XC6351A Series

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.
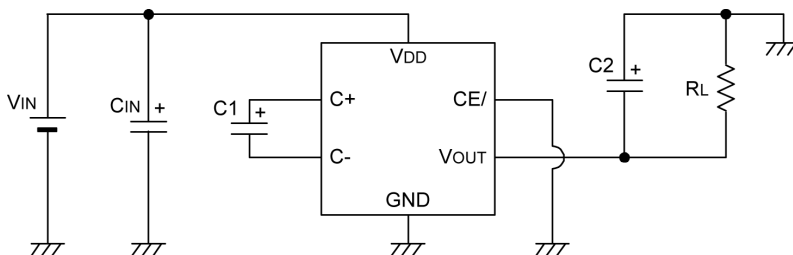
■ APPLICATIONS

- ● 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	: 310µA (TYP.)
	: 100µA (35kHz custom TYP.)
High Efficiency	: 90% (TYP.) (R_L = 2kΩ)
Stand-by Current	: 2.0µA (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

XC6351A120MR (120kHz)
V_{IN}=3.0V, C_1=C_2=1.0 µF(ceramic)
C_{IN}=1.0 µF(ceramic)
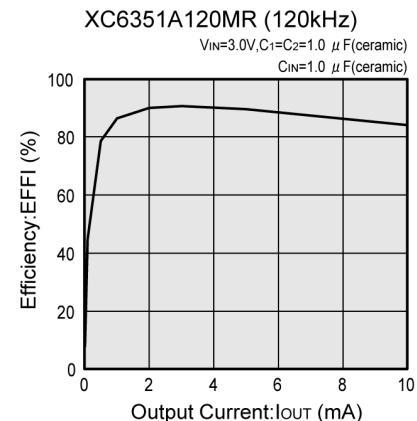
■BLOCK DIAGRAM
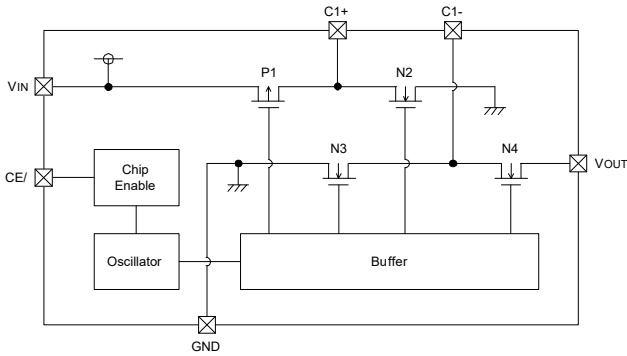
Note:
1. In operation, the following conditions will be repeated alternately:
   P1 & N3 ON: N2 & N4 OFF
   P1 & N3 OFF: N2 & N4 ON
2. In standby mode, P1, N3 & N4 will be ON and N2 will be OFF. The output pin V_{OUT} will be connected to GND.

■PRODUCT CLASSIFICATION
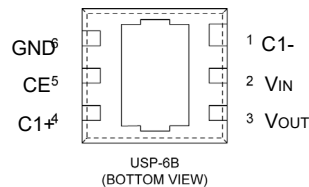
●Ordering Information

XC6351A ①②③④⑤-⑥[*1]

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

[*1] The "-G" suffix indicates that the products are Halogen and Antimony free as well as being fully RoHS compliant.

■PIN CONFIGURATION
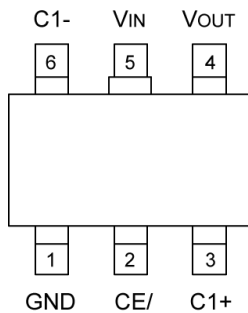
SOT-26
(TOP VIEW)

USP-6B
(BOTTOM 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 V_{IN} (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	V_{OUT}	Reverse Output
5	2	V_{IN}	Power Supply
6	1	C1-	External Capacitor -Pin

■PIN FUNCTIOS ASSIGNMENT

CE/PIN	STATUS
H	Stand-by
L	Active

■ABSOLUTE MAXIMUM RATINGS

Ta = 25℃

PARAMETER		SYMBOL	RATINGS	UNITS
V_{IN} Input Voltage		V_{IN}	6.0	V
V_{OUT} Pin Voltage		V_{OUT}	-6.0 ~ 0.3	V
C1+ Pin Voltage		C1+	-0.3 ~ V_{IN} + 0.3	V
C1- Pin Voltage		C1-	V_{OUT} - 0.3 ~ 0.3	V
CE/ Pin Voltage		CE/	-0.3 ~ V_{IN} + 0.3	V
V_{OUT} Pin Current		I_{OUT}	50	mA
Power Dissipation	SOT-26	Pd	150	mW
			600 (40mm x 40mm Standard board) [*1]	
	USP-6B		100	
			1000 (40mm x 40mm Standard board) [*1]	
Operating Temperature Range		Topr	-30 ~ 80	℃
Storage Temperature Range		Tstg	-40 ~ 125	℃

