

RoHS Compliant Product

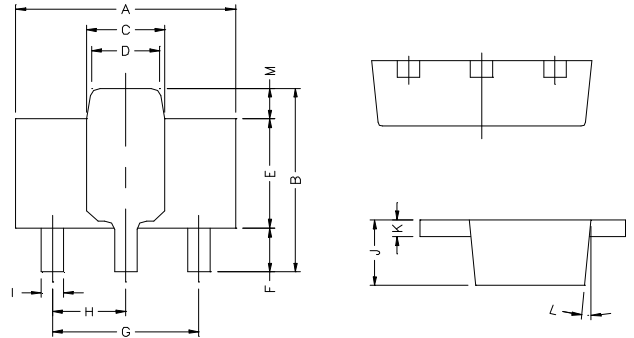
Description

The SM6201 series are highly precise, low power consumption, positive voltage regulators manufactured using CMOS and laser trimming technologies. The series provide large currents with a significantly small dropout voltage. The SM6201 consists of a current limiter circuit, a driver transistor, a precision reference voltage and an error amplifier. Output voltage is selectable in 0.1V steps between 1.3~6.0V.

Features

- * Max. Operating Voltage: 10V
- * Highly Accurate: Output Voltage $\pm 2\%$
- * Low Power Consumption: Typ. 2 μ A
- * Output Voltage Range: 1.3V~6V (selectable in 0.1V steps)
- * Dropout Voltage: 0.16V@ $I_{OUT}=100mA$
- * Output Voltage Temperature Characteristics: Typ. $\pm 100ppm/^{\circ}C$
- * Max. Output Current: 250mA (Typ.)
- * Capacitors Can Be Tantalum Or Ceramic

SOT-89

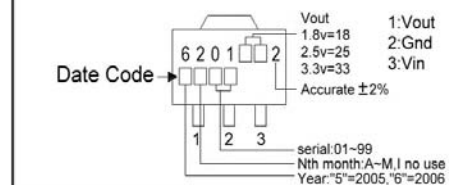


REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.4	4.6	G	3.00	REF.
B	4.05	4.25	H	1.50	REF.
C	1.50	1.70	I	0.40	0.52
D	1.30	1.50	J	1.40	1.60
E	2.40	2.60	K	0.35	0.41
F	0.89	1.20	L	5° TYP.	
			M	0.70 REF.	

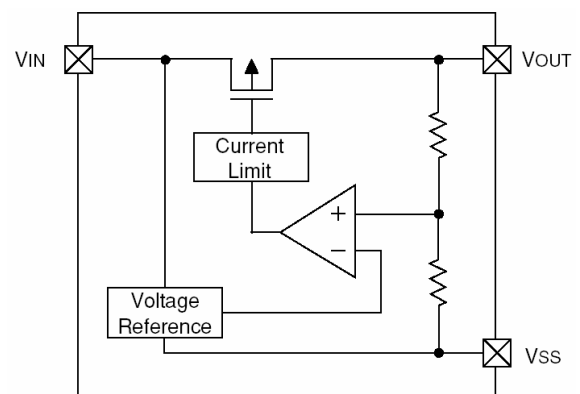
Applications

- * Reference Voltage
- * Portable Games And AV Equipment
- * Battery Powered Equipment
- * Cameras, Video Recorders
- * Mobile Phones And Cordless Phones

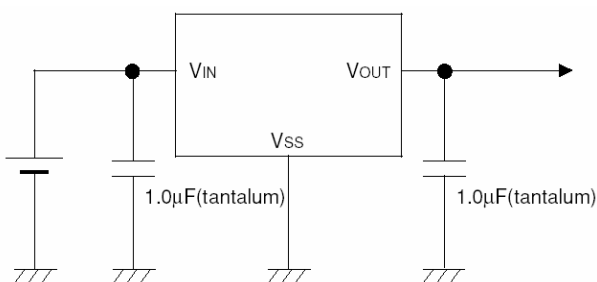
Marking :



