

ELM84xxxxxA CMOS 1.2A high current LDO voltage regulator

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■ General description

ELM84xxxxxA is CMOS voltage regulator which is characterized with high current 1.2A and low dropout (45mV at $V_{out}=3.3V$ and $I_{out}=300mA$). There are 2 types of CE selection of ELM84 series: non-chip enable function and “H” active. The standard output voltages are 1.2V, 1.8V, 3.3V, 5.0V. ELM84 series can also be made as semi-custom IC within the range of 0.8V to 5.0V by 0.1V step. This series includes short circuit current limiter, inrush current limiter and thermal shutdown circuit. Ceramic capacitors with low ESR can be used as input and output ones. Output capacitor discharge function is also available as semi-custom.

■ Features

- Thermal protection circuit
- Current limit protection circuit
- Short protection circuit
- Output voltage range : 0.8V to 5.0V (by 0.1V)
- Output current : Min.1.2A, Typ.1.8A
- Stand by current consumption : Max. 1 μ A ($V_{in}=6.0V$ at 25°C)
- Load stability : Typ.15mV($1mA \leq I_{out} \leq 300mA$)
- Input stability : Typ. 0.02%/V ($V_{out}=3.3V$, $I_{out}=100mA$)
- Accuracy of output voltage : $\pm 1.0\%$ ($V_{out} \geq 2.0V$) or $\pm 20mV$ ($V_{out} < 2.0V$) at $I_{out}=100mA$
- Package : SOT-89, SOT-89-5, SOT-23, SOT-25, SON8-3 \times 3

■ Application

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

■ Maximum absolute ratings

Parameter	Symbol	Limit	Unit
Input voltage	V_{in}	$V_{ss}-0.3$ to 6.5	V
CE Input voltage	V_{ce}	$V_{ss}-0.3$ to 6.5	V
Output voltage	V_{out}	$V_{ss}-0.3$ to $V_{in}+0.3$	V
Output current	I_{out}	2000 * (1)	mA
Power dissipation	Pd	1000 (SOT-89) * (2)	mW
		1000 (SOT-89-5) * (2)	
		500 (SOT-23) * (2)	
		600 (SOT-25) * (2)	
		1000 (SON8-3 \times 3) * (2)	
Operationg Temperature	T_{op}	-40 to +85	°C
Storage Temperature	T_{stg}	-55 to +125	°C

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

* 2. Mounted on glass epoxy board (FR-4). (76.2mm \times 114.3mm \times 1.6mm : based on EIJ/JEDEC standard size), 2layers, Cu thickness 35 μ m, Cu area : top side 20%, back side 100%.

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■ Selection guide

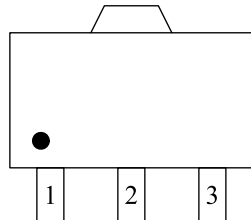
ELM84xxxxxA-x

Symbol		
a, b	Output voltage	e.g. : 12: Vout=1.2V, 18: Vout=1.8V 33: Vout=3.3V, 50: Vout=5.0V
c	CE selection	1: No CE 3: CE="H" active without Co discharge 4: CE="H" active with Co discharge
d	Package	A: SOT-89, SOT-89-5 B: SOT-23, SOT-25 G: SON8-3×3
e	Pin configuration type	1: Type1 2: Type2
f	Product version	A
g	Taping direction	S, N: Refer to PKG file

ELM84 x x x x x A - x
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 a b c d e f g

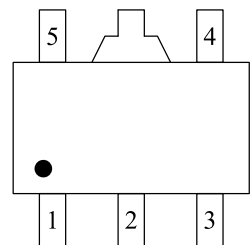
■ Pin configuration

SOT-89(TOP VIEW)



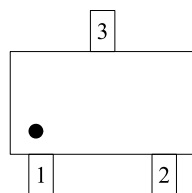
Pin No.	ELM84xx1A1A	ELM84xx1A2A
	Pin name	Pin name
1	VOUT	VSS
2	VSS	VIN
3	VIN	VOUT

SOT-89-5(TOP VIEW)



Pin No.	ELM84xx3A1A, ELM84xx4A1A
	Pin name
1	CE
2	VSS
3	NC
4	VIN
5	VOUT

SOT-23(TOP VIEW)

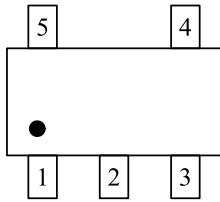


Pin No.	ELM84xx1B1A	ELM84xx1B2A
	Pin name	Pin name
1	VOUT	VSS
2	VIN	VOUT
3	VSS	VIN

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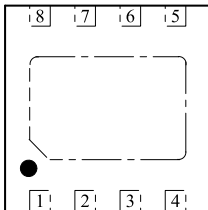
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SOT-25(TOP VIEW)

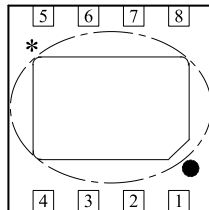


Pin No.	ELM84xx3B1A ELM84xx4B1A	ELM84xx3B2A ELM84xx4B2A
	Pin name	
1	VOUT	VIN
2	VSS	VSS
3	VIN	CE
4	NC	NC
5	CE	VOUT

SON8-3x3(TOP VIEW)



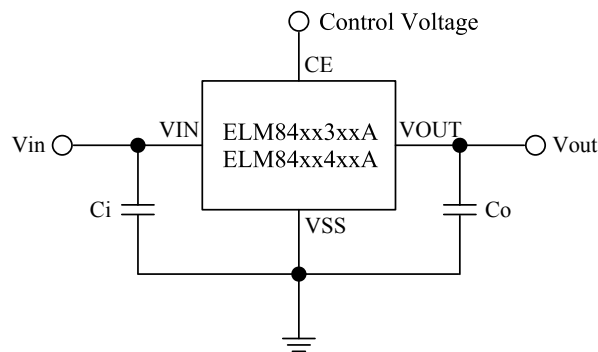
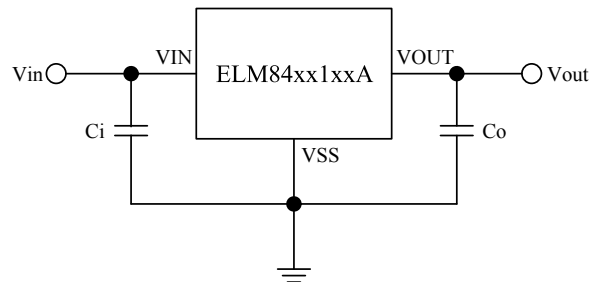
SON8-3x3(BOTTOM VIEW)



ELM84xx3G1A, ELM84xx4G1A			
Pin No.	Pin name	Pin No.	Pin name
1	VOUT	5	VSS
2	VOUT	6	NC
3	NC	7	VIN
4	CE	8	VIN

* The potential of the tab on the back is connected to VSS internally. Please set it to be open or connect to Vss pin(recommended).

Standard circuit

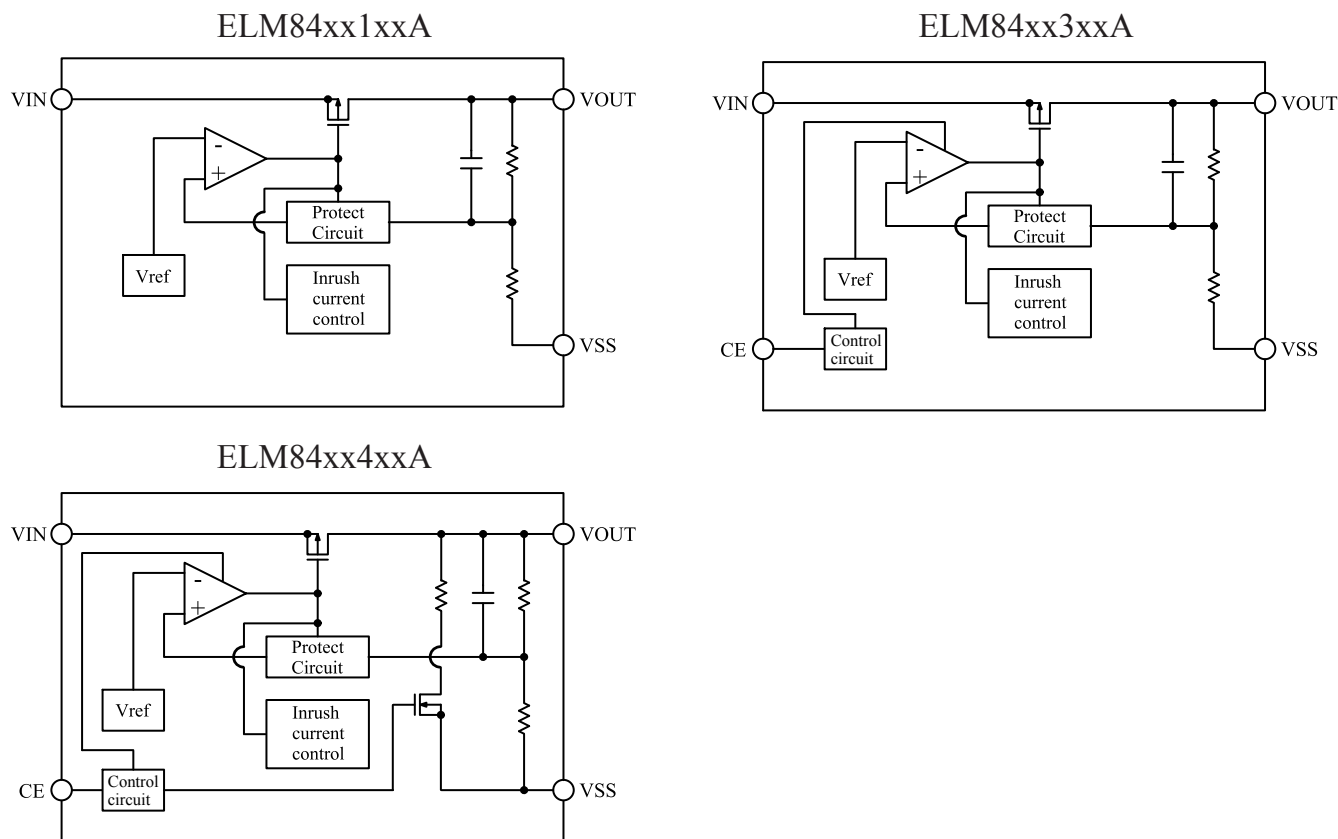


* Please connect 2.2 μ F at minimum for Ci and Co. Ceramic capacitors with 4.7 μ F or greater are recommended for stability operation.

