

- ◆ **Operating Voltage Range** 1.2V to 5.0V
- ◆ **Highly Efficient** 90%
- ◆ **Low Power Consumption** 310 $\mu$ A (120kHz)
- ◆ **CE ( Chip Enable ) function**
- ◆ **SOT - 26 Package**

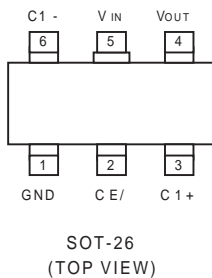
### General Description

The XC6351A series are charge pump voltage inverter ICs that have 4 MOSFETs built in. Since highly efficient negative voltages can be generated with only 2 external capacitors connected, GaAs bias power supplies & OpAmp's negative power supplies etc., can be easily accommodated on a standard PCB. A mini-molded, 6 pin, SOT-26 package provides for space saving and makes high density mounting possible. Low power consumption and high efficiency make this series perfect for use with battery operated applications. Since the IC's operations stop when output is shutdown via the CE (chip enable) function, total power consumption reduction is possible in applications which use this IC.

### Pin Assignment

PIN NUMBER	SYMBOL	FUNCTION
1	GND	Ground
2	CE/	Chip Enable (-ve logic)
3	C1+	External Capacitor +Pin
4	VOUT	Reverse Output Pin
5	VIN	Power Supply Pin
6	C1-	External Capacitor -Pin

### Pin Configuration, Application Circuit



### Applications

- Cellular and portable phones
- Miniature LCD panels
- Palmtop computers, PDAs
- Various battery powered systems

### Features

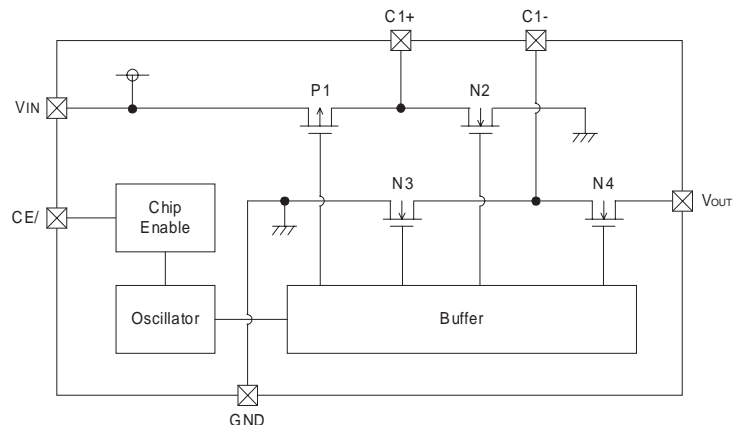
<b>Operating Voltage Range :</b>	1.2V to 5.0V
<b>Oscillator Frequency :</b>	120kHz 35kHz ( custom )
<b>Low Supply Current :</b>	310 $\mu$ A ( typ ) 100 $\mu$ A ( typ ; 35kHz )
<b>High Efficiency :</b>	90% (typ) ( RL = 2k $\Omega$ )
<b>Stand-by Current :</b>	2.0 $\mu$ A ( max. )
<b>Ultra Small Package :</b>	SOT-26 mini mold

### Absolute Maximum Ratings

Ta = 25°C, GND = 0V

PARAMETER	SYMBOL	RATINGS	UNITS
VIN input voltage	VIN	6	V
VOUT pin voltage	VOUT	-6 to 0.3	V
C1+ pin voltage	C1+	-0.3 to VIN+0.3	V
C1- pin voltage	C1-	VOUT-0.3 to +0.3	V
CE/ pin voltage	CE/	-0.3 to VIN+0.3	V
OUT pin current	IOUT	50	mA
Continuous Total Power Dissipation	Pd	150	mW
Ambient Operating Temperature	Topr	-30 to +80	°C
Storage Temperature	Tstg	-40 to +125	°C

### Block Diagram



Note :

1. In operation, the following conditions will be repeated alternately :  
 P1 & N3 ON : N2 & N4 OFF  
 P1 & N3 OFF : N2 & N4 ON
2. In standby mode, P1, N3 & N4 will be ON and N2 will be OFF.  
 The output pin VOUT will be connected to GND.