Block Diagram



Typical Application Circuit



Absolute Maximum Ratings $T_a=25^\circ\text{C}$

Parameter	Symbol	Ratings	Unit
Input Voltage	V_{IN}	12	V
Output Current	I_{OUT}	500	mA
Output Voltage	V_{OUT}	$V_{SS}-0.3\sim V_{IN}+0.3$	V
Operating Ambient Temperature	T_{opr}	-40~+85	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55~+125	$^\circ\text{C}$
Continuous Total Power Dissipation	P_d	500	mW

Electrical Characteristics $T_a=25^\circ\text{C}$

SM6201-50 $V_{OUT}(T) = 5.0\text{V}$ (Note1)

Parameter	Symbol	Condition	Min	TYP	Max	Unit
Output Voltage	$V_{OUT(E)}$ (Note2)	$V_{IN}=6.0\text{V}$, $I_{OUT}=40\text{mA}$	4.900	5.000	5.100	V
Max. Output Current	$I_{OUT\ max}$	$V_{IN}=6\text{V}$, $V_{OUT(E)}\geq 4.5\text{V}$	200	-	-	mA
Load Regulation	ΔV_{OUT}	$V_{IN}=6\text{V}$, $I_{OUT}=1\text{mA}$ to 100mA	-	30	70	mV
Dropout Voltage (Note3)	V_{dif1}	$I_{OUT}=100\text{mA}$	-	160	340	mV
	V_{dif2}	$I_{OUT}=200\text{mA}$	-	400	600	
Supply Current	I_{SS}	$V_{IN}=6\text{V}$	-	2.0	6.0	μA
Input Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN}\cdot V_{OUT}}$	$I_{OUT}=40\text{mA}$ $V_{IN}=6\text{V}$ to 10V	-	0.2	0.3	%/V
Input Voltage	V_{IN}		1.8	-	10	V
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr}\cdot V_{OUT}}$	$I_{OUT}=40\text{mA}$ $-40^\circ\text{C}\leq T_{opr}\leq 85^\circ\text{C}$	-	± 100	-	ppm/ $^\circ\text{C}$

Note 1: $V_{OUT}(T)$ =Specified Output Voltage.

2: $V_{OUT}(E)$ =Effective Output Voltage (i.e. the output voltage when " $V_{OUT}(T) + 1.0\text{V}$ " is provided while maintaining a certain I_{OUT}

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3: $V_{dif} = \{V_{IN1}^{(Note5)} - V_{OUT1}^{(Note4)}\}$

4: V_{OUT1} =A voltage equal to 98% of the output voltage when a stabilized ($V_{OUT}(T) + 1.0\text{V}$) is output.

5: V_{IN1} =The input voltage at the time V_{OUT1} is output (input voltage has been gradually reduced).

SM6201-33 $V_{OUT}(T) = 3.3\text{V}$ (Note1)

Parameter	Symbol	Condition	Min	TYP	Max	Unit
Output Voltage	$V_{OUT(E)}$ (Note2)	$V_{IN}=4.3\text{V}$, $I_{OUT}=40\text{mA}$	3.234	3.300	3.366	V
Max. Output Current	$I_{OUT\ max}$	$V_{IN}=4.3\text{V}$, $V_{OUT(E)}\geq 2.97\text{V}$	150	-	-	mA
Load Regulation	ΔV_{OUT}	$V_{IN}=4.3\text{V}$, $I_{OUT}=1\text{mA}$ to 80mA	-	20	50	mV
Dropout Voltage (Note3)	V_{dif1}	$I_{OUT}=80\text{mA}$	-	200	360	mV
	V_{dif2}	$I_{OUT}=160\text{mA}$	-	450	700	
Supply Current	I_{SS}	$V_{IN}=4.3\text{V}$	-	2.0	5.0	μA
Input Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN}\cdot V_{OUT}}$	$I_{OUT}=40\text{mA}$ $V_{IN}=4.3\text{V}$ to 10V	-	0.2	0.3	%/V
Input Voltage	V_{IN}		1.8	-	10	V
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr}\cdot V_{OUT}}$	$I_{OUT}=40\text{mA}$ $-40^\circ\text{C}\leq T_{opr}\leq 85^\circ\text{C}$	-	± 100	-	ppm/ $^\circ\text{C}$

