

XC6351A Series

ETR08001-004c

Charge Pump Voltage Inverter IC

■ 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, SOT-26 and USP-6B packages 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.

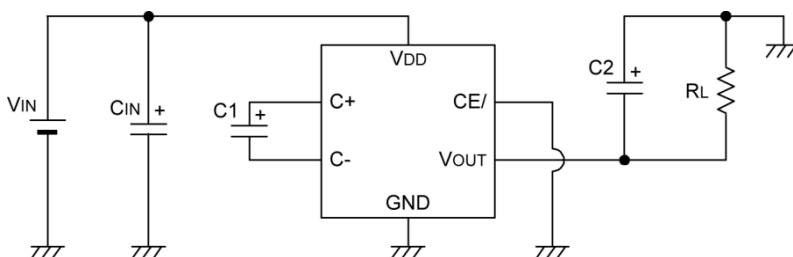
■ APPLICATIONS

- Negative power supplies
- Power supplies for Opamp
- Cellular and portable phones
- Miniature LCD panels
- PDAs
- Various battery powered systems

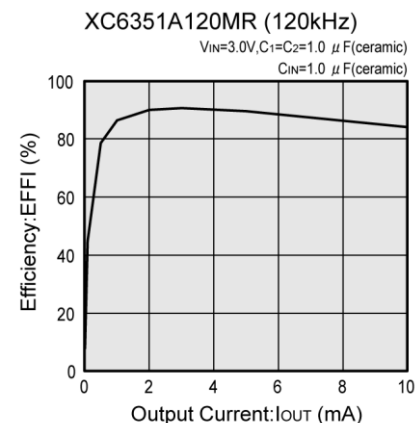
■ FEATURES

Operating Voltage Range	: 1.2V ~ 5.0V
Oscillation Frequency	: 120kHz : 35kHz (custom)
Low Supply Current	: 310 μ A (TYP.) : 100 μ A (35kHz custom TYP.)
High Efficiency	: 90% (TYP.) (RL = 2k Ω)
Stand-by Current	: 2.0 μ A (MAX.)
CE(Chip Enable) Function	
Operating Ambient Temperature	: -30°C ~ 80°C
Packages	: SOT-26 ,USP-6B
Environmentally Friendly	: EU RoHS Compliant, Pb Free

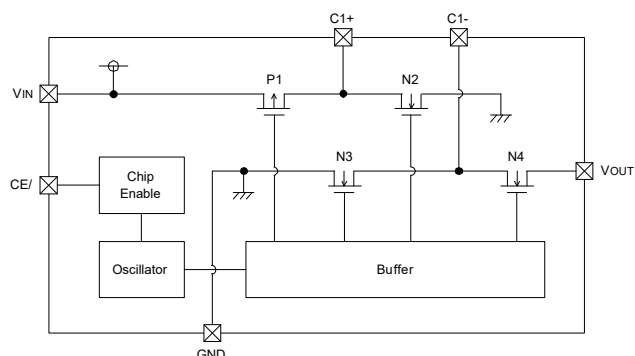
■ TYPICAL APPLICATION CIRCUIT



■ TYPICAL PERFORMANCE CHARACTERISTICS



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.

PRODUCT CLASSIFICATION

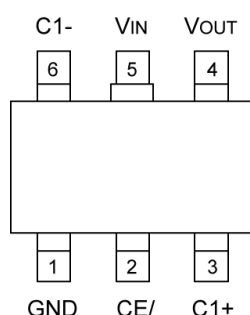
Ordering Information

XC6351A ①②③④⑤-⑥^(*)

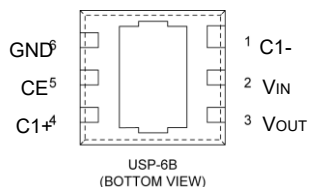
DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
①②③	Oscillation Frequency	120	120kHz
		035	35kHz (custom)
④⑤-⑥	Packages	MR-G	SOT-26 (3,000pcs/Reel)
	Taping Type	DR-G	USP-6B (3,000pcs/Reel)

(*) The "-G" suffix indicates that the products are Halogen and Antimony free as well as being fully EU RoHS compliant.