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■Block diagram



■Electrical characteristics (ELM84xx1xxA)

Vout=1.2V (ELM84121xxA), No CE pin

Ci=Co=4.7μF, Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=2.2V, Iout=100mA	1.180	1.200	1.220	V
Input voltage	Vin		1.4		6.0	V
Output current	Iout	Vin=2.2V	1200	1800		mA
Current consumption	Iss	Vin=2.2V, No load		85	150	μA
Input/Output voltage differential	Vdif	Iout=300mA		135	220	mV
Input stability	$\Delta V_{out}/\Delta V_{in}$	Iout=100mA, 1.7V ≤ Vin ≤ 6.0V		0.04	0.20	%/V
Load stability 1	$\Delta V_{out}/\Delta I_{out}$	1mA ≤ Iout ≤ 300mA, Vin=2.2V		15	30	mV
Load stability 2	$\Delta V_{out}/\Delta I_{out}$	1mA ≤ Iout ≤ 1000mA, Vin=2.2V		50		mV
Output voltage temperature coefficient	$\Delta V_{out}/\Delta T_{op}$	Top=-40°C to +85°C Vin=2.2V, Iout=100mA		±100		ppm/°C
Inrush current limit	Irlim	Vin=2.2V		500		mA
Short circuit current	Ishort	Vin=2.2V, Vout=0V		150		mA
Ripple rejection ratio	RR	Vin=2.2V, f=1kHz, Iout=100mA		60		dB
Thermal shutdown temperature	Tsd	Vin=2.2V		160		°C
Thermal shutdown recovery temperature	Tsdr	Vin=2.2V		145		°C
Output noise	Vno	Vin=2.2V, BW=10Hz to 100kHz		30		μVrms

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Vout=1.8V (ELM84181xxA), No CE pin

Ci=Co=4.7μF, Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=2.8V, Iout=100mA	1.780	1.800	1.820	V
Input voltage	Vin		1.4		6.0	V
Output current	Iout	Vin=2.8V	1200	1800		mA
Current consumption	Iss	Vin=2.8V, No load		65	125	μA
Input/Output voltage differential	Vdif	Iout=300mA		70	120	mV
Input stability	ΔVout/ΔVin	Iout=100mA, 2.3V≤Vin≤6.0V		0.04	0.20	%/V
Load stability 1	ΔVout/ΔIout	1mA≤Iout≤300mA, Vin=2.8V		15	30	mV
Load stability 2	ΔVout/ΔIout	1mA≤Iout≤1000mA, Vin=2.8V		50		mV
Output voltage temperature coefficient	ΔVout/ΔTop	Top=-40°C to +85°C Vin=2.8V, Iout=100mA		±100		ppm/°C
Inrush current limit	Irlim	Vin=2.8V		400		mA
Short circuit current	Ishort	Vin=2.8V, Vout=0V		150		mA
Ripple rejection ratio	RR	Vin=2.8V, f=1kHz, Iout=100mA		60		dB
Thermal shutdown temperature	Tsd	Vin=2.8V		160		°C
Thermal shutdown recovery temperature	Tsdr	Vin=2.8V		145		°C
Output noise	Vno	Vin=2.8V, BW=10Hz to 100kHz		30		μVrms

Vout=3.3V (ELM84331xxA), No CE pin

Ci=Co=4.7μF, Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=4.3V, Iout=100mA	3.267	3.300	3.333	V
Input voltage	Vin		1.4		6.0	V
Output current	Iout	Vin=4.3V	1200	1800		mA
Current consumption	Iss	Vin=4.3V, No load		70	135	μA
Input/Output voltage differential	Vdif	Iout=300mA		45	70	mV
Input stability	ΔVout/ΔVin	Iout=100mA, 3.8V≤Vin≤6.0V		0.02	0.20	%/V
Load stability 1	ΔVout/ΔIout	1mA≤Iout≤300mA, Vin=4.3V		15	30	mV
Load stability 2	ΔVout/ΔIout	1mA≤Iout≤1000mA, Vin=4.3V		50		mV
Output voltage temperature coefficient	ΔVout/ΔTop	Top=-40°C to +85°C Vin=4.3V, Iout=100mA		±100		ppm/°C
Inrush current limit	Irlim	Vin=4.3V		400		mA
Short circuit current	Ishort	Vin=4.3V, Vout=0V		150		mA
Ripple rejection ratio	RR	Vin=4.3V, f=1kHz, Iout=100mA		65		dB
Thermal shutdown temperature	Tsd	Vin=4.3V		160		°C
Thermal shutdown recovery temperature	Tsdr	Vin=4.3V		145		°C
Output noise	Vno	Vin=4.3V, BW=10Hz to 100kHz		30		μVrms

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Vout=5.0V (ELM84501xxA), No CE pin

Ci=Co=4.7μF, Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=6.0V, Iout=100mA	4.950	5.000	5.050	V
Input voltage	Vin		1.4		6.0	V
Output current	Iout	Vin=6.0V	1200	1800		mA
Current consumption	Iss	Vin=6.0V, No load		75	140	μA
Input/Output voltage differential	Vdif	Iout=300mA		37	60	mV
Input stability	ΔVout/ΔVin	Iout=100mA, 5.5V≤Vin≤6.0V		0.02	0.20	%/V
Load stability 1	ΔVout/ΔIout	1mA≤Iout≤300mA, Vin=6.0V		15	30	mV
Load stability 2	ΔVout/ΔIout	1mA≤Iout≤1000mA, Vin=6.0V		50		mV
Output voltage temperature coefficient	ΔVout/ΔTop	Top=-40°C to +85°C Vin=6.0V, Iout=100mA		±100		ppm/°C
Inrush current limit	Irlim	Vin=6.0V		500		mA
Short circuit current	Ishort	Vin=6.0V, Vout=0V		200		mA
Ripple rejection ratio	RR	Vin=6.0V, f=1kHz, Iout=100mA		60		dB
Thermal shutdown temperature	Tsd	Vin=6.0V		160		°C
Thermal shutdown recovery temperature	Tsdr	Vin=6.0V		145		°C
Output noise	Vno	Vin=6.0V, BW=10Hz to 100kHz		30		μVrms

■ Electrical characteristics (ELM84xx3xxA, ELM84xx4xxA)

Vout=1.2V (ELM84123xxA, ELM84124xxA), With CE pin

Ci=Co=4.7μF, Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=2.2V, Iout=100mA	1.180	1.200	1.220	V
Input voltage	Vin		1.4		6.0	V
Output current	Iout	Vin=2.2V	1200	1800		mA
Current consumption	Iss	Vin=2.2V, No load		85	150	μA
Standby current consumption	Istby	Vin=6.0V, Vce=0V			1.0	μA
CE input voltage High	Vceh	Vin=6.0V	1.0		6.0	V
CE input voltage Low	Vcel	Vin=1.4V	0.0		0.4	V
CE input current High	Iceh	Vce=Vin=6.0V	-0.1	0.3	1.0	μA
CE input current Low	Icel	Vce=Vss, Vin=6.0V	-0.1	0.0	0.1	μA
Input/Output voltage differential	Vdif	Iout=300mA		135	220	mV
Input stability	ΔVout/ΔVin	Iout=100mA, 1.7V≤Vin≤6.0V		0.04	0.20	%/V
Load stability 1	ΔVout/ΔIout	1mA≤Iout≤300mA, Vin=2.2V		15	30	mV
Load stability 2	ΔVout/ΔIout	1mA≤Iout≤1000mA, Vin=2.2V		50		mV
Output voltage temperature coefficient	ΔVout/ΔTop	Top=-40°C to +85°C Vin=2.2V, Iout=100mA		±100		ppm/°C
Inrush current limit	Irlim	Vin=2.2V		500		mA
Output capacitor discharge resistance	Rdchg	Vin=2.2V		200		Ω
Short circuit current	Ishort	Vin=2.2V, Vout=0V		150		mA
Ripple rejection ratio	RR	Vin=2.2V, f=1kHz, Iout=100mA		60		dB
Thermal shutdown temperature	Tsd	Vin=2.2V		160		°C
Thermal shutdown recovery temperature	Tsdr	Vin=2.2V		145		°C
Output noise	Vno	Vin=2.2V, BW=10Hz to 100kHz		30		μVrms

* Rdchg is applied for ELM84124xxA only.

