

# XC6206 Series

## GENERAL DESCRIPTION

The XC6206 series are highly precise, low power consumption, high voltage, positive voltage regulators manufactured using CMOS and laser trimming technologies. The series provides large currents with a significantly small dropout voltage.

The XC6206 consists of a current limiter circuit, a driver transistor, a precision reference voltage and an error correction circuit. The series is compatible with low ESR ceramic capacitors. The current limiter's foldback circuit also operates as a short protect for the output current limiter and the output pin.

Output voltage can be set internally by laser trimming technologies. It is selectable in 0.1V increments within a range of 1.2V to 5.0V.

SOT-23, SOT-89, TO-92 and USP-6B packages are available.

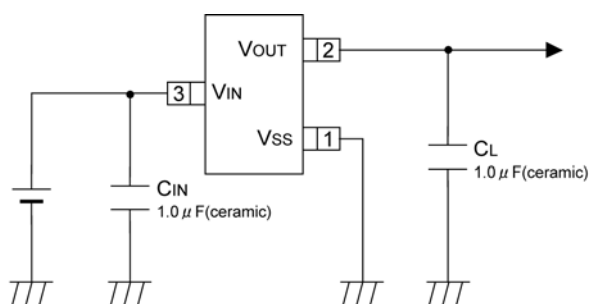
## APPLICATIONS

- Battery powered equipment
- Reference voltage sources
- Cameras, video cameras
- Portable AV systems
- Mobile phones
- Portable games
- Cordless phones, wireless communication equipment

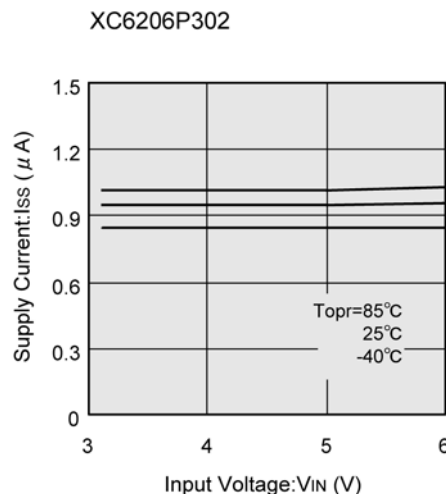
## FEATURES

- CMOS**
- Maximum Output Current** : 250mA (5.0V type)
- Dropout Voltage** : 250mV @ 100mA (3.0V type)
- Maximum Operating Voltage** : 6.0V
- Output Voltage Range** : 1.2V ~ 5.0V (0.1V increments)
- Highly Accurate** : Fixed voltage accuracy  $\pm 2\%$   
( $\pm 30\text{mV}$  @  $V_{\text{OUT}} < 1.5\text{V}$ )  
( $\pm 1\%$  @  $V_{\text{OUT}} \geq 2.0\text{V}$ )
- Low Power Consumption** : 1.0 $\mu\text{A}$  (TYP.)
- Operating Temperature Range** :  $-40^{\circ}\text{C}$  ~  $85^{\circ}\text{C}$
- Low ESR Capacitor** : Ceramic capacitor compatible
- Current Limit Circuit Built-in**
- Ultra Small Package** : SOT-23 (250mW)  
SOT-89 (500mW)  
TO-92 (300mW)  
USP-6B (100mW)

## TYPICAL APPLICATION CIRCUIT

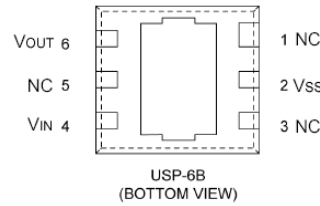
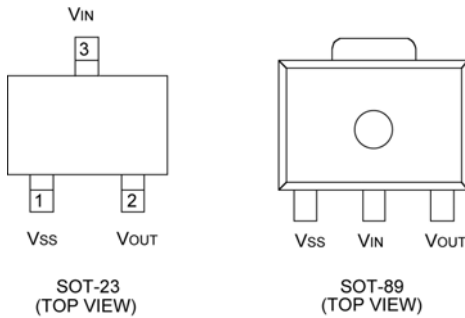