Each rating voltage is based on the GND

[*1] 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℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Supply Current	I_{DD}		-	310	520	μA	1
Operating Voltage Range	V_{IN}	R_L=5kΩ	1.2	-	5.0	V	2
Oscillation Frequency	f_{OSC}		75	120	192	kHz	1
Power Transition Efficiency	EFFI	R_L=2kΩ	-	90	-	%	2
Voltage Transition Efficiency	V_{EFFI}	R_L=∞	95	-	-	%	2
Output Impedance	R_{OUT}	R_L=5kΩ	-	45	90	Ω	2
Stand -by Current	I_{STB}	CE/=V_{IN}	-	-	2.0	μA	3
CE/ 'H' Level Voltage	V_{CEH}		0.9	-	-	V	3
CE/ 'L' Level Voltage	V_{CEL}		-	-	0.25	V	3

Measuring Conditions: Unless otherwise stated, V_{IN} = 5.0V, CE/ = 0V

fosc＝35kHz, Ta=25℃

| PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Supply Current	I_{DD}		-	100	170	μA	1
Operating Voltage Range	V_{IN}	RL=5kΩ	1.2	-	5.0	V	2
Oscillation Frequency	f_{OSC}		21	35	56	kHz	1
Power Transition Efficiency	EFFI	R_L=2kΩ	-	90	-	%	2
Voltage Transition Efficiency	VEFFI	RL＝∞	95	-	-	%	2
Output Impedance	R_{OUT}	RL＝5kΩ	-	45	90	Ω	2
Stand -by Current	I_{STB}	CE/=VIN	-	-	2.0	μA	3
CE/ 'H' Level Voltage	V_{CEH}		0.9	-	-	V	3
CE/ 'L' Level Voltage	V_{CEL}		-	-	0.25	V	3

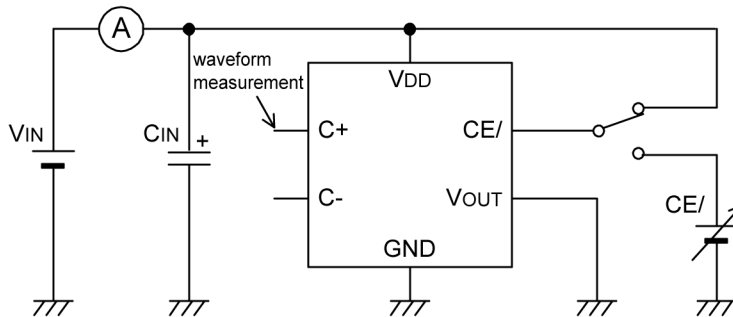Measuring Conditions: Unless otherwise stated, V_{IN} = 5.0V, CE/ = 0V

■TEST CIRCUITS

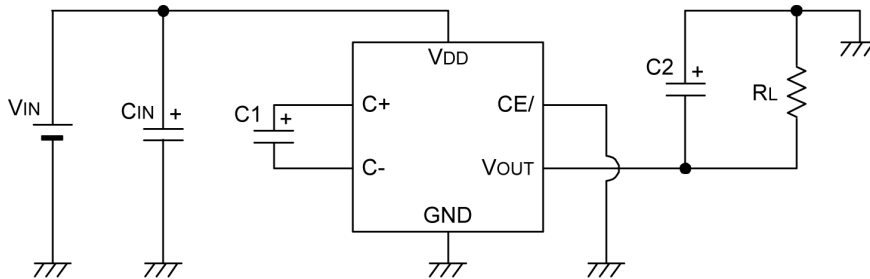Circuit 1
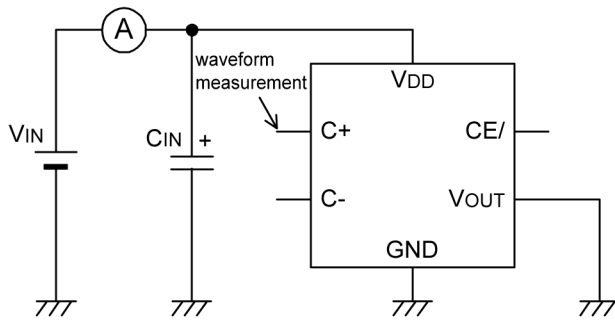
Circuit 2
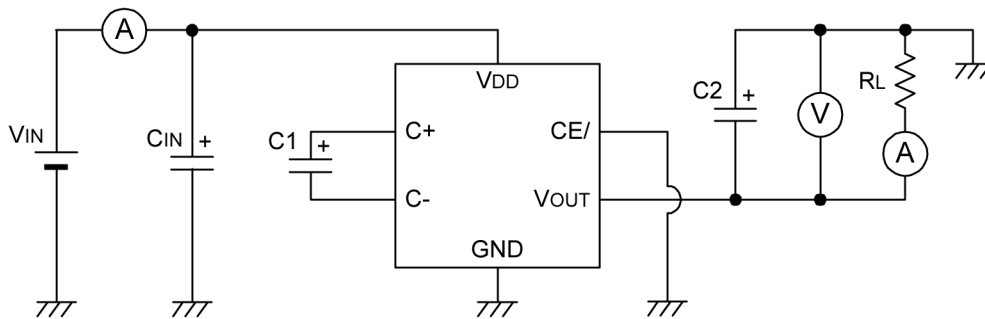
Circuit 3