ELM84xxxxA CMOS 1.2A high current LDO voltage regulator

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Vout=1.8V (ELM84183xxA, ELM84184xxA), With CE pin

Ci=Co=4.7μF, Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=2.8V, Iout=100mA	1.780	1.800	1.820	V
Input voltage	Vin		1.4		6.0	V
Output current	Iout	Vin=2.8V	1200	1800		mA
Current consumption	Iss	Vin=2.8V, No load		65	125	μA
Standby current consumption	Istby	Vin=6.0V, Vce=0V			1.0	μA
CE input voltage High	Vceh	Vin=6.0V	1.0		6.0	V
CE input voltage Low	Vcel	Vin=1.4V	0.0		0.4	V
CE input current High	Iceh	Vce=Vin=6.0V	-0.1	0.3	1.0	μA
CE input current Low	Icel	Vce=Vss, Vin=6.0V	-0.1	0.0	0.1	μA
Input/Output voltage differential	Vdif	Iout=300mA		70	120	mV
Input stability	ΔVout/ΔVin	Iout=100mA, 2.3V≤Vin≤6.0V		0.04	0.20	%/V
Load stability 1	ΔVout/ΔIout	1mA≤Iout≤300mA, Vin=2.8V		15	30	mV
Load stability 2	ΔVout/ΔIout	1mA≤Iout≤1000mA, Vin=2.8V		50		mV
Output voltage temperature coefficient	ΔVout/ΔTop	Top=-40°C to +85°C Vin=2.8V, Iout=100mA		±100		ppm/°C
Inrush current limit	Irlim	Vin=2.8V		500		mA
Output capacitor discharge resistance	Rdchg	Vin=2.8V		200		Ω
Short circuit current	Ishort	Vin=2.8V, Vout=0V		150		mA
Ripple rejection ratio	RR	Vin=2.8V, f=1kHz, Iout=100mA		60		dB
Thermal shutdown temperature	Tsd	Vin=2.8V		160		°C
Thermal shutdown recovery temperature	Tsdr	Vin=2.8V		145		°C
Output noise	Vno	Vin=2.8V, BW=10Hz to 100kHz		30		μVrms

* Rdchg is applied for ELM84184xxA only.

ELM84xxxxxA CMOS 1.2A high current LDO voltage regulator

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Vout=3.3V (ELM84333xxA, ELM84334xxA), With CE pin

Ci=Co=4.7μF, Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=4.3V, Iout=100mA	3.267	3.300	3.333	V
Input voltage	Vin		1.4		6.0	V
Output current	Iout	Vin=4.3V	1200	1800		mA
Current consumption	Iss	Vin=4.3V, No load		70	135	μA
Standby current consumption	Istby	Vin=6.0V, Vce=0V			1.0	μA
CE input voltage High	Vceh	Vin=6.0V	1.0		6.0	V
CE input voltage Low	Vcel	Vin=1.4V	0.0		0.4	V
CE input current High	Iceh	Vce=Vin=6.0V	-0.1	0.3	1.0	μA
CE input current Low	Icel	Vce=Vss, Vin=6.0V	-0.1	0.0	0.1	μA
Input/Output voltage differential	Vdif	Iout=300mA		45	70	mV
Input stability	ΔVout/ΔVin	Iout=100mA, 3.8V≤Vin≤6.0V		0.02	0.20	%/V
Load stability 1	ΔVout/ΔIout	1mA≤Iout≤300mA, Vin=4.3V		15	30	mV
Load stability 2	ΔVout/ΔIout	1mA≤Iout≤1000mA, Vin=4.3V		50		mV
Output voltage temperature coefficient	ΔVout/ΔTop	Top=-40°C to +85°C Vin=4.3V, Iout=100mA		±100		ppm/°C
Inrush current limit	Irlim	Vin=4.3V		400		mA
Output capacitor discharge resistance	Rdchg	Vin=4.3V		200		Ω
Short circuit current	Ishort	Vin=4.3V, Vout=0V		150		mA
Ripple rejection ratio	RR	Vin=4.3V, f=1kHz, Iout=100mA		65		dB
Thermal shutdown temperature	Tsd	Vin=4.3V		160		°C
Thermal shutdown recovery temperature	Tsdr	Vin=4.3V		145		°C
Output noise	Vno	Vin=4.3V, BW=10Hz to 100kHz		30		μVrms

* Rdchg is applied for ELM84334xxA only.

ELM84xxxxA CMOS 1.2A high current LDO voltage regulator

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Vout=5.0V (ELM84503xxA, ELM84504xxA), With CE pin

Ci=Co=4.7μF, Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	Vout	Vin=6.0V, Iout=100mA	4.950	5.000	5.050	V
Input voltage	Vin		1.4		6.0	V
Output current	Iout	Vin=6.0V	1200	1800		mA
Current consumption	Iss	Vin=6.0V, No load		75	140	μA
Standby current consumption	Istby	Vin=6.0V, Vce=0V			1.0	μA
CE input voltage High	Vceh	Vin=6.0V	1.0		6.0	V
CE input voltage Low	Vcel	Vin=1.4V	0.0		0.4	V
CE input current High	Iceh	Vce=Vin=6.0V	-0.1	0.3	1.0	μA
CE input current Low	Icel	Vce=Vss, Vin=6.0V	-0.1	0.0	0.1	μA
Input/Output voltage differential	Vdif	Iout=300mA		37	60	mV
Input stability	ΔVout/ΔVin	Iout=100mA, 5.5V≤Vin≤6.0V		0.02	0.20	%/V
Load stability 1	ΔVout/ΔIout	1mA≤Iout≤300mA, Vin=6.0V		15	30	mV
Load stability 2	ΔVout/ΔIout	1mA≤Iout≤1000mA, Vin=6.0V		50		mV
Output voltage temperature coefficient	ΔVout/ΔTop	Top=-40°C to +85°C Vin=6.0V, Iout=100mA		±100		ppm/°C
Inrush current limit	Irlim	Vin=6.0V		500		mA
Output capacitor discharge resistance	Rdchg	Vin=6.0V		200		Ω
Short circuit current	Ishort	Vin=6.0V, Vout=0V		200		mA
Ripple rejection ratio	RR	Vin=6.0V, f=1kHz, Iout=100mA		60		dB
Thermal shutdown temperature	Tsd	Vin=6.0V		160		°C
Thermal shutdown recovery temperature	Tsdr	Vin=6.0V		145		°C
Output noise	Vno	Vin=6.0V, BW=10Hz to 100kHz		30		μVrms

* Rdchg is applied for ELM84504xxA only.

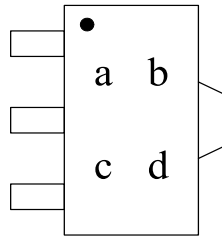
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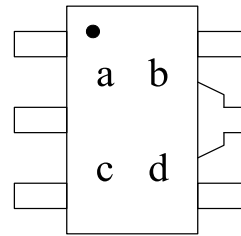
■ Marking

- SOT-89, SOT-23 package : ELM84xx1xxA (No CE)
- SOT-89-5, SOT-25 package : ELM84xx3xxA, ELM84xx4xxA (with CE)

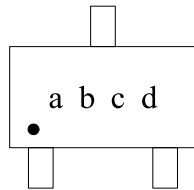
SOT-89



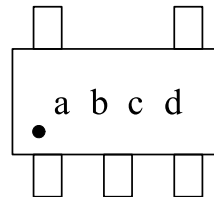
SOT-89-5



SOT-23



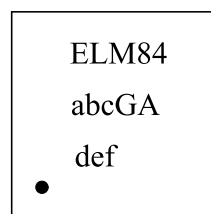
SOT-25



a to d : Assembly lot No. —
0 to 9 and A to Z (I, O, X excepted.)

- SON8-3×3 package : ELM84xx3G1A, ELM84xx4G1A (with CE)

SON8-3x3



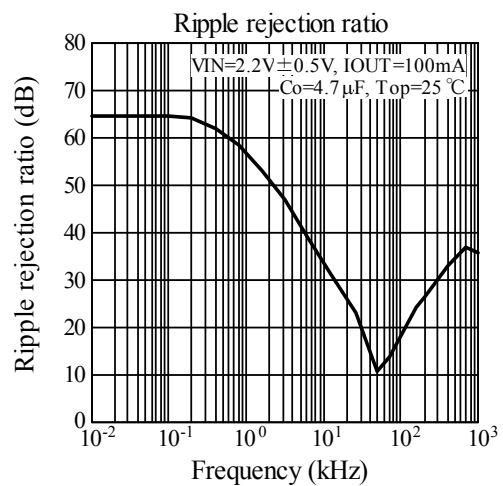
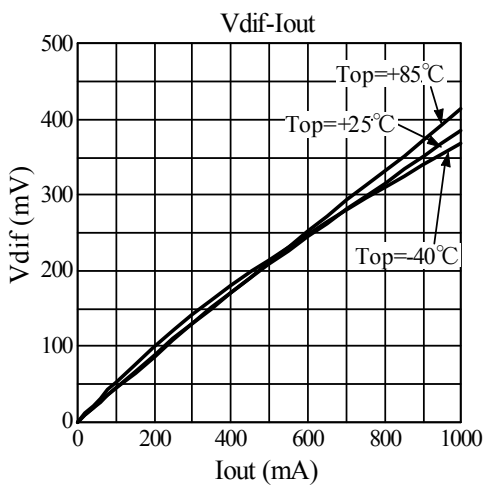
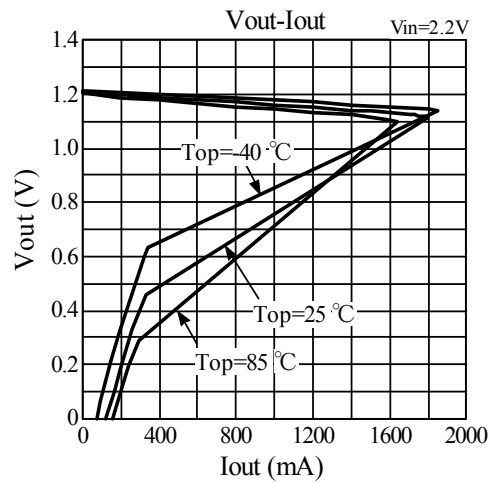
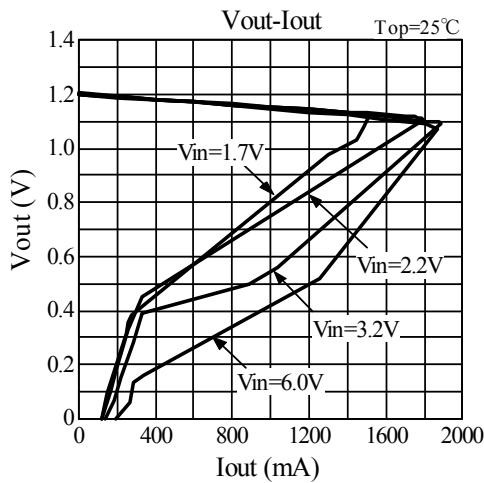
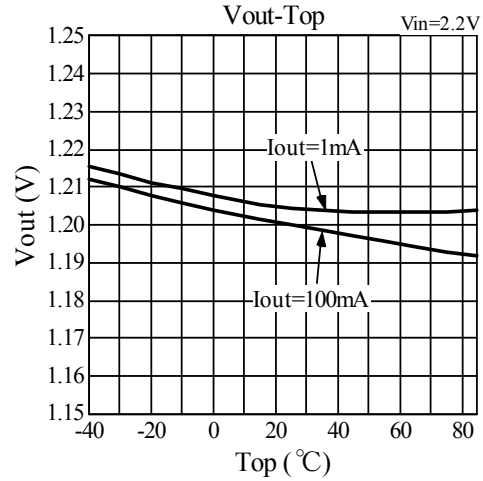
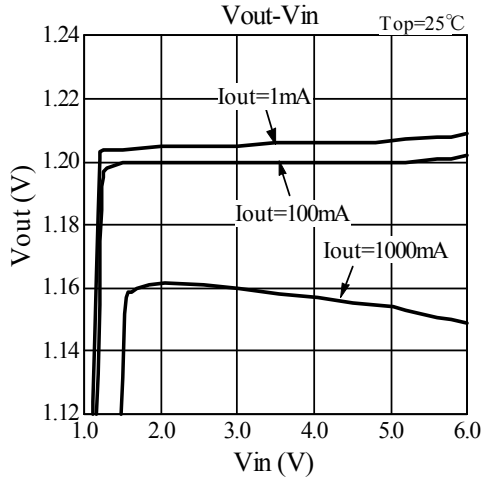
a, b : Output voltage. e.g. : 33(V_{out}=3.3V)
c : CE selection (3 or 4)
d to f : Assembly lot No. (0 to 9 and A to Z (I, O, X excepted).)

