

## High Current Dual Positive Regulator

### ■ GENERAL DESCRIPTION

The XC6406 series are highly precise, low power consumption, dual positive regulators. They are fabricated using Torex's CMOS process. Performance features of the series include high current and low dropout voltage, and the series features a voltage reference, and error amplifier, a current limiter and a phase compensation circuit plus a driver transistor.

Output voltage of each regulator 1 and regulator 2 is selectable in 100mV increments within the range of 1.8V to 6.0V.

The XC6406 series is available in the SOP-8 package.

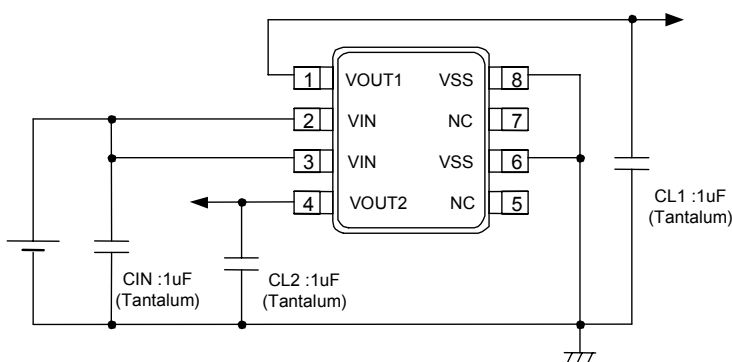
### ■ APPLICATIONS

- CD-ROM, DVD
- Battery powered equipment
- PDAs
- Cameras, Video recorders
- Portable AV equipment
- Reference voltage

### ■ FEATURES

<b>Maximum Output Current</b>	: 400mA (within the power dissipation)
<b>Maximum Operating Voltage</b>	: 8.0V
<b>Output Setting Voltage Range</b>	: 1.8 ~ 6.0V (100mV increments)
<b>Accuracy</b>	: $\pm 2\%$
<b>Low Power Consumption</b>	: 20 $\mu$ A (TYP.)
<b>Line Regulation</b>	: 0.2% / V (TYP.)
<b>Output Voltage</b>	
<b>Temperature Range</b>	: 100 ppm/ $^{\circ}$ C (TYP.)
<b>Operating Temperature Range</b>	: - 40 $^{\circ}$ C ~ 85 $^{\circ}$ C
<b>Dropout Voltage</b>	: 150mV@100mA : 300mV@200mA
<b>Small Packages</b>	: SOP-8 : SOP-8FD (Under development)

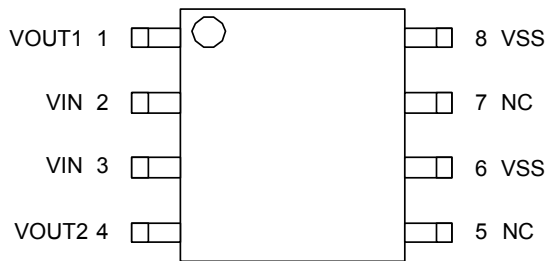
### ■ TYPICAL APPLICATION CIRCUIT



\* Please connect the VIN pins No. 2 and No. 3 externally.

\*\*Please connect the Vss pins No. 6 and No. 8 externally.

## PIN CONFIGURATION



SOP-8 & SOP-8FD (TOP VIEW)

\* Please connect the  $V_{IN}$  pins No. 2 and No. 3 externally.

\*\*Please connect the  $V_{SS}$  pins No. 6 and No. 8 externally.

