C$
Short circuit current	I_{lim}	$V_{out}=0V$		70		mA
Ripple rejection ratio	RR	$f=1kHz$, $I_{out}=40mA$		60		dB
Thermal shutdown temperature	T_{sd}			165		$^\circ C$
Output noise	V_{no}	$BW=10Hz$ to $100kHz$		30		μV_{rms}

ELM85xxxxA CMOS 600mA/800mA LDO voltage regulator

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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	$\Delta V_{out}/\Delta V_{in}$	3.8V≤Vin≤6.0V, Iout=100mA		0.02	0.20	%/V
Load stability	$\Delta V_{out}/\Delta I_{out}$	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	$\Delta V_{out}/\Delta T_{op}$	-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 (ELM85xx3xA)

Vout=3.0V(ELM85303xA), 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	$\Delta V_{out}/\Delta V_{in}$	3.5V≤Vin≤6.0V, Iout=100mA		0.02	0.20	%/V
Load stability	$\Delta V_{out}/\Delta I_{out}$	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	$\Delta V_{out}/\Delta T_{op}$	-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

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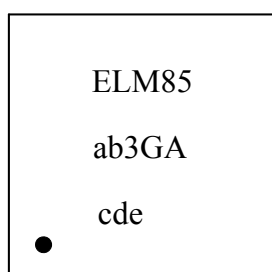
Vout=3.3V(ELM85333xA), CE="H" active

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	$\Delta V_{out}/\Delta V_{in}$	3.8V ≤ Vin ≤ 6.0V, Iout=100mA		0.02	0.20	%/V
Load stability	$\Delta V_{out}/\Delta I_{out}$	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	$\Delta V_{out}/\Delta T_{op}$	-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

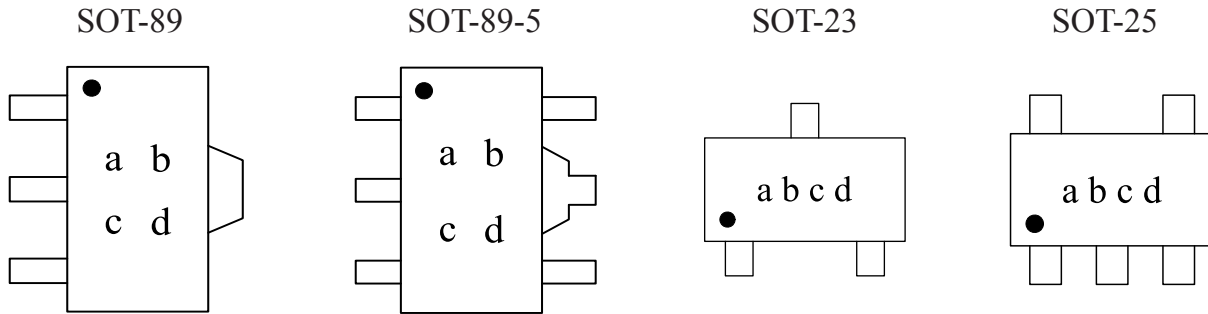
SON8-3x3



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

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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	