## Electrical Characteristics

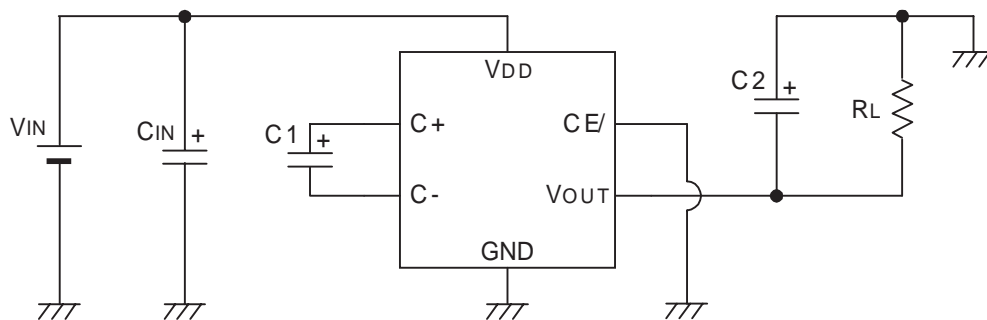
Fosc = 120kHz

Ta = 25°C

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS	CIRCUIT
Supply Current		I <sub>DD</sub>		310	520	μA	1
Operating Voltage Range	R <sub>L</sub> = 5kΩ	V <sub>IN</sub>	1.2		5.0	V	2
Oscillation Frequency		F <sub>OSC</sub>	75	120	192	kHz	1
Power Transition Efficiency	R <sub>L</sub> = 2kΩ	EFFI		90		%	2
Voltage Transition Efficiency	R <sub>L</sub> = ∞	VEFFI	95			%	2
Output Impedance	R <sub>L</sub> = 5kΩ	R <sub>OUT</sub>		45	90	Ω	2
Stand -By Current	CE/ = V <sub>IN</sub>	I <sub>STB</sub>			2.0	μA	3
CE/ 'H' Level Voltage		V <sub>CEH</sub>	0.9			V	3
CE/ 'L' Level Voltage		V <sub>CEL</sub>			0.25	V	3

Measuring Conditions : Unless otherwise stated, V<sub>IN</sub> = 5.0V, CE/ = 0V

## Standard Circuit



Peripherals :

C<sub>IN</sub> = 1 μF (ceramic capacitor)

C<sub>1</sub> = C<sub>2</sub> = 1 μF (ceramic capacitor)\*

\* With the custom 35kHz frequency, C<sub>1</sub> = C<sub>2</sub> = 3.3 μF

## Notes on Use

1. Please use the IC & peripherals within the specified electrical characteristic ranges and ensure that absolute maximum ratings are not exceeded.
2. For C<sub>1</sub> & C<sub>2</sub>, please use a capacitor with as small an ESR value as possible.
3. In order to reduce impedance between the IC's input pin and the power supply, we recommend that a capacitor (C<sub>IN</sub>) be connected to the input side.
4. If an external power supply is applied to the output pin in order to have V<sub>OUT</sub> connected to GND during standby, large current flows through the IC are a possibility. Further, do not use a capacitor at C<sub>2</sub> that has a large capacitance value.