## PIN ASSIGNMENT

PIN NUMBER	PIN NAME	FUNCTION
1	$V_{OUT1}$	Regulator 1 - Output
2	$V_{IN}$	Power Input
3	$V_{IN}$	Power Input
4	$V_{OUT2}$	Regulator 2 - Output
5	NC	No Connection
6	$V_{SS}$	Ground
7	NC	No Connection
8	$V_{SS}$	Ground

## PRODUCT CLASSIFICATION

### Ordering Information

XC6406①②③④⑤⑥

DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
①	Type of Regulator 1 (VR1)	P	: Short-circuit protection circuit built-in
		E	: No current limiter circuit built-in
②	Type of Regulator 2 (VR2)	P	: Short-circuit protection circuit built-in
		E	: No current limiter circuit built-in
③ ④	Output Voltage of VR1 & VR2	18~ 60	: VR1 setting output voltage range: 1.8V ~ 6.0V VR2 setting output voltage range: 1.8V ~ 6.0V 100mV increments are available.(*1)
⑤	Package	S	: SOP-8
		(T.B.D.*2)	: SOP-8FD
⑥	Device Orientation	R	: Embossed tape, standard feed
		L	: Embossed tape, reverse feed

\*1: Output voltage of 50mV steps is applied only for 2.85V type.

\*2: T.B.D.: To be determined

## ■ ABSOLUTE MAXIMUM RATINGS

Ta = 25°C

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage	V <sub>IN</sub>	10	V
Output Current	I <sub>OUT1</sub> + I <sub>OUT2</sub>	600	mA
Output Voltage	V <sub>OUT1/2</sub>	V <sub>SS</sub> - 0.3 ~ V <sub>IN</sub> + 0.3	V
EN Pin Voltage	V <sub>EN1/2</sub>	V <sub>SS</sub> - 0.3 ~ V <sub>IN</sub> + 0.3	V
Power Dissipation	SOP-8	Pd	mW
	SOP-8FD		
Operating Temperature Range	T <sub>opr</sub>	- 40 ~ + 85	°C
Storage Temperature Range	T <sub>stg</sub>	- 55 ~ + 125	°C

## ■ ELECTRICAL CHARACTERISTICS

XC6406EExx

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current	I <sub>DD</sub>	V <sub>IN</sub> = 7V	-	20	40	μA
Input Voltage	V <sub>IN</sub>		-	-	8.0	V

\* Please connect the V<sub>IN</sub> pins No. 2 and No. 3 externally.

\*\* Please connect the V<sub>SS</sub> pins No. 6 and No. 8 externally.

V<sub>OUT(T)</sub> = 1.8V

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output Voltage (*2)	V <sub>OUT(E)</sub>	V <sub>IN</sub> =2.8V, I <sub>OUT</sub> =40mA	1.764	1.800 V <sub>OUT(T)</sub>	1.836	V
Maximum Output Current	I <sub>OUTMAX</sub>	V <sub>IN</sub> =2.8V, V <sub>OUT</sub> ≥ V <sub>OUT(E)</sub> x 0.9	400	-	-	mA
Load Regulation	ΔV <sub>OUT</sub>	V <sub>IN</sub> =2.8V, 1mA ≤ I <sub>OUT</sub> ≤ 200mA	-	40	100	mV
Dropout Voltage (*3)	V <sub>dif1</sub>	I <sub>OUT</sub> =100mA	-	200	300	mV
	V <sub>dif2</sub>	I <sub>OUT</sub> =200mA	-	400	600	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	2.8V ≤ V <sub>IN</sub> ≤ 8.0V, I <sub>OUT</sub> =40mA	-	0.2	0.3	% / V
Output Voltage Temperature Range	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	I <sub>OUT</sub> =40mA, -40°C ≤ T <sub>opr</sub> ≤ 85°C	-	±100	-	ppm / °C

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>.)

\*3: V<sub>dif</sub>={V<sub>IN</sub><sup>(5)</sup> - V<sub>OUT1</sub><sup>(4)</sup>}

\*4: V<sub>OUT1</sub>: A voltage equal to 98% of the output voltage whenever an amply stabilized V<sub>OUT1</sub>=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.