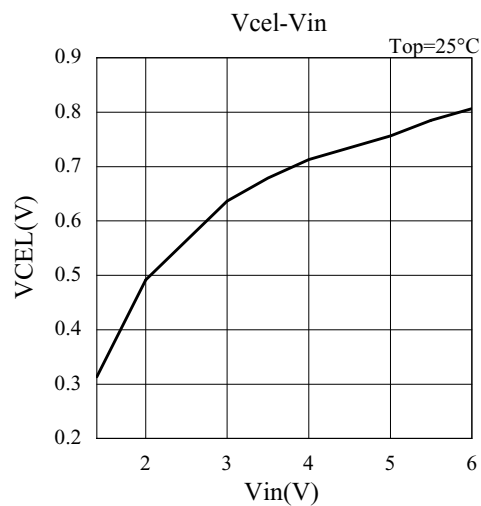
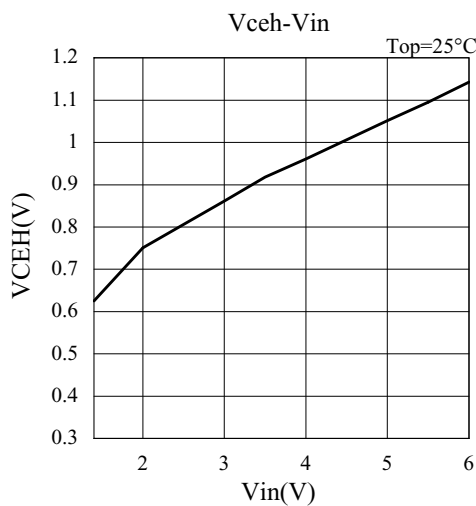
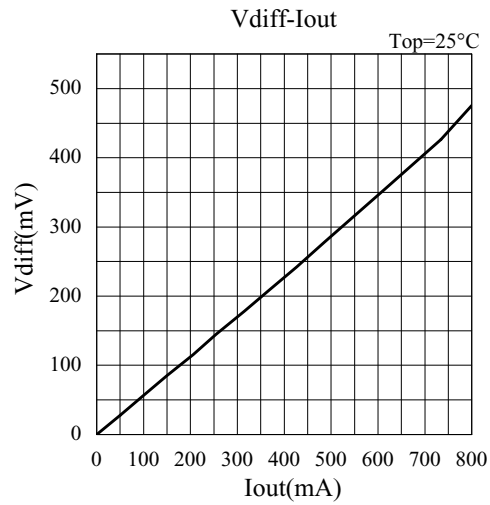
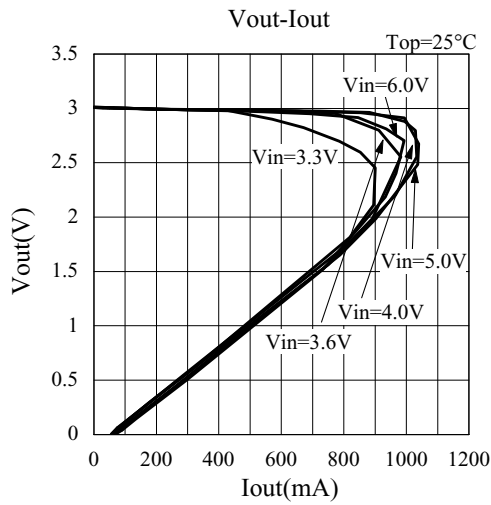
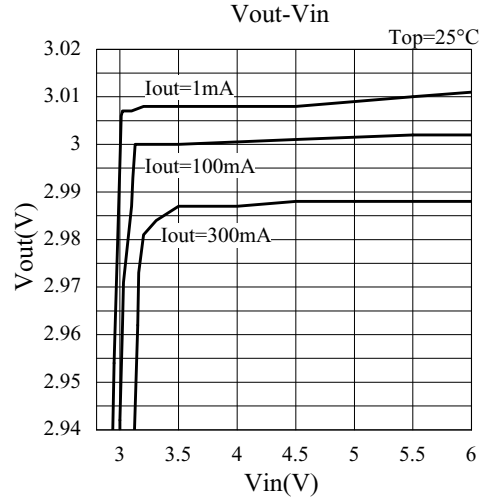
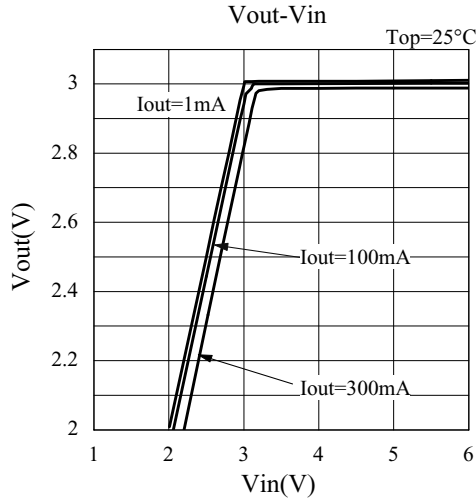
d : Represents the assembly lot number
0~9, A~Z repeated (I,O,X excepted)