SM6201-27 V_{OUT} (T) =2.7V (Note1)

Parameter	Symbol	Condition	Min	TYP	Max	Unit
Output Voltage	V _{OUT(E)} (Note2)	V _{IN} =3.7V, I _{OUT} =40mA	2.646	2.700	2.754	V
Max. Output Current	I _{OUT max}	V _{IN} =3.7V, V _{OUT(E)} ≥2.43V	100	-	-	mA
Load Regulation	ΔV _{OUT}	V _{IN} =3.7V, I _{OUT} =1mA to 60mA	-	15	40	mV
Dropout Voltage (Note3)	V _{dif1}	I _{OUT} =60mA	-	200	370	mV
	V _{dif2}	I _{OUT} =120mA	-	450	710	
Supply Current	I _{SS}	V _{IN} =3.7V	-	2.0	5.0	μA
Input Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I _{OUT} =40mA V _{IN} =3.7V to 10V	-	0.2	0.3	%/V
Input Voltage	V _{IN}		1.8	-	10	V
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	I _{OUT} =40mA -40°C ≤ T _{opr} ≤ 85°C	-	±100	-	ppm/°C

SM6201-18 V_{OUT} (T) =1.8V (Note1)

Parameter	Symbol	Condition	Min	TYP	Max	Unit
Output Voltage	V _{OUT(E)} (Note2)	V _{IN} =2.8V, I _{OUT} =40mA	1.764	1.800	1.836	V
Max. Output Current	I _{OUT max}	V _{IN} =2.8V, V _{OUT(E)} ≥1.62V	80	-	-	mA
Load Regulation	ΔV _{OUT}	V _{IN} =2.8V, I _{OUT} =1mA to 60mA	-	10	30	mV
Dropout Voltage (Note3)	V _{dif1}	I _{OUT} =40mA	-	200	370	mV
	V _{dif2}	I _{OUT} =80mA	-	450	710	
Supply Current	I _{SS}	V _{IN} =2.8V	-	3.0	5.0	μA
Input Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I _{OUT} =40mA V _{IN} =2.8V to 10V	-	0.2	0.3	%/V
Input Voltage	V _{IN}		1.8	-	10	V
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	I _{OUT} =40mA -40°C ≤ T _{opr} ≤ 85°C	-	±100	-	ppm/°C

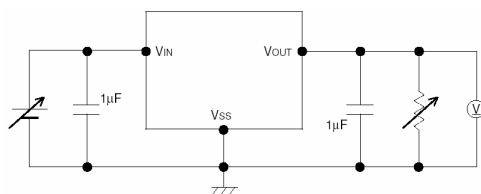
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SM6201-13 V_{OUT} (T) =1.3V (Note1)

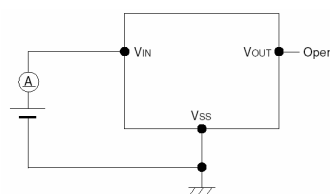
Parameter	Symbol	Condition	Min	TYP	Max	Unit
Output Voltage	V _{OUT(E)} (Note2)	V _{IN} =2.3V, I _{OUT} =40mA	1.274	1.300	1.326	V
Max. Output Current	I _{OUT max}	V _{IN} =2.3V, V _{OUT(E)} ≥1.17V	60	-	-	mA
Load Regulation	ΔV _{OUT}	V _{IN} =2.3V, I _{OUT} =1mA to 30mA	-	10	30	mV
Dropout Voltage (Note3)	V _{dif1}	I _{OUT} =30mA	-	200	600	mV
	V _{dif2}	I _{OUT} =60mA	-	500	810	
Supply Current	I _{SS}	V _{IN} =2.3V	-	3.0	5.0	μA
Input Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I _{OUT} =40mA V _{IN} =2.3V to 10V	-	0.2	0.3	%/V
Input Voltage	V _{IN}		1.8	-	10	V
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	I _{OUT} =40mA -40°C ≤ T _{opr} ≤ 85°C	-	±100	-	ppm/°C