## ELECTRICAL CHARACTERISTICS (Continued)

XC6406EExx (Continued)

$V_{OUT(T)} = 2.5V$

$T_a = 25^\circ C$

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output Voltage (*2)	$V_{OUT(E)}$	$V_{IN} = 3.5V, I_{OUT} = 40mA$	2.450	2.500 $V_{OUT(T)}$	2.550	V
Maximum Output Current	$I_{OUTMAX}$	$V_{IN} = 3.5V, V_{OUT} \geq V_{OUT(E)} \times 0.93$	400	-	-	mA
Load Regulation	$\Delta V_{OUT}$	$V_{IN} = 3.5V, 1mA \leq I_{OUT} \leq 200mA$	-	40	100	mV
Dropout Voltage (*3)	$V_{dif1}$	$I_{OUT} = 100mA$	-	170	250	mV
	$V_{dif2}$	$I_{OUT} = 200mA$	-	320	500	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$3.5V \leq V_{IN} \leq 8.0V, I_{OUT} = 40mA$	-	0.2	0.3	% / V
Output Voltage Temperature Range	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT} = 40mA, -40^\circ C \leq T_{opr} \leq 85^\circ C$	-	$\pm 100$	-	ppm / $^\circ C$

NOTE:

\*1:  $V_{OUT(T)}$  : Specified output voltage

\*2:  $V_{OUT(E)}$  : Effective output voltage

(I.e. the output voltage when " $V_{OUT(T)} + 1.0V$ " is provided at the  $V_{IN}$  pin while maintaining a certain  $I_{OUT}$ .)

\*3:  $V_{dif} = \{V_{IN}^{(5)} - V_{OUT1}^{(4)}\}$

\*4:  $V_{OUT1}$ : A voltage equal to 98% of the output voltage whenever an amply stabilized  $V_{OUT1} = I_{OUT} \{V_{OUT(T)} + 1.0V\}$  is input.

\*5:  $V_{IN1}$  = The input voltage when  $V_{OUT1}$  appears as input voltage is gradually decreased.

$V_{OUT(T)} = 3.3V$

$T_a = 25^\circ C$

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output Voltage (*2)	$V_{OUT(E)}$	$V_{IN} = 4.3V, I_{OUT} = 40mA$	3.234	3.300 $V_{OUT(T)}$	3.366	V
Maximum Output Current	$I_{OUTMAX}$	$V_{IN} = 4.3V, V_{OUT} \geq V_{OUT(E)} \times 0.93$	400	-	-	mA
Load Regulation	$\Delta V_{OUT}$	$V_{IN} = 4.3V, 1mA \leq I_{OUT} \leq 200mA$	-	40	100	mV
Dropout Voltage (*3)	$V_{dif1}$	$I_{OUT} = 100mA$	-	150	220	mV
	$V_{dif2}$	$I_{OUT} = 200mA$	-	300	420	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$3.5V \leq V_{IN} \leq 8.0V, I_{OUT} = 40mA$	-	0.2	0.3	% / V
Output Voltage Temperature Range	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT} = 40mA, -40^\circ C \leq T_{opr} \leq 85^\circ C$	-	$\pm 100$	-	ppm / $^\circ C$

NOTE:

\*1:  $V_{OUT(T)}$  : Specified output voltage

\*2:  $V_{OUT(E)}$  : Effective output voltage

(I.e. the output voltage when " $V_{OUT(T)} + 1.0V$ " is provided at the  $V_{IN}$  pin while maintaining a certain  $I_{OUT}$ .)