## TYPICAL PERFORMANCE CHARACTERISTICS

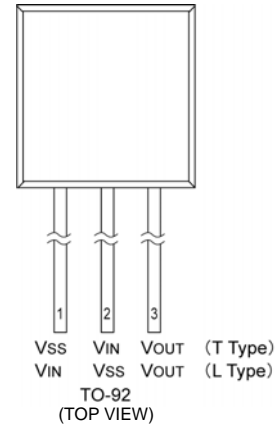


# XC6206 Series

## PIN CONFIGURATION



\*The dissipation pad for the USP-6B package should be solder-plated in recommended mount pattern and metal masking so as to enhance mounting strength and heat release. If the pad needs to be connected to other pins, it should be connected to the pin number 4 (V<sub>IN</sub>).



## PIN ASSIGNMENT

PIN NUMBER				PIN NAME	FUNCTIONS
SOT-23	SOT-89/TO-92 (T)	USP-6B	TO-92 (L)		
1	1	2	2	V <sub>SS</sub>	Ground
3	2	4	1	V <sub>IN</sub>	Power Input
2	3	6	3	V <sub>OUT</sub>	Output
-	-	1, 3, 5	-	NC	No Connection

## PRODUCT CLASSIFICATION

Ordering Information

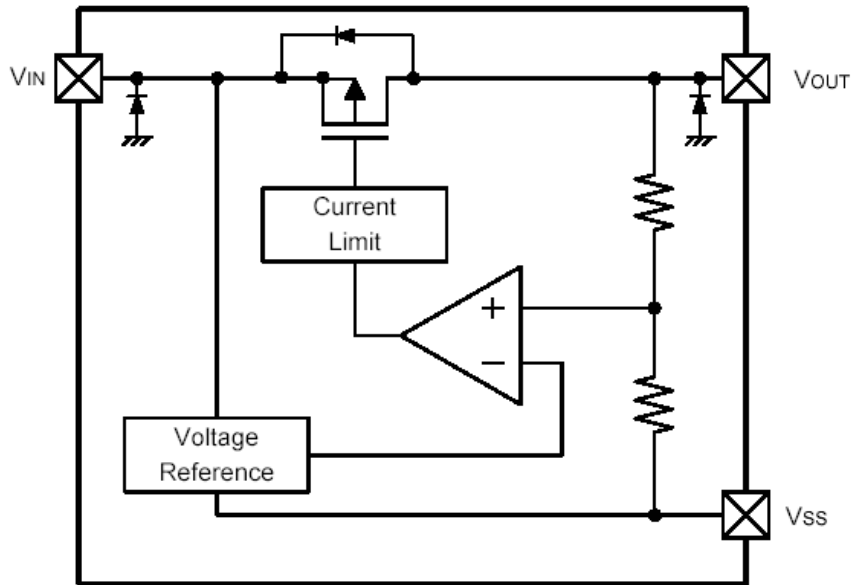
XC6206P

DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
	Output Voltage	12~50	: e.g. V <sub>OUT</sub> : 3.0V =3, =0
	Accuracy	2	: Within ± 2% (within ±30mV when V <sub>OUT</sub> <1.5V)
		1 *	: Within ±1%
	Packages	M	: SOT-23
		P	: SOT-89
		D	: USP-6B
		T	: TO-92 (T type)
		L	: TO-92 (L type) (Discontinued Product)
	Device Orientation	R	: Embossed tape, standard feed
		L	: Embossed tape, reverse feed
		H	: Page type (TO-92)
		B	: Bag (TO-92)

\* ±1% accuracy can be set at V<sub>OUT(T)</sub> ≥ 2.0V.