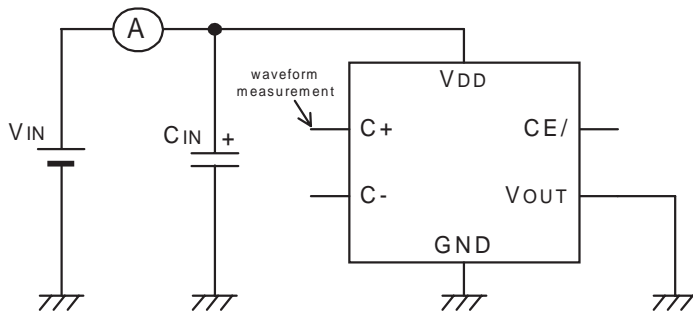
## Ordering Information

XC6351A 1 2 3 4 5

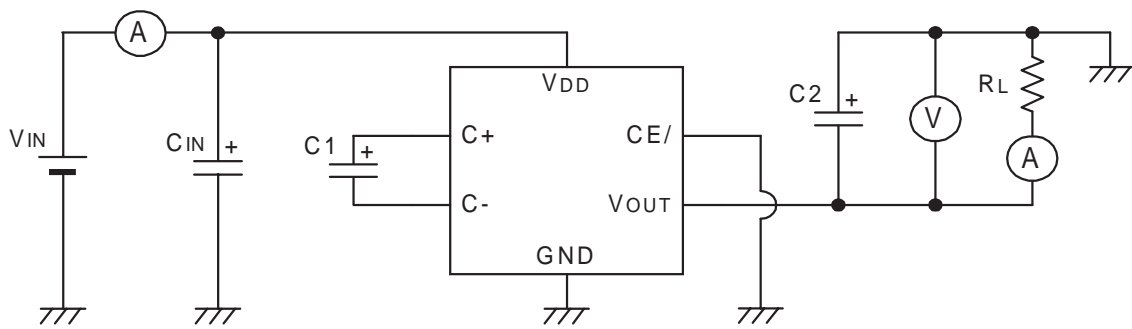
SYMBOL	DESCRIPTION	
1 2 3	120	Oscillation frequency 120kHz
	035	Oscillation frequency 35kHz (custom)
4	M	Package SOT-26
5	R	Embossed Tape Standard feed
	L	Embossed Tape Reverse feed

### Measurement Circuits

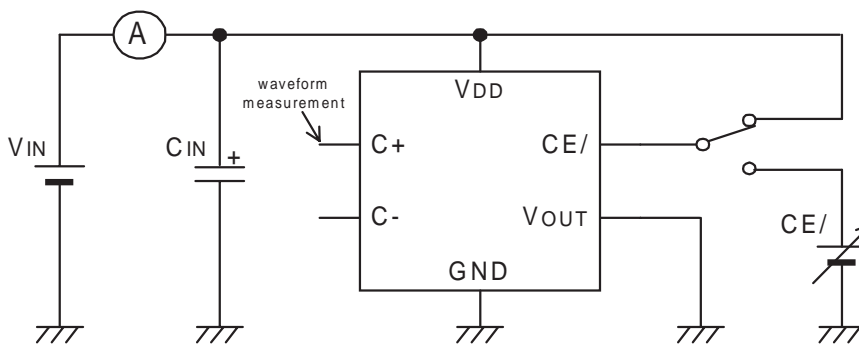
Circuit 1



Circuit 2



Circuit 3



Peripherals :

$C_{IN} = 1 \mu\text{F}$  (ceramic capacitor)

$C_1 = C_2 = 1 \mu\text{F}$  (ceramic capacitor)\*

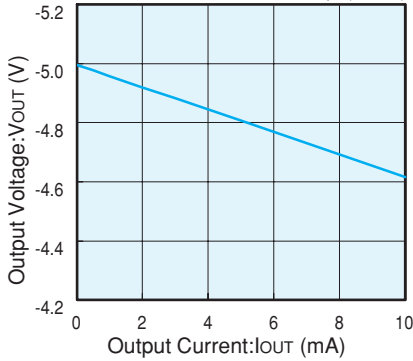
\* With the custom 35kHz frequency,  $C_1 = C_2 = 3.3 \mu\text{F}$

## Electrical Characteristics

### (1) Output Voltage vs. Output Current

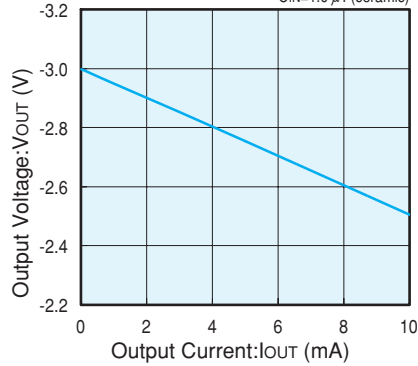
#### XC6351A120MR (120kHz)

V<sub>IN</sub>=5.0V, C<sub>1</sub>=C<sub>2</sub>=1.0 μF(ceramic)  
C<sub>IN</sub>=1.0 μF(ceramic)



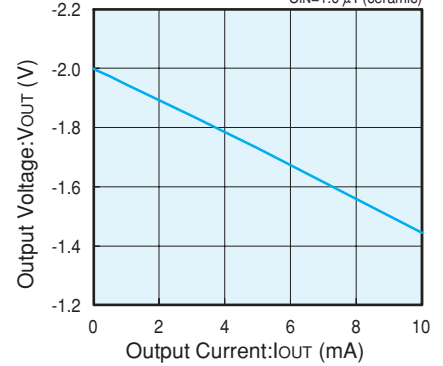
#### XC6351A120MR (120kHz)