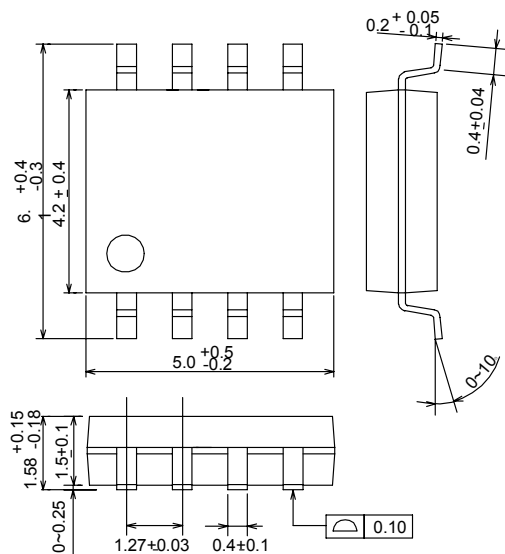
\*3:  $V_{dif} = \{V_{IN}^{(5)} - V_{OUT1}^{(4)}\}$

\*4:  $V_{OUT1}$ : A voltage equal to 98% of the output voltage whenever an amply stabilized  $V_{OUT1} = I_{OUT} \{V_{OUT(T)} + 1.0V\}$  is input.

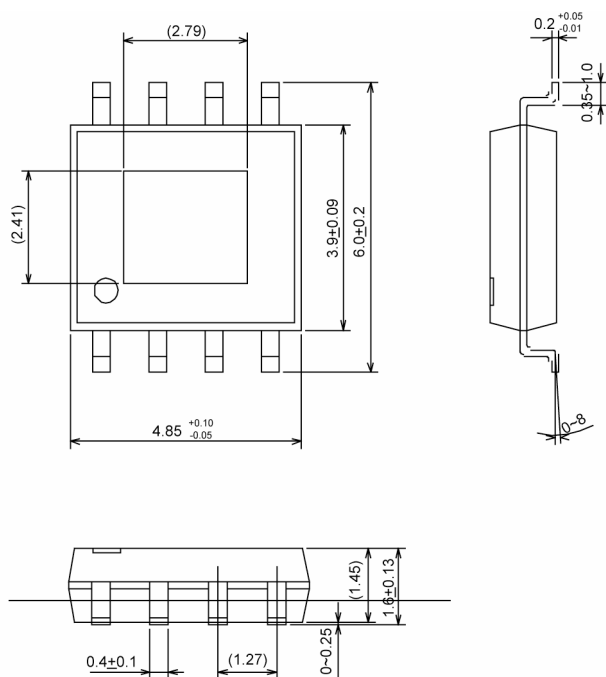
\*5:  $V_{IN1}$  = The input voltage when  $V_{OUT1}$  appears as input voltage is gradually decreased.

## PACKAGING INFORMATION

### ● SOP-8

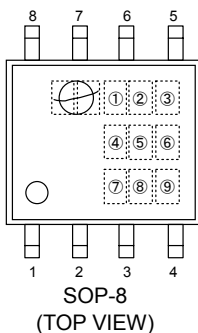


### ● SOP-8FD



## MARKING RULE

### ● SOP-8



SOP-8  
(TOP VIEW)

①② Represents product series

MARK		PRODUCT SERIES
①	②	
0	6	XC6406xxxxSx

③ Represents type of VR1 regulator

MARK	VR1 REGULATOR TYPE	PRODUCT SERIES
P	Short-Circuit Protection Circuit Built-In	XC6406PxxxSx
E	No Current Limiter Circuit Built-In	XC6406ExxxSx

④ Represents type of VR2 regulator

MARK	VR2 REGULATOR TYPE	PRODUCT SERIES
P	Short-Circuit Protection Circuit Built-In	XC6406PxxxSx
E	No Current Limiter Circuit Built-In	XC6406ExxxSx

⑤⑥ Represents VR output voltage

ex)

MARK		VOLTAGE (V)		PRODUCT SERIES
⑤	⑥	VR1	VR2	
0	1	3.3	2.5	XC6406xx01Sx

⑦ Represents a least significant digit of production year (ex)

MARK	PRODUCTION YEAR
3	2003
4	2004

⑧⑨ Represents production lot number (ex)

0 to 9, A to Z repeated (G, I, J, O, Q, W excepted).

Note: No character inversion used.

MARK		PRODUCTION LOT NUMBER
⑧	⑨	
-	3	03
0	1	1A

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