Test Circuit

Circuit1

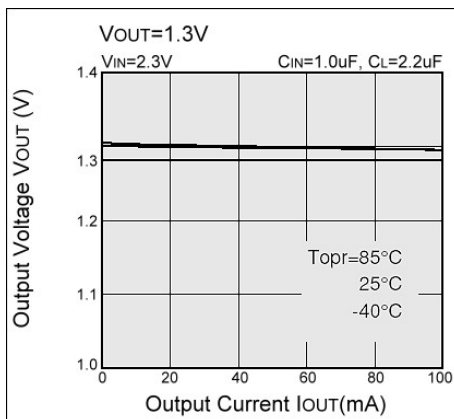
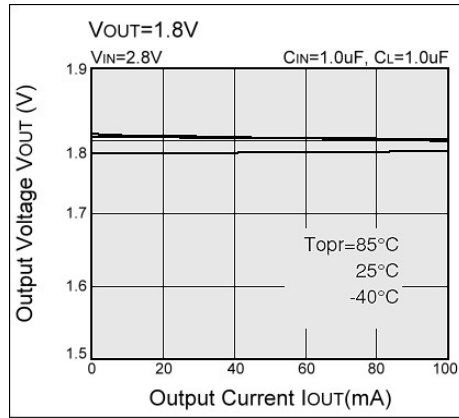
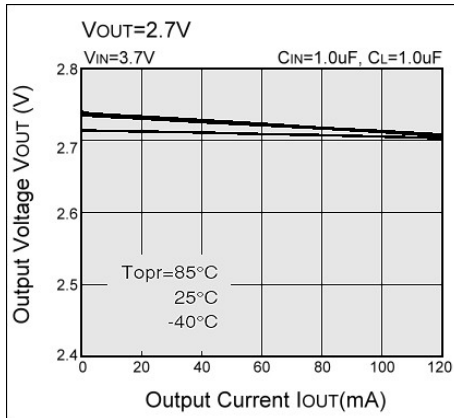
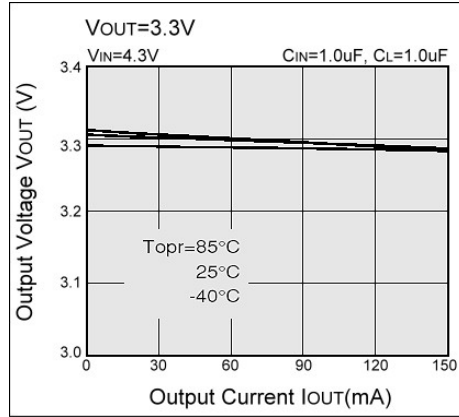
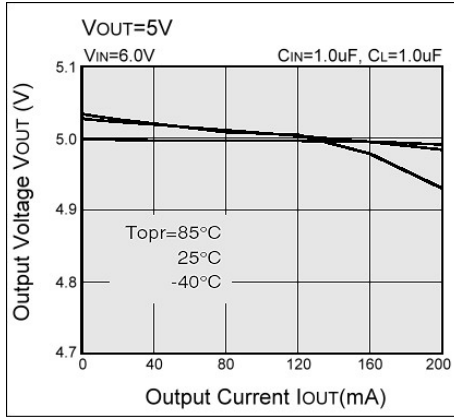