ELM84xxxxA CMOS 1.2A high current LDO voltage regulator

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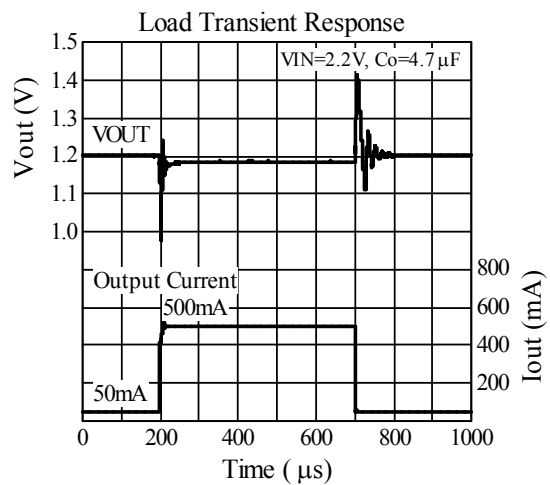
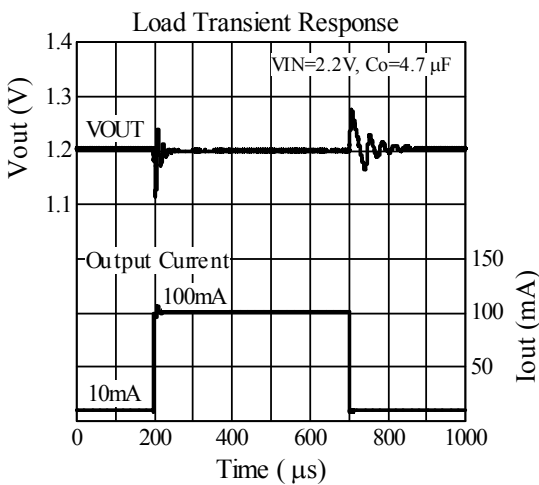
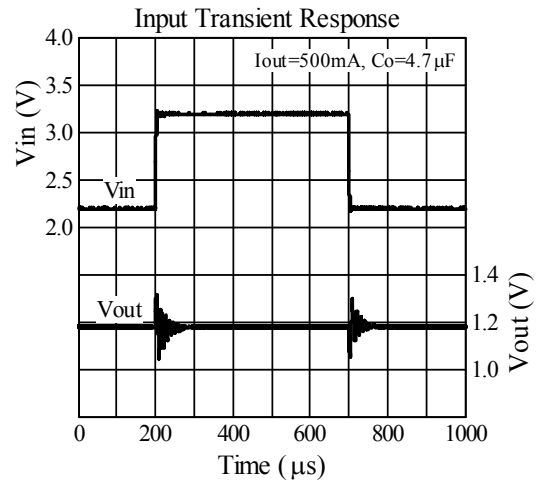
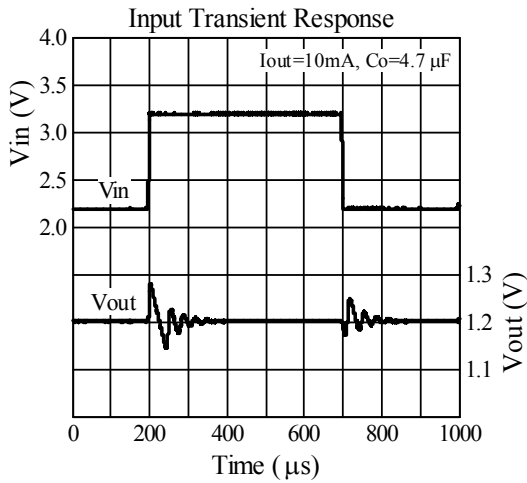
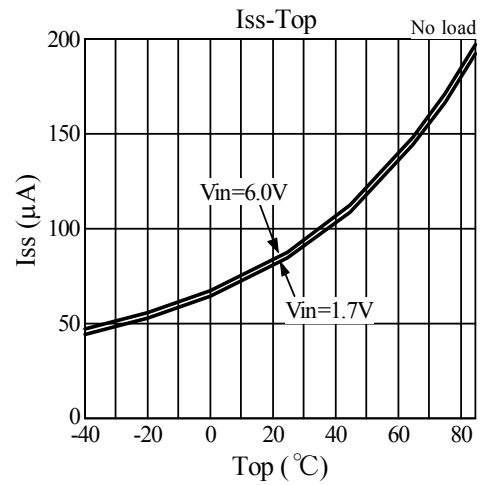
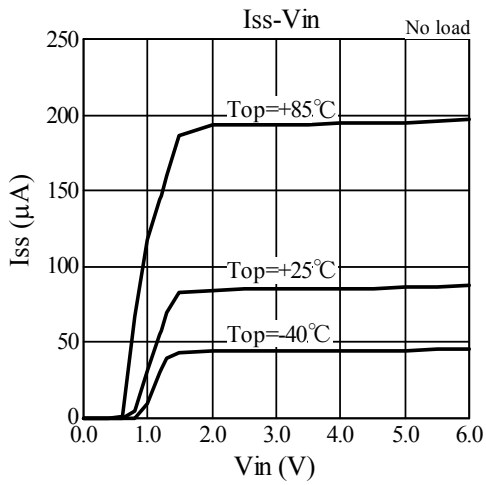
■ Typical characteristics

- $V_{out}=1.2V$ (ELM8412xxxxA)