PIN CONFIGURATION



SOT-26
(TOP VIEW)



*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 VIN (No. 2) pin.

PIN ASSIGNMENT

PIN NUMBER		SYMBOL	FUNCTION
SOT-26	USP-6B		
1	6	GND	Ground
2	5	CE/	Chip Enable (Low Active)
3	4	C1+	External Capacitor +Pin
4	3	VOUT	Reverse Output
5	2	VIN	Power Supply
6	1	C1-	External Capacitor -Pin

PIN FUNCTION ASSIGNMENT

CE/PIN	STATUS
H	Stand-by
L	Active

■ ABSOLUTE MAXIMUM RATINGS

Ta = 25°C

PARAMETER		SYMBOL	RATINGS	UNITS
VIN Input Voltage		VIN	6.0	V
VOUT Pin Voltage		VOUT	-6.0 ~ 0.3	V
C1+ Pin Voltage		C1+	-0.3 ~ VIN + 0.3	V
C1- Pin Voltage		C1-	VOUT - 0.3 ~ 0.3	V
CE/ Pin Voltage		CE/	-0.3 ~ VIN + 0.3	V
VOUT Pin Current		IOUT	50	mA
Power Dissipation	SOT-26	Pd	150 (IC only)	mW
			600 (40mm x 40mm Standard board) (*1)	
	USP-6B		100 (IC only)	
			1000 (40mm x 40mm Standard board) (*1)	
Operating Temperature Range		Topr	-30 ~ 80	°C
Storage Temperature Range		Tsta	-40 ~ 125	°C

Each rating voltage is based on the GND.

(*) This is a reference data taken by using the test board. Please see the power dissipation page for the mounting condition.

■ ELECTRICAL CHARACTERISTICS

fosc = 120kHz, Ta = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Supply Current	IDD		-	310	520	μA	1
Operating Voltage Range	VIN	RL = 5kΩ	1.2	-	5.0	V	2
Oscillation Frequency	fosc		75	120	192	kHz	1
Power Transition Efficiency	EFFI	RL = 2kΩ	-	90	-	%	2
Voltage Transition Efficiency	VEFFI	RL = ∞	95	-	-	%	2
Output Impedance	ROUT	RL = 5kΩ	-	45	90	Ω	2
Stand -by Current	ISTB	CE/ = VIN	-	-	2.0	μA	3
CE/ 'H' Level Voltage	VCEH		0.9	-	-	V	3
CE/ 'L' Level Voltage	VCEL		-	-	0.25	V	3

Measuring Conditions: Unless otherwise stated, VIN = 5.0V, CE/ = 0V

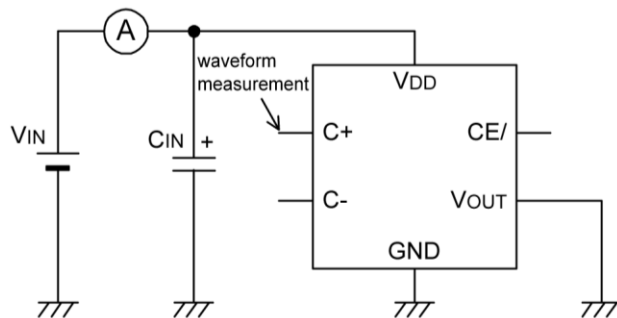
fosc = 35kHz, Ta = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Supply Current	IDD		-	100	170	μA	1
Operating Voltage Range	VIN	RL = 5kΩ	1.2	-	5.0	V	2
Oscillation Frequency	fosc		21	35	56	kHz	1
Power Transition Efficiency	EFFI	RL = 2kΩ	-	90	-	%	2
Voltage Transition Efficiency	VEFFI	RL = ∞	95	-	-	%	2
Output Impedance	ROUT	RL = 5kΩ	-	45	90	Ω	2
Stand -by Current	ISTB	CE/ = VIN	-	-	2.0	μA	3
CE/ 'H' Level Voltage	VCEH		0.9	-	-	V	3
CE/ 'L' Level Voltage	VCEL		-	-	0.25	V	3