Circuit2



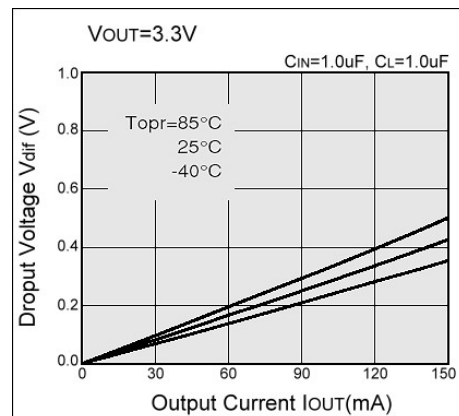
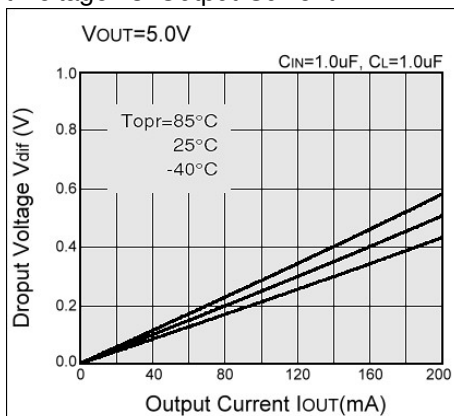
Characteristics Curve

(1) Output Voltage vs. Output Current



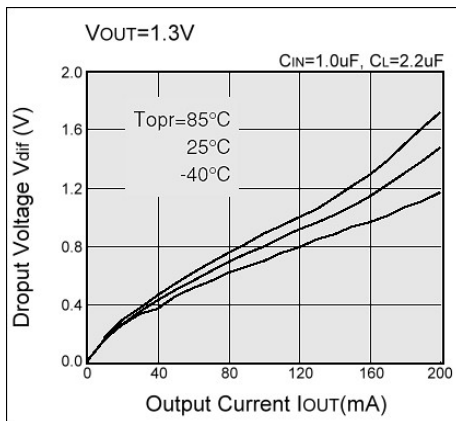
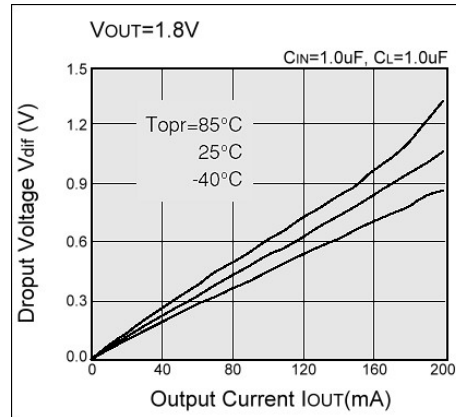
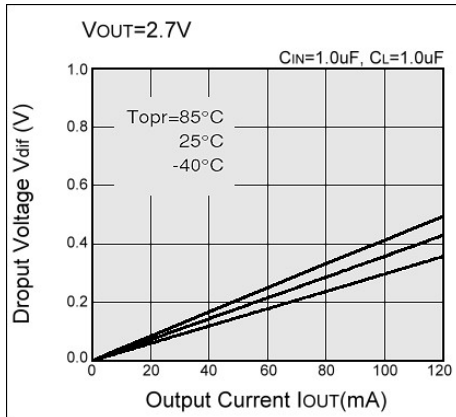
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(2) Dropout Voltage vs. Output Current