# XC6206 Series

## BLOCK DIAGRAM



\*Diodes inside the circuit are an ESD protection diode and a parasitic diode.

## ABSOLUTE MAXIMUM RATINGS

Ta=25°C

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage	V <sub>IN</sub>	7.0	V
Output Current	I <sub>OUT</sub>	500 *	mA
Output Voltage	V <sub>OUT</sub>	V <sub>SS</sub> - 0.3 ~ V <sub>IN</sub> + 0.3	V
Power Dissipation	SOT-23	P <sub>d</sub>	250
	SOT-89		500
	USP-6B		100
	TO-92		300
Operating Temperature Range	T <sub>opr</sub>	- 40 ~ + 85	°C
Storage Temperature Range	T <sub>stg</sub>	- 55 ~ + 125	°C

\* I<sub>OUT</sub>=P<sub>d</sub> / (V<sub>IN</sub>-V<sub>OUT</sub>)



# XC6206 Series

## ELECTRICAL CHARACTERISTICS

XC6206P series

Ta=25 °C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Output Voltage <sup>(*7)</sup>	V <sub>OUT(E)</sub> <sup>(*2)</sup>	I <sub>OUT</sub> =30mA	x 0.98	V <sub>OUT(T)</sub>	x 1.02	V	
			E-1				
Maximum Output Current	I <sub>OUTMAX</sub>	-	E-2	-	-	mA	
Load Regulation	V <sub>OUT</sub>	V <sub>OUT(T)</sub> >1.8V: I <sub>OUT</sub> 100mA V <sub>OUT(T)</sub> ≤1.8V: I <sub>OUT</sub> 50mA	-	-	E-3	mV	
Dropout Voltage	V <sub>dif1</sub>	I <sub>OUT</sub> =30mA	-	E-4		mV	
	V <sub>dif2</sub>	V <sub>OUT(T)</sub> >1.8V: I <sub>OUT</sub> =100mA V <sub>OUT(T)</sub> ≤1.8V: I <sub>OUT</sub> =60mA	-	E-5		mV	
Supply Current	I <sub>DD</sub>	V <sub>CE</sub> =V <sub>IN</sub>	-	1.0	3.0	μA	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \cdot V_{OUT}}$	V <sub>OUT(T)</sub> <4.5V: V <sub>OUT(T)</sub> +1.0V V <sub>IN</sub> 6.0V V <sub>OUT(T)</sub> ≥4.5V: 5.5V V <sub>IN</sub> 6.0V I <sub>OUT</sub> =30mA	-	0.05	0.25	%/V	
Input Voltage	V <sub>IN</sub>	-	1.8	-	6.0	V	-
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{opr} \cdot V_{OUT}}$	I <sub>OUT</sub> =30mA -40 °C T <sub>opr</sub> 85 °C	-	±100	-	ppm/°C	
Short Circuit Current	I <sub>short</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, V <sub>OUT</sub> =V <sub>SS</sub>	-	E-6	-	mA	

NOTE:

- \* 1 : V<sub>OUT(T)</sub> = Specified output voltage
- \* 2 : V<sub>OUT(E)</sub> = Effective output voltage (I.e. The output voltage when "V<sub>OUT(T)</sub>+1.0V" is provided at the V<sub>IN</sub> pin while maintaining a certain I<sub>OUT</sub> value.)
- \* 3 : V<sub>dif</sub> = {V<sub>IN</sub> 1<sup>(\*5)</sup> - V<sub>OUT</sub> 1<sup>(\*4)</sup> }
- \* 4 : V<sub>OUT1</sub> = A voltage equal to 98% of the output voltage whenever an amply stabilized I<sub>OUT</sub> {V<sub>OUT(T)</sub> + 1.0V} is input.
- \* 5 : V<sub>IN1</sub> = The input voltage when V<sub>OUT1</sub> appears as input voltage is gradually decreased.
- \* 6 : Unless otherwise stated, V<sub>IN</sub> = V<sub>OUT(T)</sub> + 1.0V
- \* 7 : When V<sub>OUT(T)</sub>≥1.5V, accuracy is ±2%.  
When V<sub>OUT(T)</sub><1.5V, accuracy is MIN.:V<sub>OUT(T)</sub> -30mV / MAX.:V<sub>OUT(T)</sub> +30mV  
±1% accuracy (MIN.: V<sub>OUT(T)</sub> x 0.99 / MAX.:V<sub>OUT(T)</sub> x 1.01) is set at V<sub>OUT(T)</sub>≥2.0V