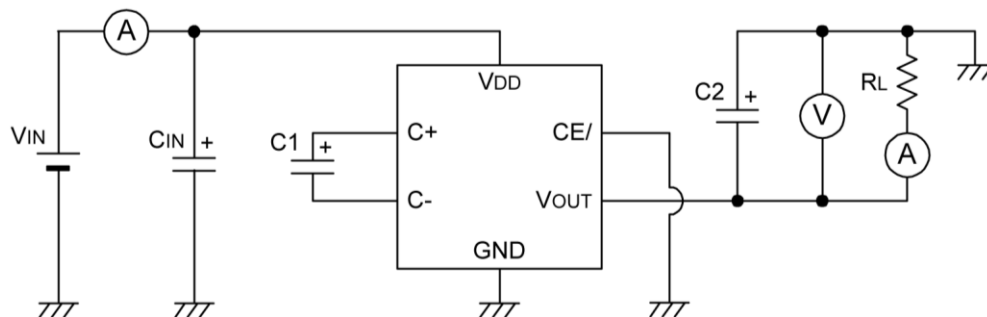
Measuring Conditions: Unless otherwise stated, VIN = 5.0V, CE/ = 0V

TEST CIRCUITS

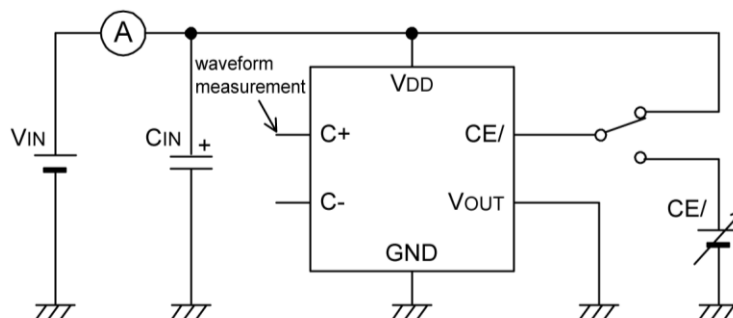
Circuit 1



Circuit 2



Circuit 3



External components:

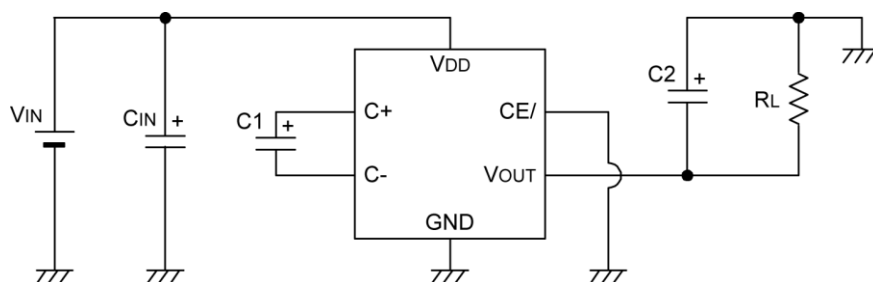
$C_{IN} = 1\mu F$ (ceramic capacitor)

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

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

TYPICAL APPLICATION CIRCUIT

● Standard Circuit



External components:

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

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

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

NOTES ON USE

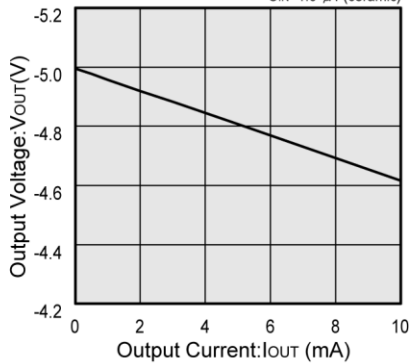
1. Please use the IC & external components: within the specified electrical characteristics range and ensure that absolute maximum ratings are not exceeded.
2. For C_1 & C_2 , please use a capacitor with as small an ESR value as possible.
3. In order to reduce impedance between the IC's input pin and the power supply, we recommend that a capacitor (C_{IN}) be connected to the input side.
4. If an external power supply is applied to the output pin in order to have V_{OUT} connected to GND during standby, large current flows through the IC are a possibility. Further, do not use a capacitor at C_2 that has a large capacitance value.

TYPICAL PERFORMANCE CHARACTERISTICS

(1) Output Voltage vs. Output Current

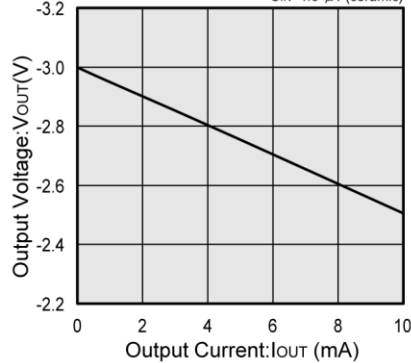
XC6351A120MR (120kHz)

$V_{IN}=5.0V, C_1=C_2=1.0 \mu F(\text{ceramic})$
 $C_{IN}=1.0 \mu F(\text{ceramic})$



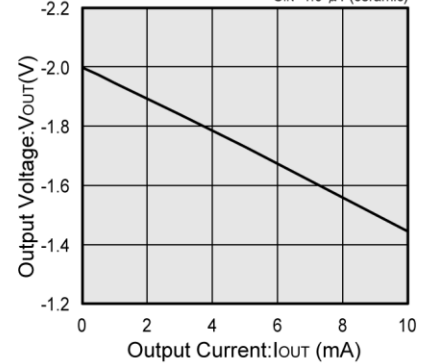
XC6351A120MR (120kHz)

$V_{IN}=3.0V, C_1=C_2=1.0 \mu F(\text{ceramic})$
 $C_{IN}=1.0 \mu F(\text{ceramic})$



XC6351A120MR (120kHz)

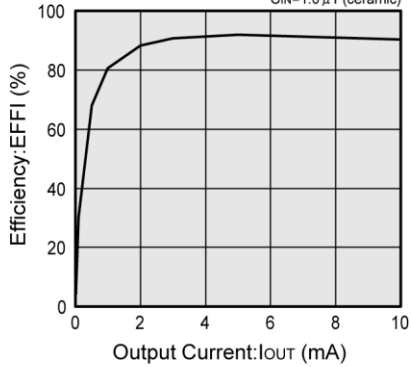
$V_{IN}=2.0V, C_1=C_2=1.0 \mu F(\text{ceramic})$
 $C_{IN}=1.0 \mu F(\text{ceramic})$



(2) Efficiency vs. Output Current

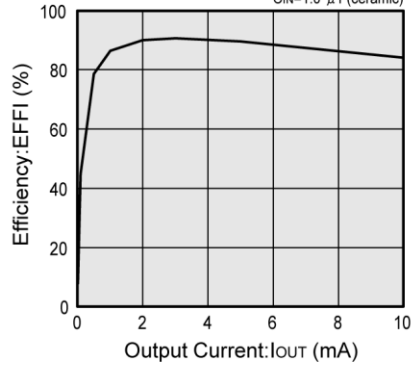
XC6351A120MR (120kHz)

$V_{IN}=5.0V, C_1=C_2=1.0 \mu F(\text{ceramic})$
 $C_{IN}=1.0 \mu F(\text{ceramic})$