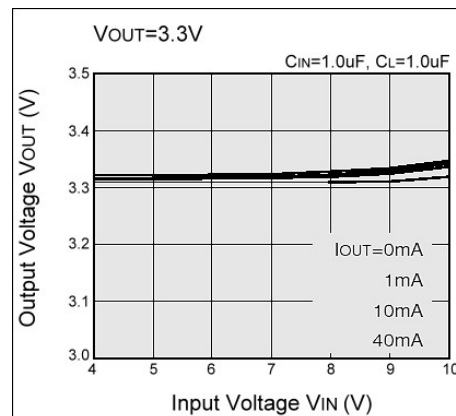
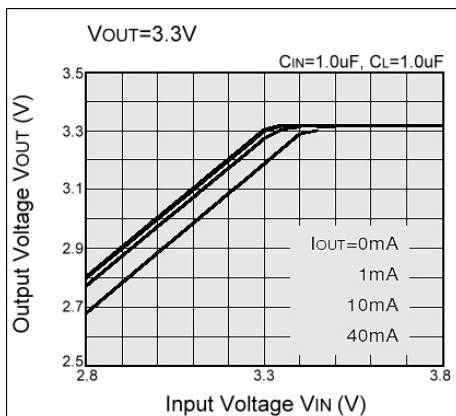
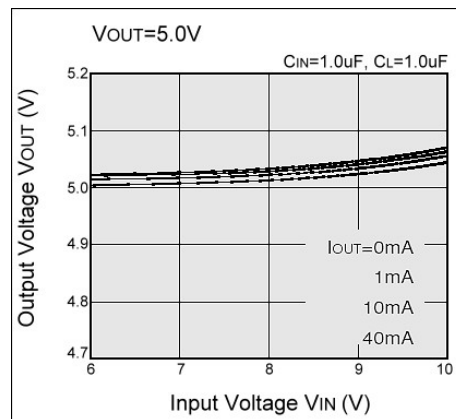
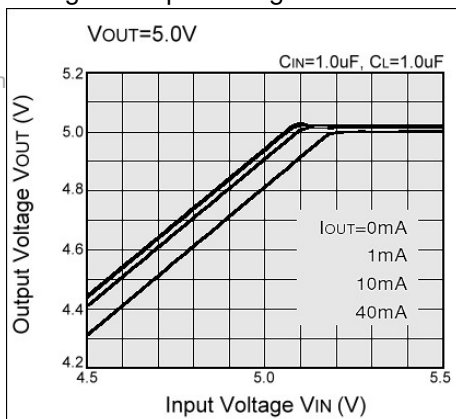


SM6201
CMOS Positive
Voltage Regulator

(2) Dropout Voltage vs. Output Current



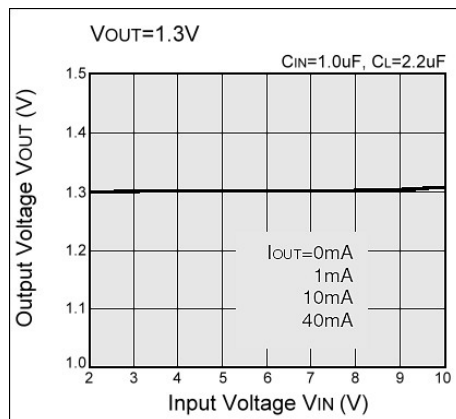
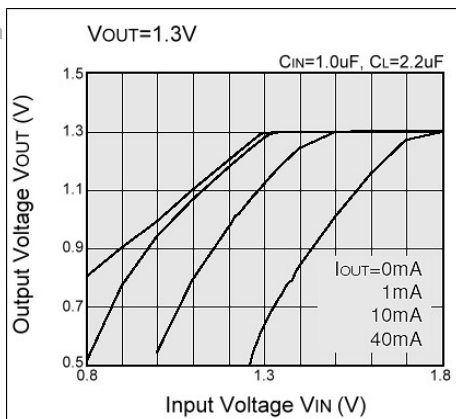
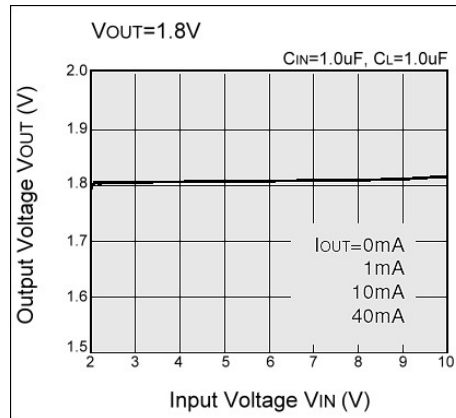
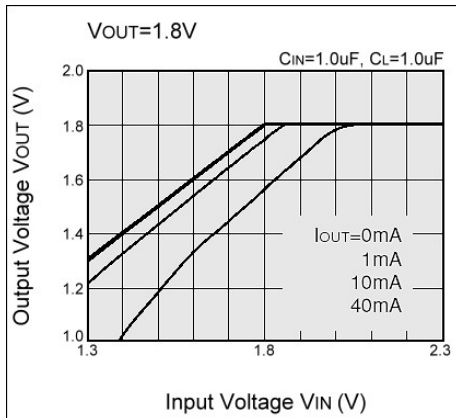
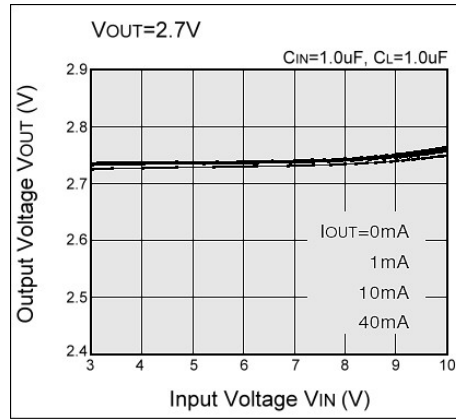
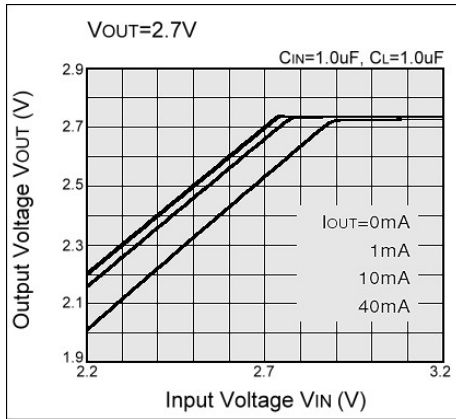
(3) Output Voltage vs. Input Voltage