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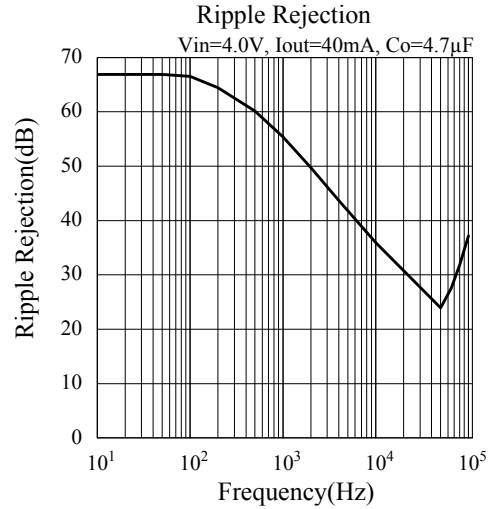
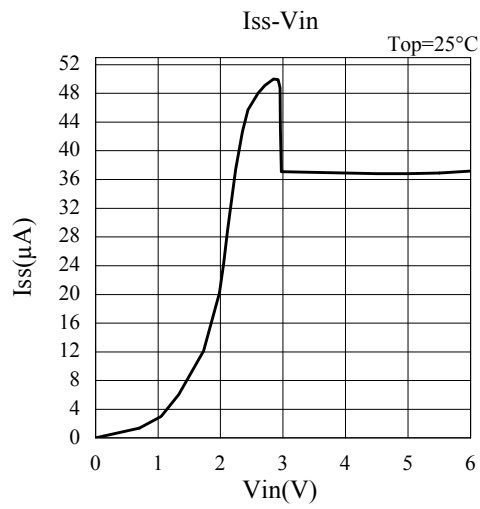
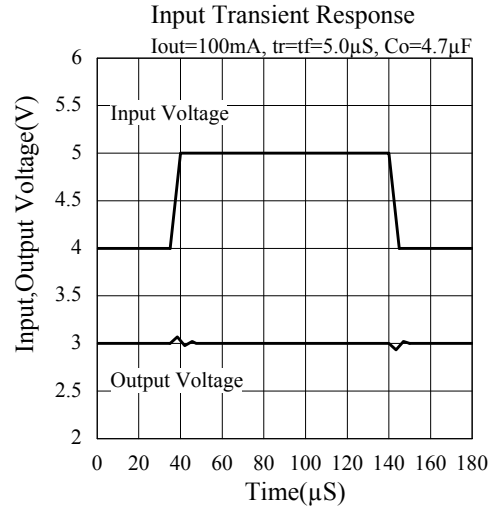
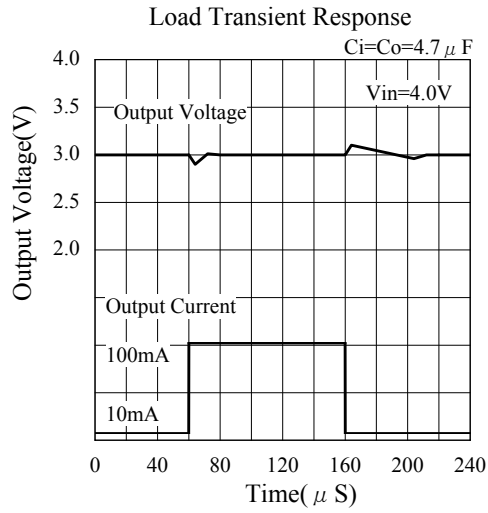
■ Typical characteristics

- 3.0V Vout unit (ELM8530xxA)