V<sub>IN</sub>=3.0V, C<sub>1</sub>=C<sub>2</sub>=1.0 μF(ceramic)  
C<sub>IN</sub>=1.0 μF(ceramic)



#### XC6351A120MR (120kHz)

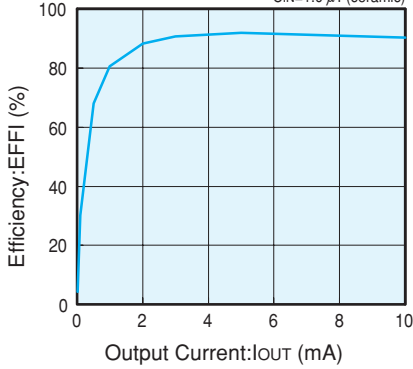
V<sub>IN</sub>=2.0V, C<sub>1</sub>=C<sub>2</sub>=1.0 μF(ceramic)  
C<sub>IN</sub>=1.0 μF(ceramic)



### (2) Efficiency vs. Output Current

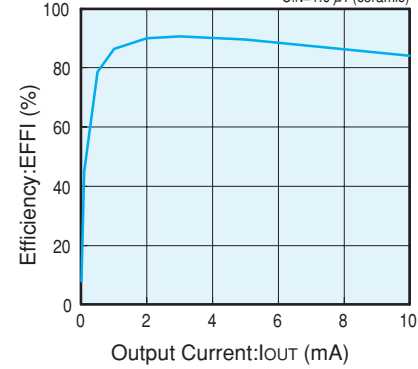
#### XC6351A120MR (120kHz)

V<sub>IN</sub>=5.0V, C<sub>1</sub>=C<sub>2</sub>=1.0 μF(ceramic)  
C<sub>IN</sub>=1.0 μF(ceramic)



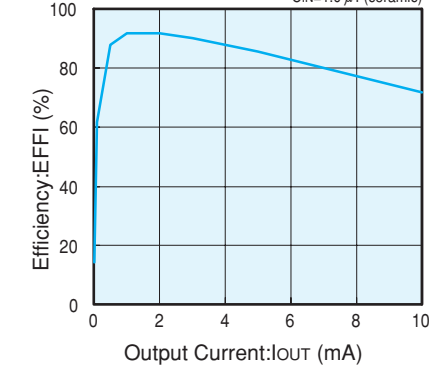
#### XC6351A120MR (120kHz)

V<sub>IN</sub>=3.0V, C<sub>1</sub>=C<sub>2</sub>=1.0 μF(ceramic)  
C<sub>IN</sub>=1.0 μF(ceramic)



#### XC6351A120MR (120kHz)

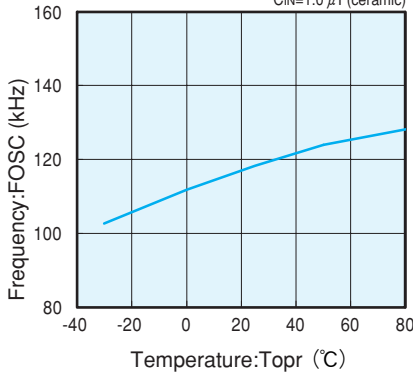
V<sub>IN</sub>=2.0V, C<sub>1</sub>=C<sub>2</sub>=1.0 μF(ceramic)  
C<sub>IN</sub>=1.0 μF(ceramic)



### (3) Oscillation Frequency vs. Ambient Temperature

#### XC6351A120MR (120kHz)

V<sub>IN</sub>=5.0V, C<sub>1</sub>=C<sub>2</sub>=1.0 μF(ceramic)  
C<sub>IN</sub>=1.0 μF(ceramic)



### (4) Oscillation Frequency vs. Input Voltage

#### XC6351A120MR (120kHz)

C<sub>1</sub>=C<sub>2</sub>=1.0 μF(ceramic), T<sub>OPR</sub>=25 (°C)  
C<sub>IN</sub>=1.0 μF(ceramic)