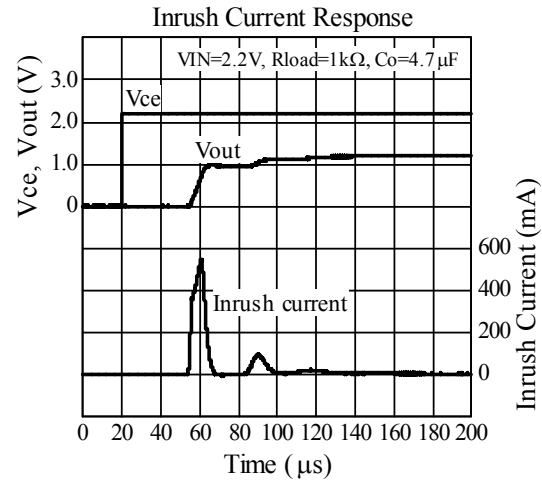
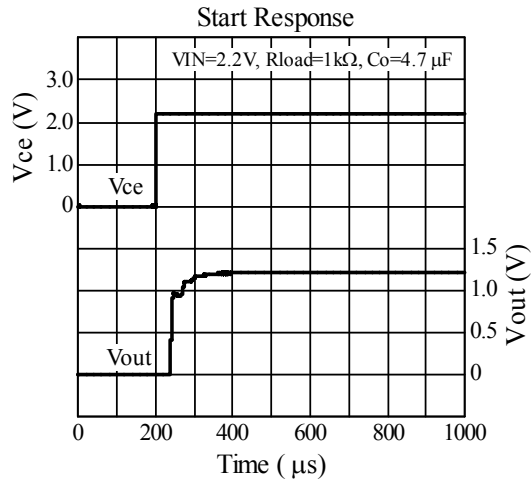
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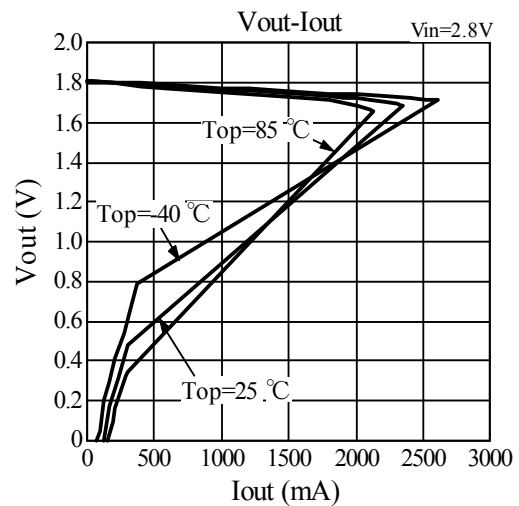
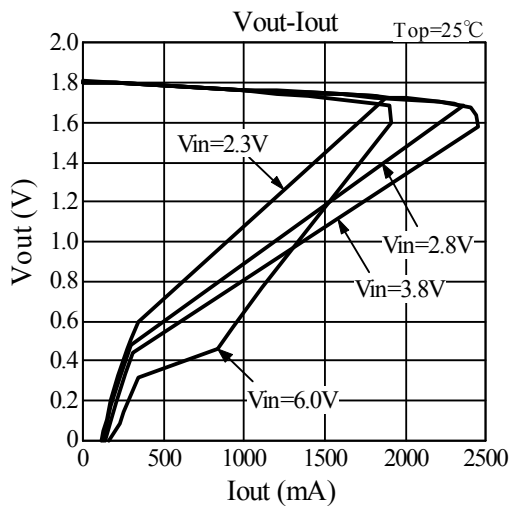
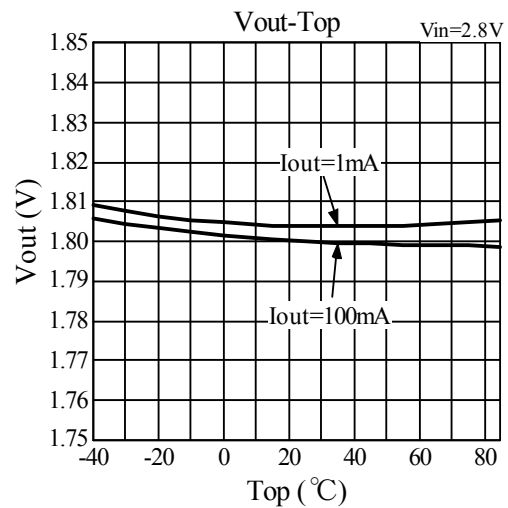
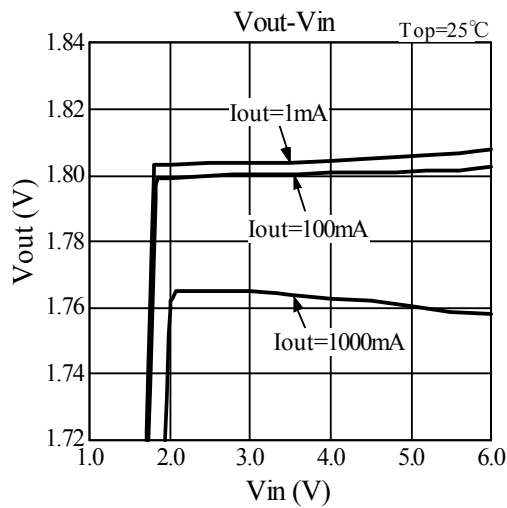


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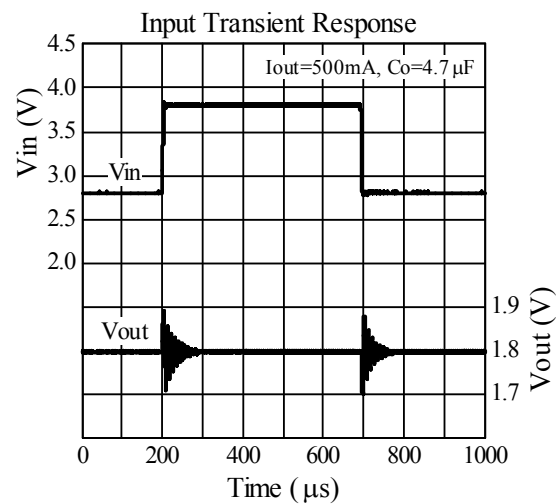
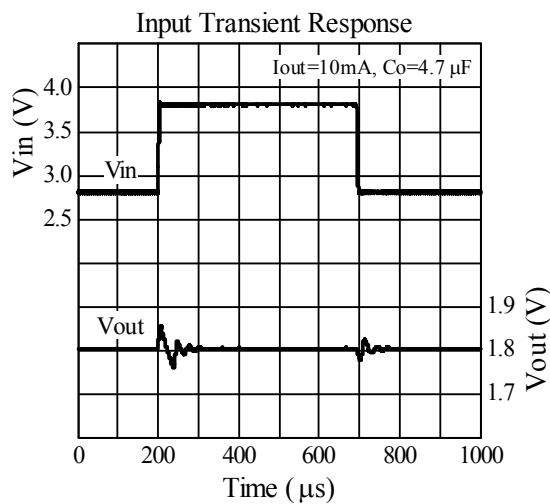
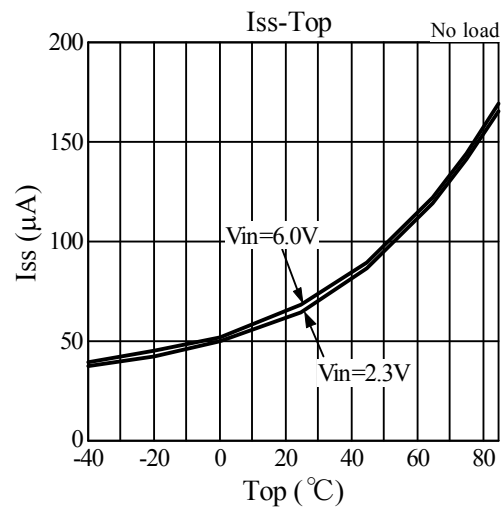
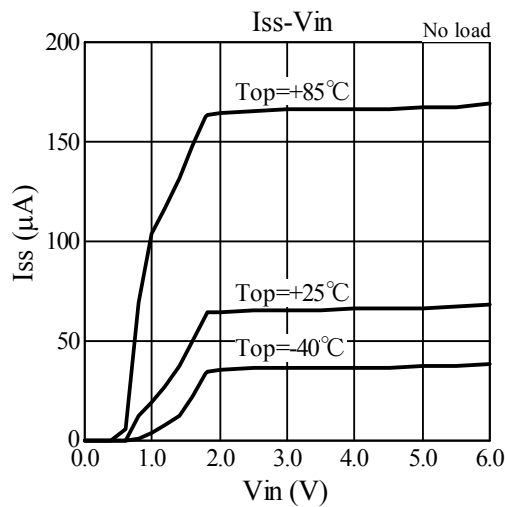
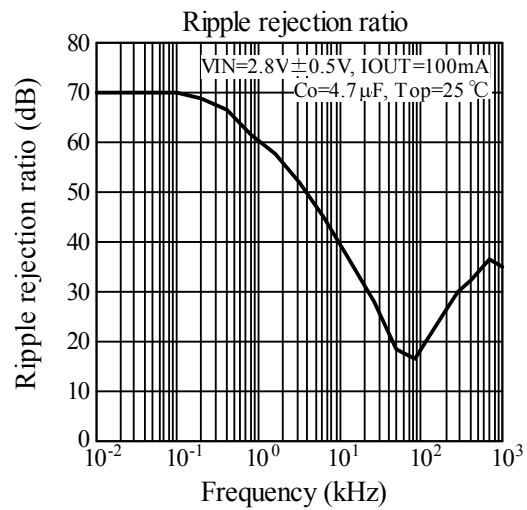
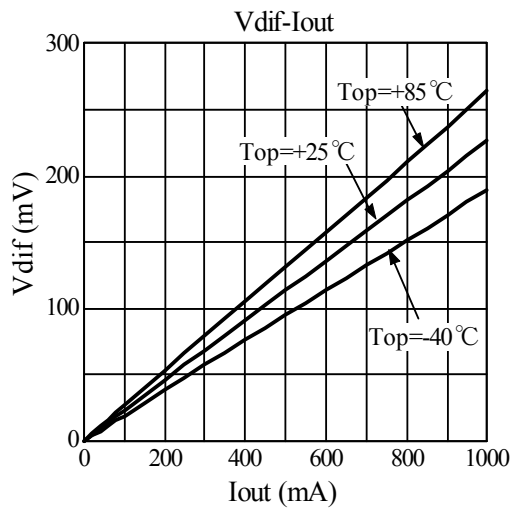


- Vout=1.8V (ELM8418xxxxA)