# XC6206 Series

## ELECTRICAL CHARACTERISTICS (Continued)

Electrical Characteristics Chart

PARAMETER	E-1				E-2	E-3	E-4		E-5		E-6
	OUTPUT VOLTAGE				MAX. OUTPUT CURRENT	LOAD REGULATION	DROPOUT VOLTAGE 1		DROPOUT VOLTAGE 2		SHORT CURRENT
	2% ACCURACY		1% ACCURACY				$\Delta V_{OUT}$ (mV)	Vdif1 (mV)		Vdif2 (mV)	
SETTING VOLTAGE	V <sub>OUT(E)</sub> (V)		V <sub>OUT(E)</sub> (V)		I <sub>OUTMAX</sub> (mA)	$\Delta V_{OUT}$ (mV)	Vdif1 (mV)		Vdif2 (mV)		I <sub>short</sub> (mA)
V <sub>OUT(T)</sub>	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	TYP.	MAX.	TYP.	MAX.	TYP.
1.2	1.170	1.230	Not Available		60	40	460	760	700	960	180
1.3	1.270	1.330					400	650			
1.4	1.370	1.430					350	590	580	860	
1.5	1.470	1.530					300	510			
1.6	1.568	1.632			80	45	250	450	450	810	
1.7	1.666	1.734					200	410			
1.8	1.764	1.836					150	390	780		
1.9	1.862	1.938									
2.0	1.960	2.040	1.980	2.020	120	50	100	370	350	130	
2.1	2.058	2.042	2.079	2.121							
2.2	2.156	2.244	2.178	2.222							
2.3	2.254	2.346	2.277	2.323							
2.4	2.352	2.448	2.376	2.424	150	55	75	350	250	710	
2.5	2.450	2.550	2.475	2.525							
2.6	2.548	2.652	2.574	2.626							
2.7	2.646	2.754	2.673	2.727							
2.8	2.744	2.856	2.772	2.828	200	60	75	350	250	680	
2.9	2.842	2.958	2.871	2.929							
3.0	2.940	3.060	2.970	3.030							
3.1	3.038	3.162	3.069	3.131							
3.2	3.136	3.264	3.168	3.232	250	70	60	320	200	630	
3.3	3.234	3.366	3.267	3.333							
3.4	3.332	3.468	3.366	3.434							
3.5	3.430	3.570	3.465	3.535							
3.6	3.528	3.672	3.564	3.636	75	75	60	320	200	630	
3.7	3.626	3.774	3.663	3.737							
3.8	3.724	3.876	3.762	3.838							
3.9	3.822	3.978	3.861	3.939							
4.0	3.920	4.080	3.960	4.040	250	75	60	320	200	630	
4.1	4.018	4.182	4.059	4.141							
4.2	4.116	4.284	4.158	4.242							
4.3	4.214	4.386	4.257	4.343							
4.4	4.312	4.488	4.356	4.444	80	80	50	290	175	600	
4.5	4.410	4.590	4.455	4.545							
4.6	4.508	4.692	4.554	4.646							
4.7	4.606	4.794	4.653	4.747							
4.8	4.704	4.896	4.752	4.848							
4.9	4.802	4.998	4.851	4.949							
5.0	4.900	5.100	4.950	5.050							