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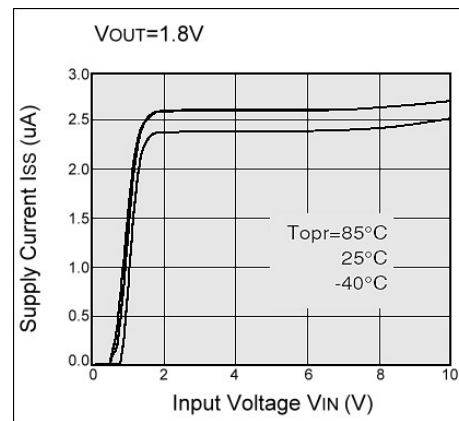
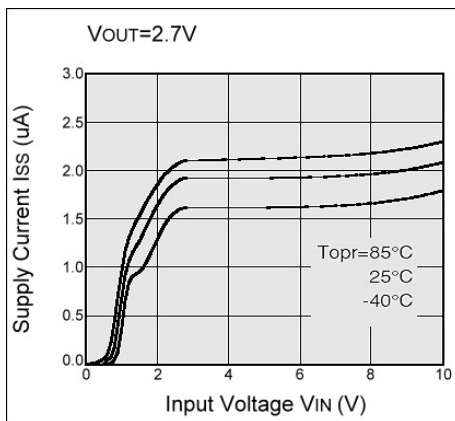
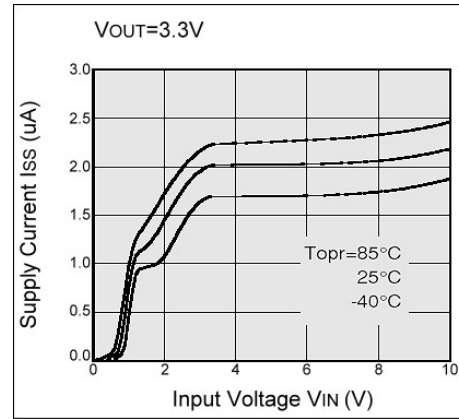
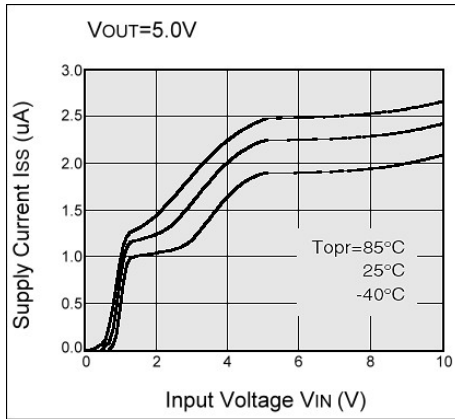
SM6201
CMOS Positive
Voltage Regulator