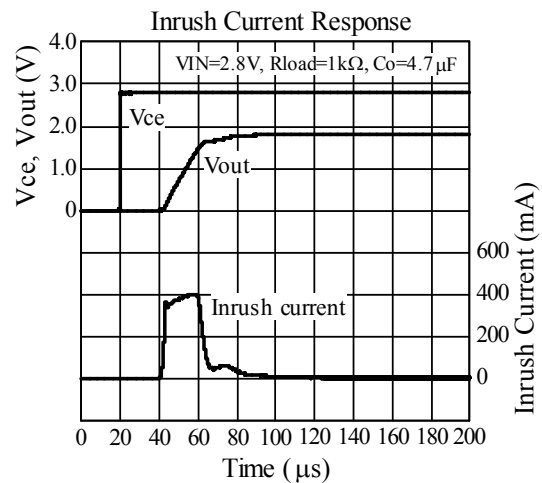
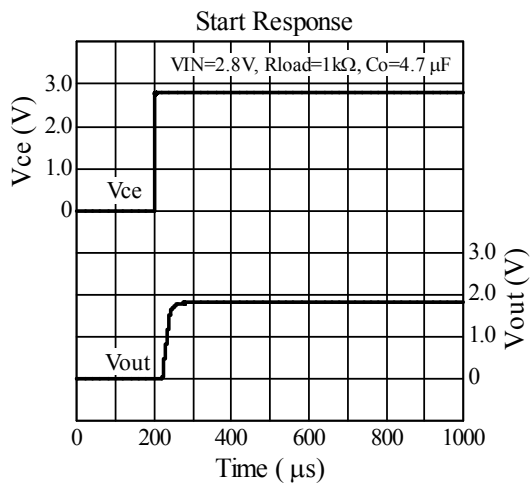
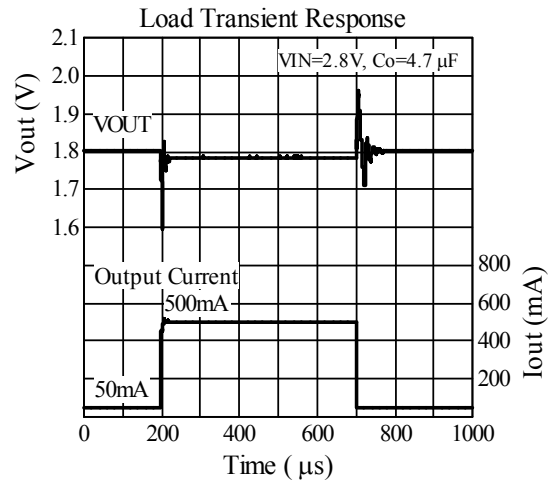
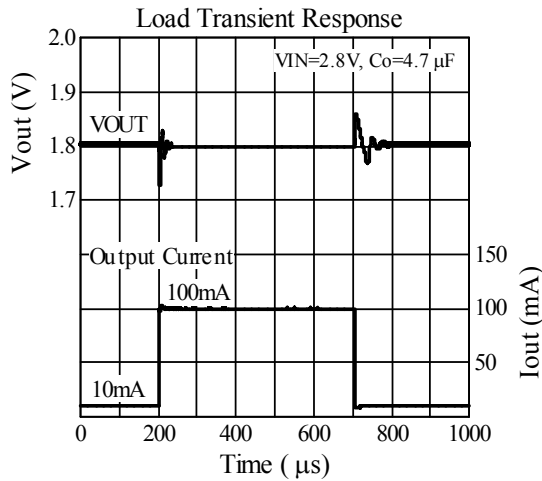
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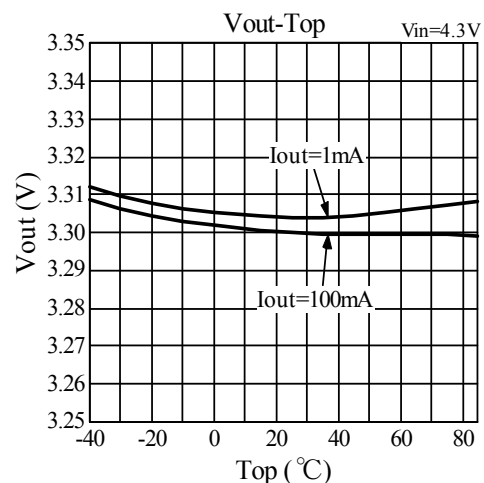
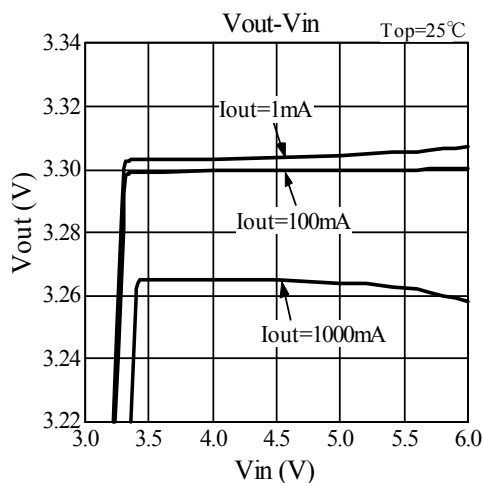


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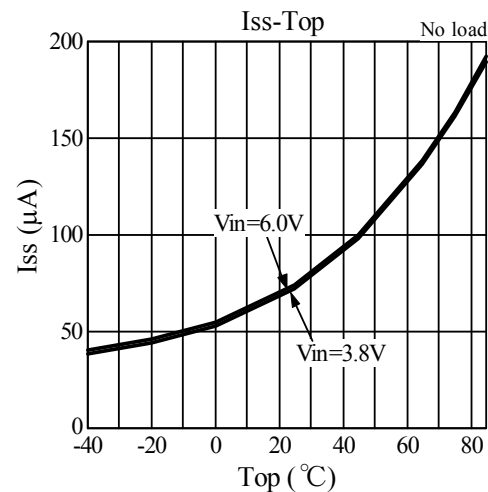
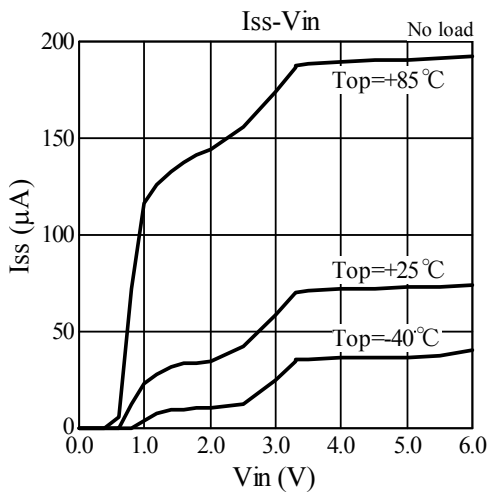
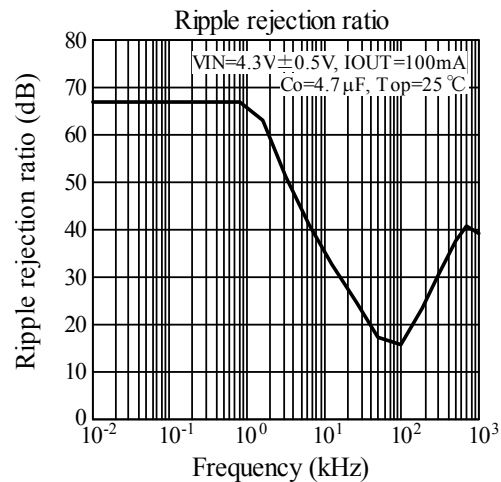
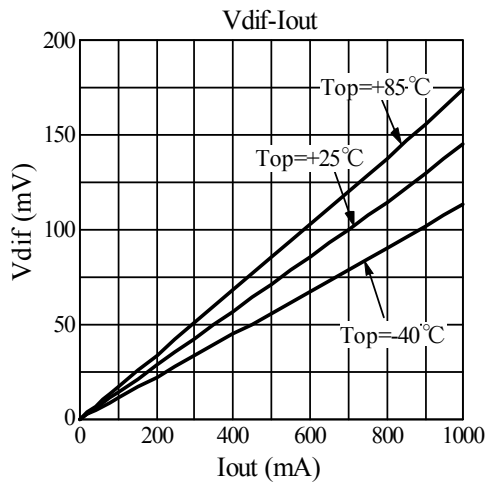
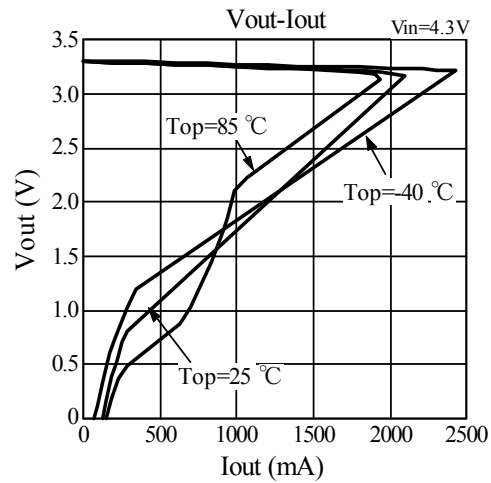
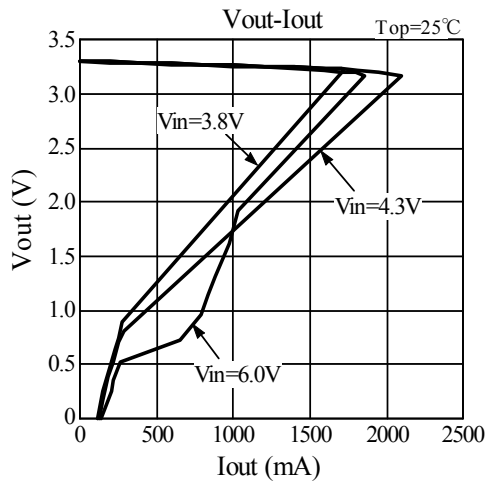


- Vout=3.3V (ELM8433xxxA)