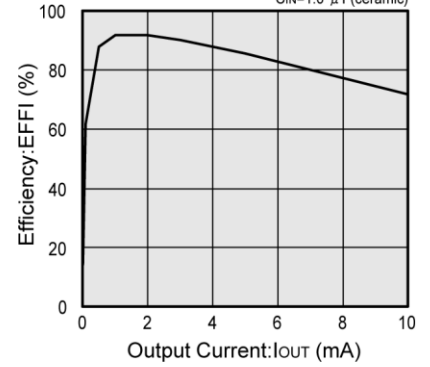
XC6351A120MR (120kHz)

$V_{IN}=3.0V, C_1=C_2=1.0 \mu F(\text{ceramic})$
 $C_{IN}=1.0 \mu F(\text{ceramic})$



XC6351A120MR (120kHz)

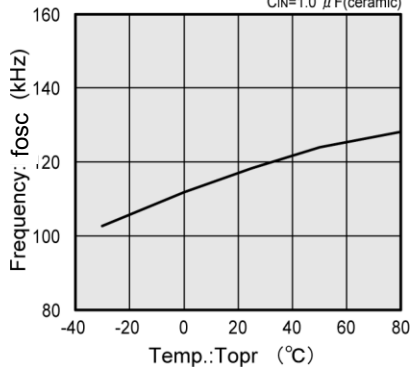
$V_{IN}=2.0V, C_1=C_2=1.0 \mu F(\text{ceramic})$
 $C_{IN}=1.0 \mu F(\text{ceramic})$



(3) Oscillation Frequency vs. Ambient Temperature (4) Oscillation Frequency vs. Input Voltage

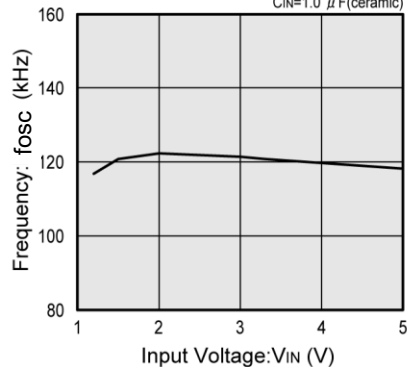
XC6351A120MR (120kHz)

$V_{IN}=5.0V, C_1=C_2=1.0 \mu F(\text{ceramic})$
 $C_{IN}=1.0 \mu F(\text{ceramic})$



XC6351A120MR (120kHz)

$C_1=C_2=1.0 \mu F(\text{ceramic}), T_{OPR}=25 (^\circ C)$
 $C_{IN}=1.0 \mu F(\text{ceramic})$



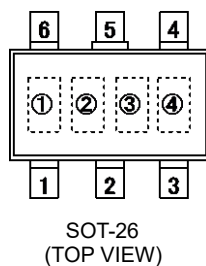
■ PACKAGING INFORMATION

For the latest package information go to, www.torexsemi.com/technical-support/packages

PACKAGE	OUTLINE / LAND PATTERN	THERMAL CHARACTERISTICS
SOT-26	SOT-26 PKG	SOT-26 Power Dissipation
USP-6B	USP-6B PKG	USP-6B Power Dissipation

MARKING RULE

● SOT-26



① represents product series

MARK	PRODUCT SERIES
A	XC6351AxxxMx-G

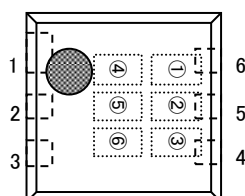
②,③ represents oscillation frequency

MARK		OSCILLATION FREQUENCY	PRODUCT SERIES
②	③		
0	3	35kHz	XC6351A035MR-G
1	2	120kHz	XC6351A120MR-G

④ represents production lot number

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

● USP-6B



①,②,③ represents product series

MARK			PRODUCT SERIES
①	②	③	
5	1	A	XC6351AxxxDR-G

④,⑤ represents oscillation frequency

MARK		OSCILLATION FREQUENCY	PRODUCT SERIES
④	⑤		
0	3	35kHz	XC6351A035DR-G
1	2	120kHz	XC6351A120DR-G

⑥ represents production lot number

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

Note: No character inversion used.

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