(3) Output Voltage vs. Input Voltage

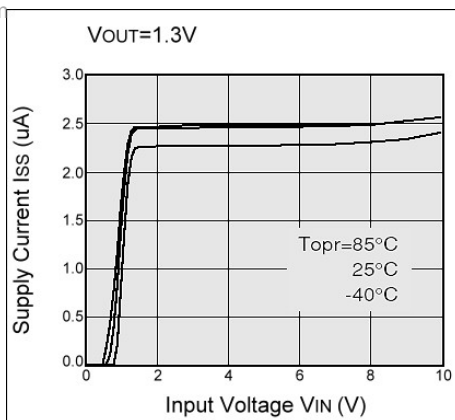


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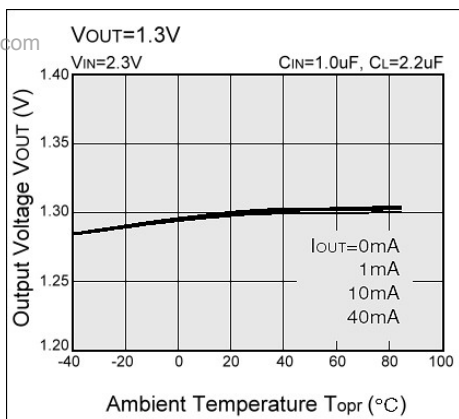
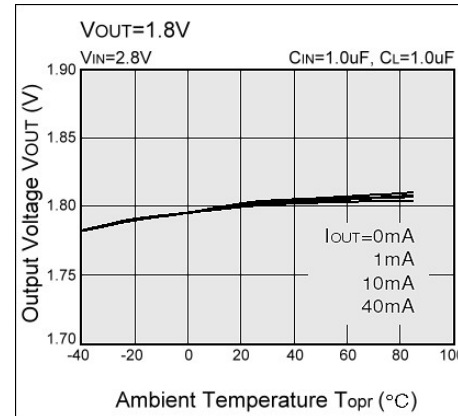
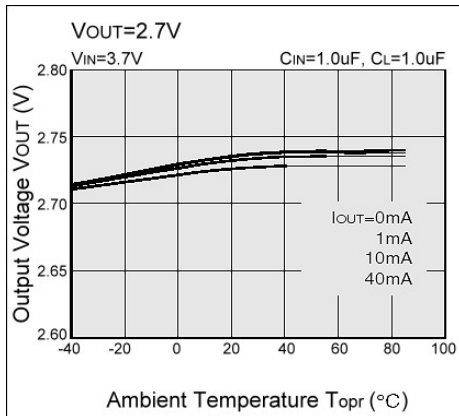
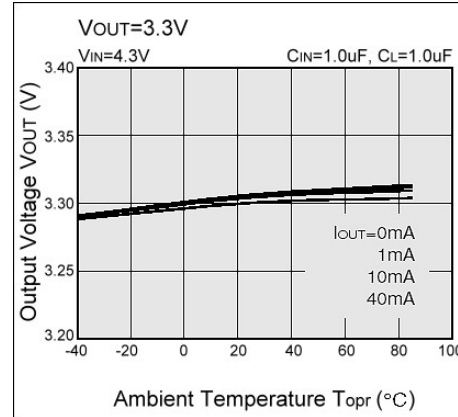
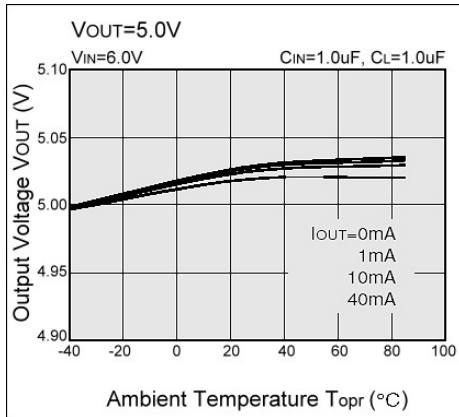
(4) Supply Current vs. Input Voltage



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(5) Output Voltage vs. Ambient Temperature



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