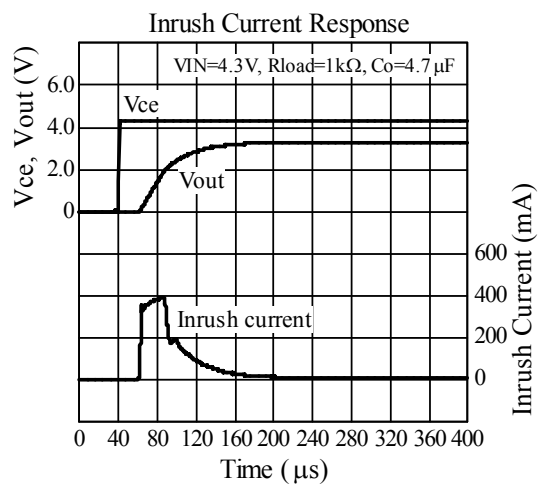
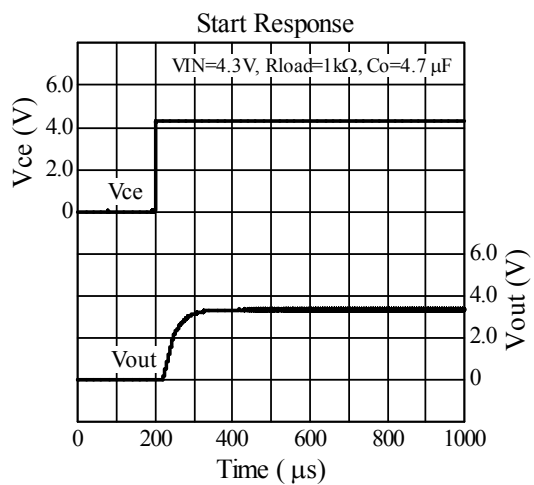
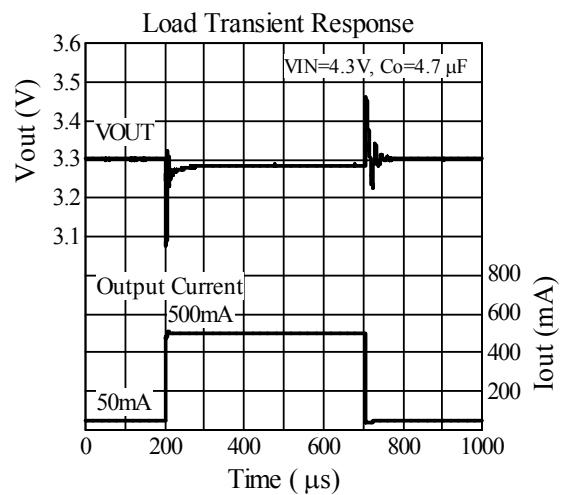
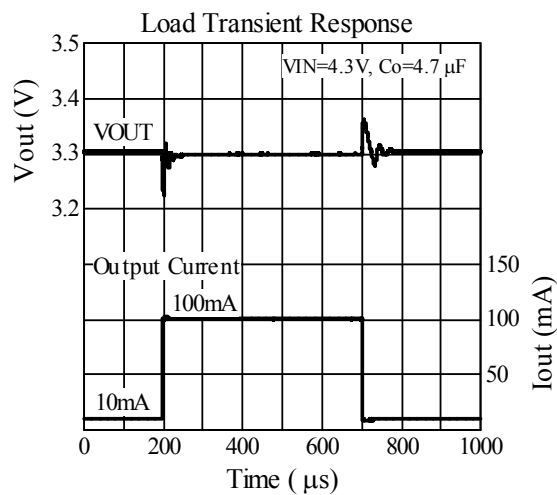
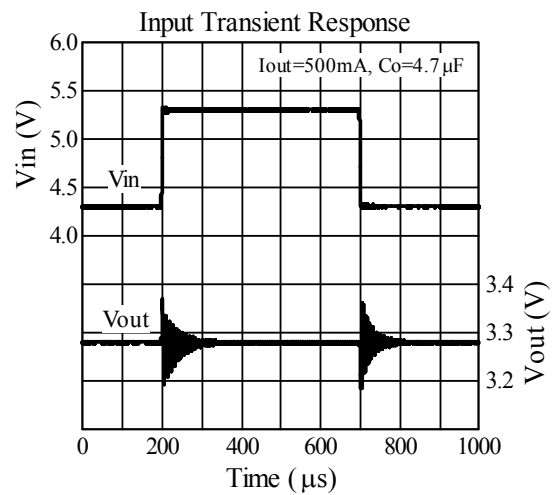
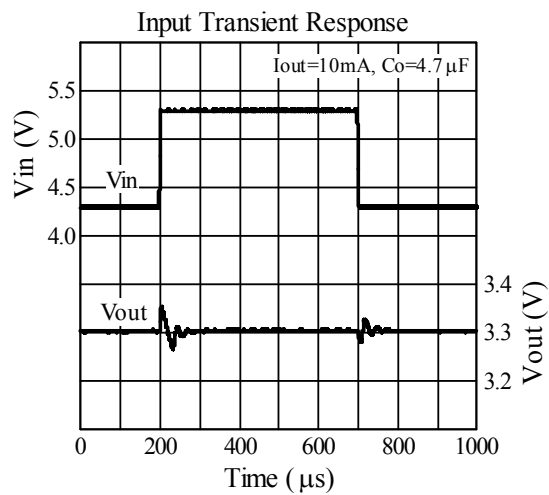
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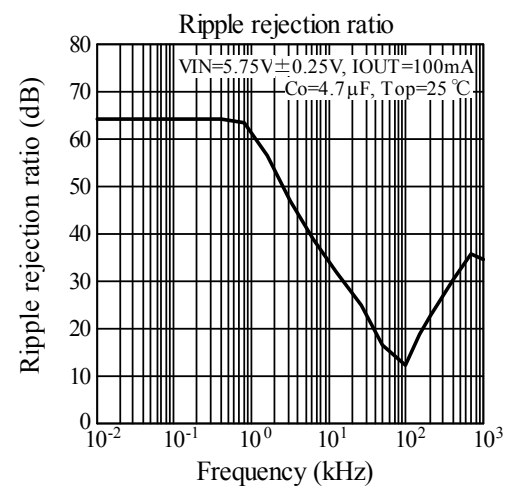
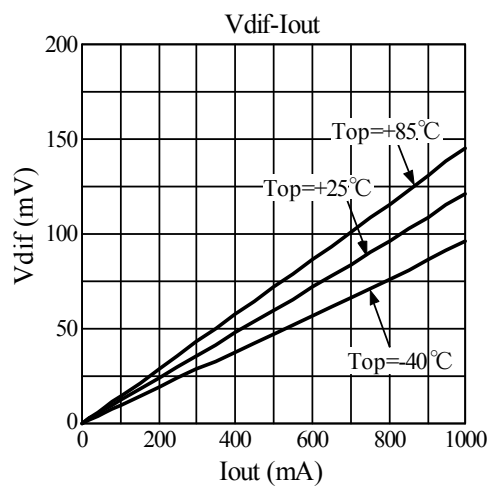
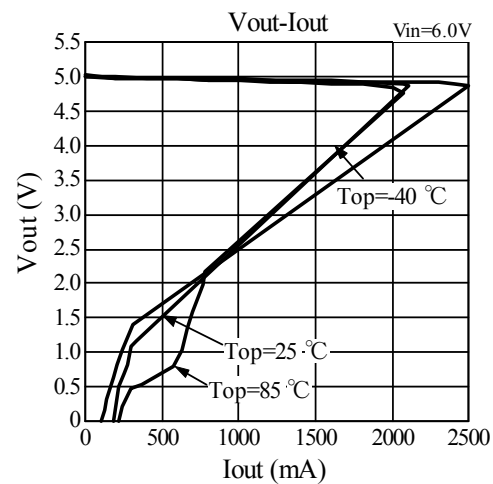
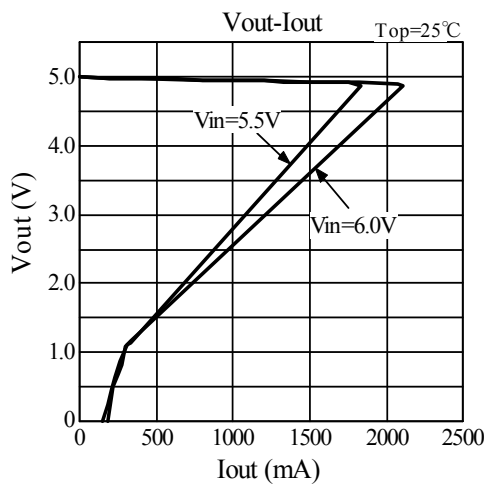
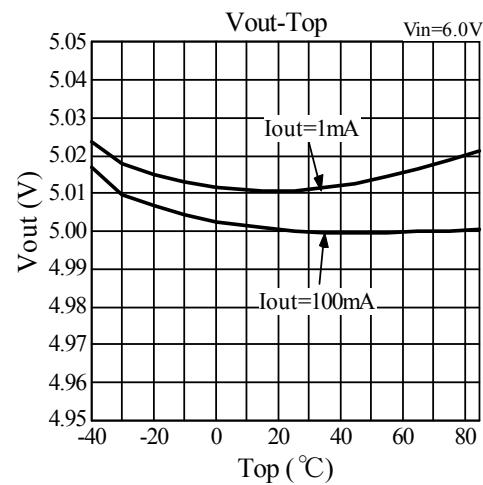
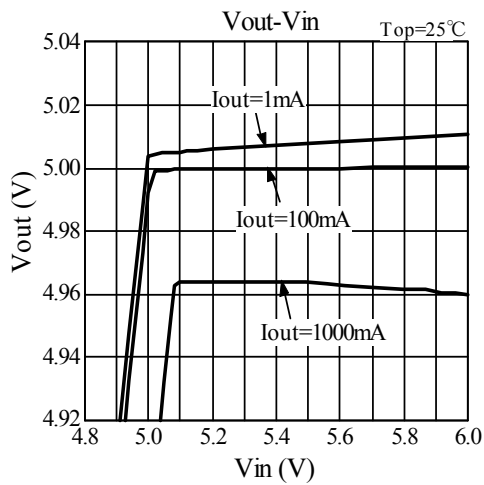
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ELM84xxxxA CMOS 1.2A high current LDO voltage regulator