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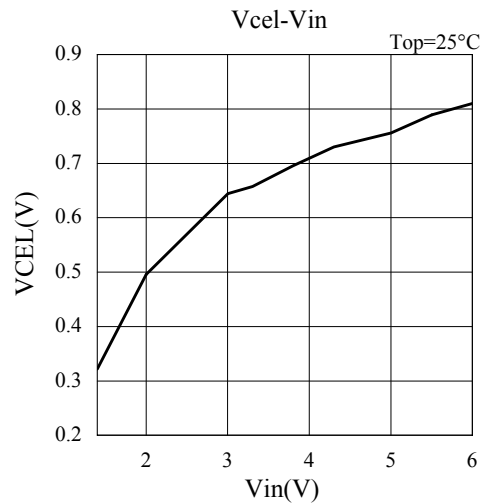
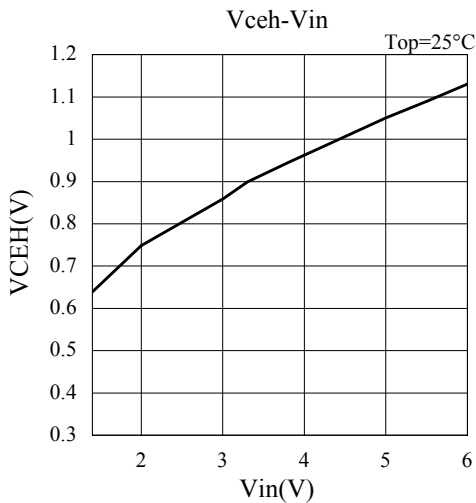
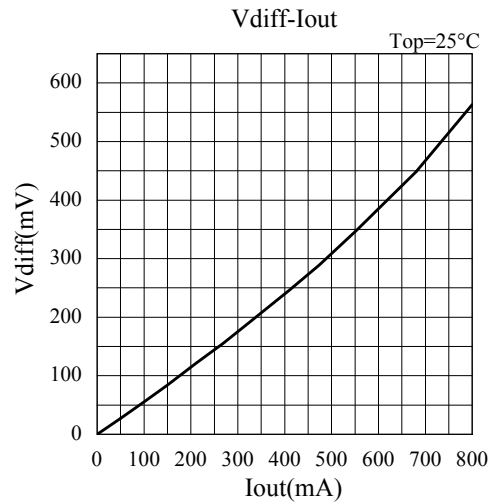
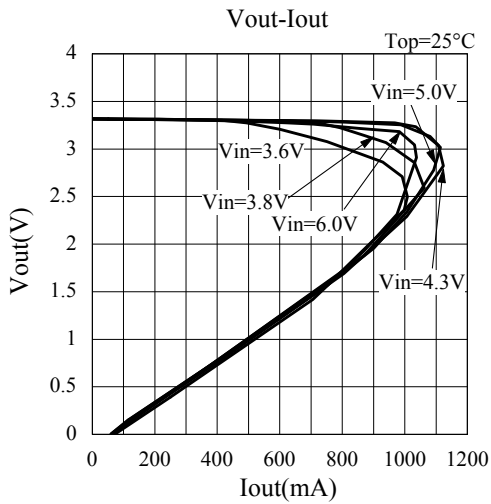
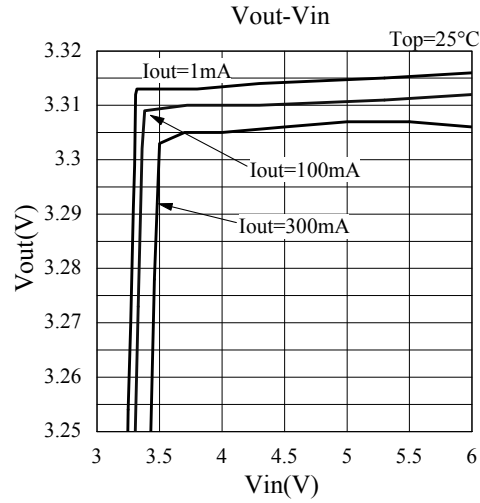
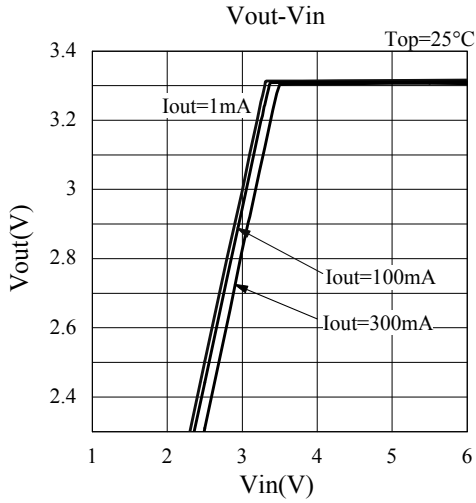
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- 3.3V Vout unit (ELM8533xxA)



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