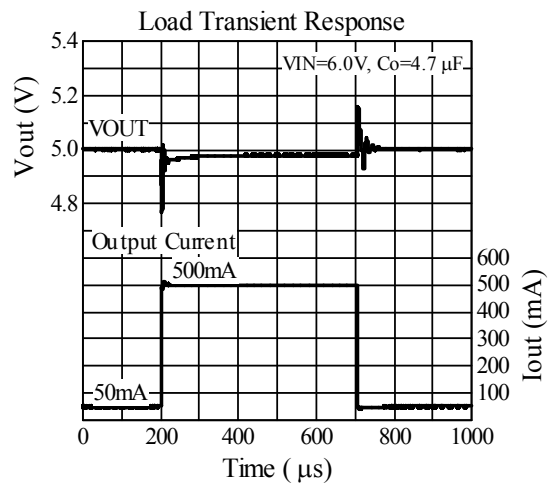
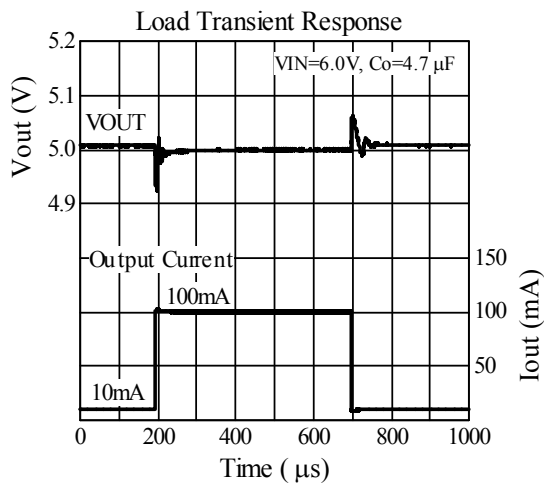
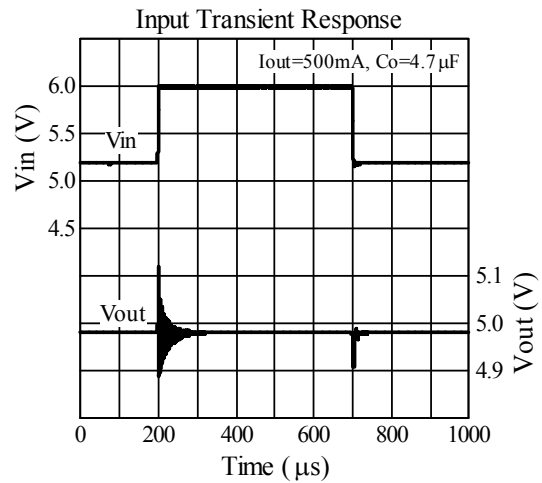
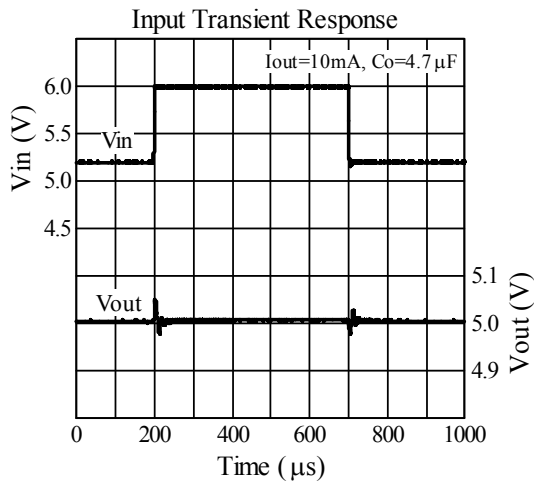
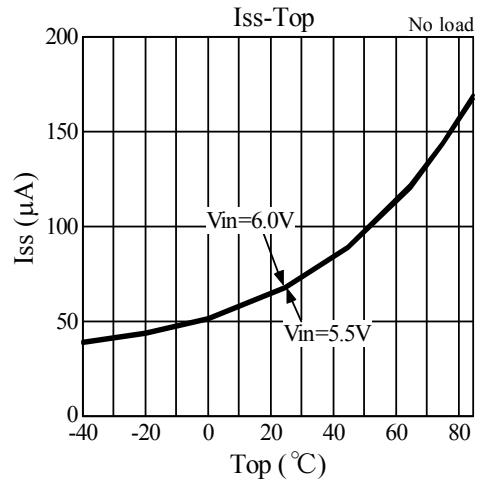
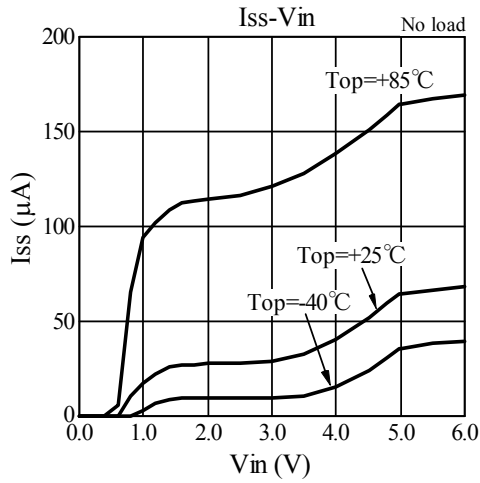
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- $V_{out}=5.0V$ (ELM8450xxxA)



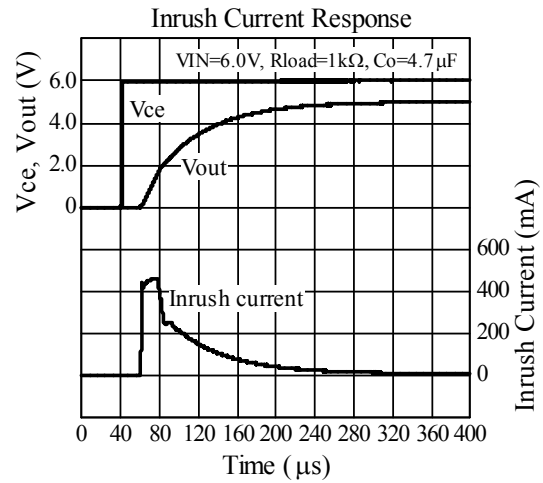
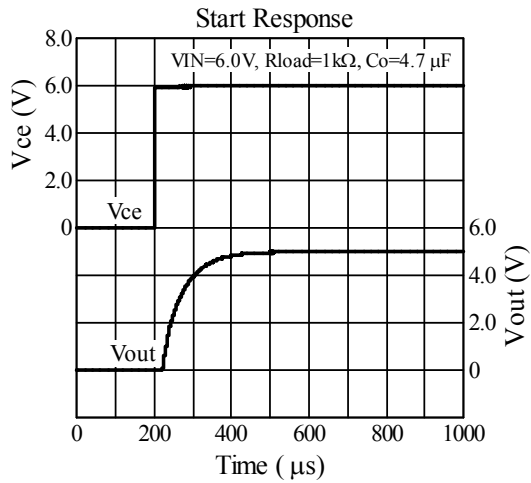
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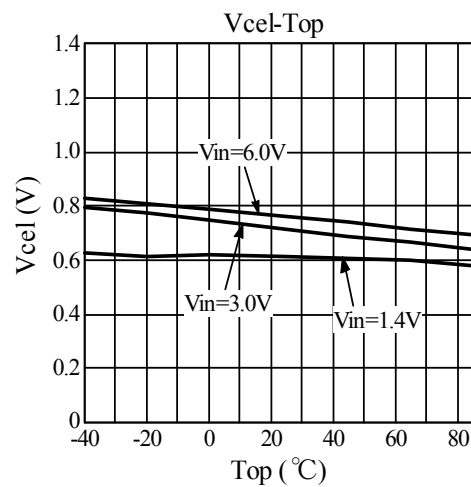
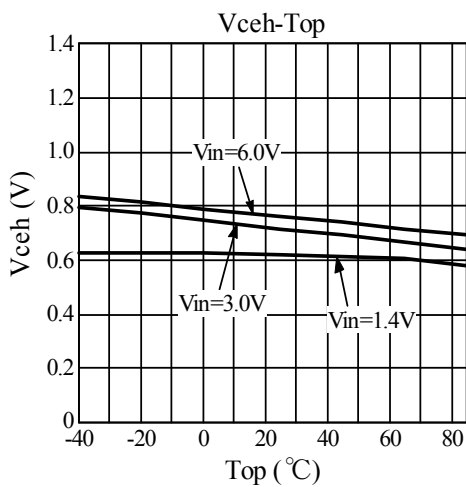
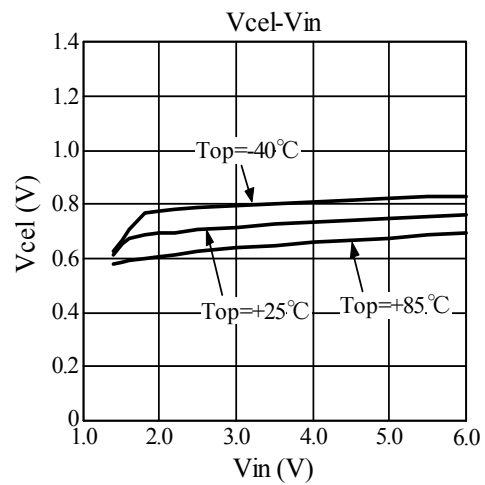
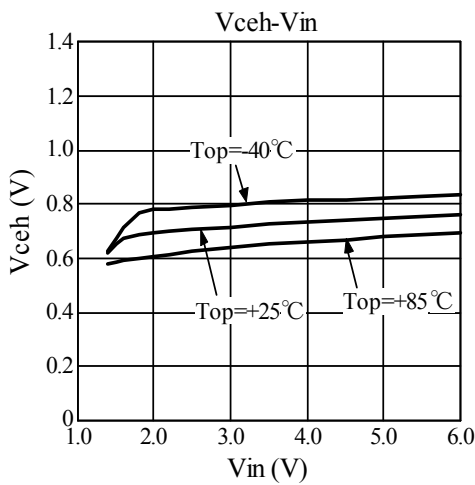


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- ELM84xx3xxA, ELM84xx4xxA



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