External components:

C_{IN} = 1μF (ceramic capacitor)

C1 = C2 = 1μF (ceramic capacitor)*

* With the custom 35kHz frequency, C1 = C2 = 3.3μF

■ TYPICAL APPLICATION CIRCUIT

● Standard Circuit

External components:
    C_{IN} = 1μF (ceramic capacitor)
    C1 = C2 = 1μF (ceramic capacitor)*
   * With the custom 35kHz frequency, C1 = C2 = 3.3 μF

■ 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 C1 & C2, 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 C2 that has a large capacitance value.

■TYPICAL PERFORMANCE CHARACTERISTICS
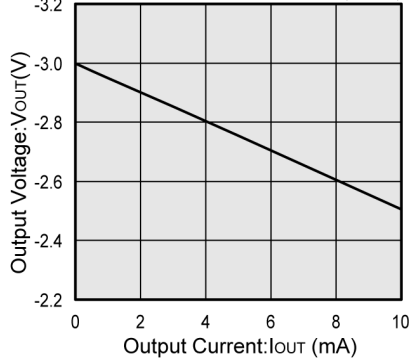
(1) Output Voltage vs. Output Current
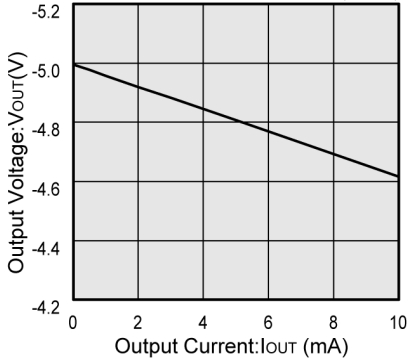
XC6351A120MR (120kHz)
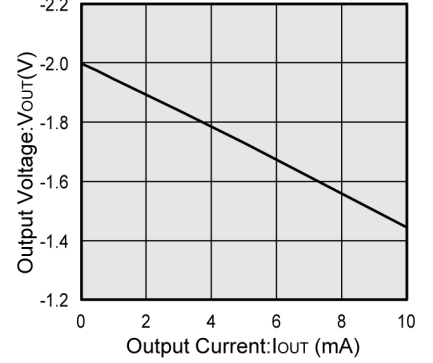V_{IN}=5.0V,C_1=C_2=1.0 μF(ceramic)
C_{IN}=1.0 μF(ceramic)

XC6351A120MR (120kHz)
V_{IN}=3.0V,C_1=C_2=1.0 μF(ceramic)
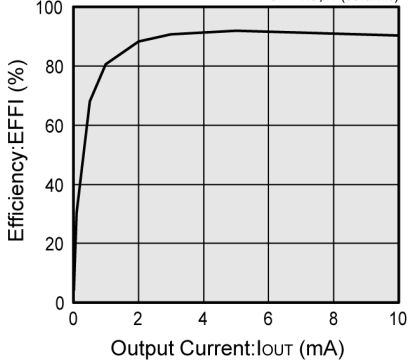C_{IN}=1.0 μF(ceramic)

XC6351A120MR (120kHz)
V_{IN}=2.0V,C_1=C_2=1.0 μF(ceramic)
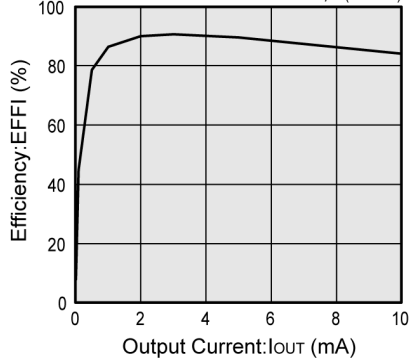C_{IN}=1.0 μF(ceramic)

(2) Efficiency vs. Output Current

XC6351A120MR (120kHz)
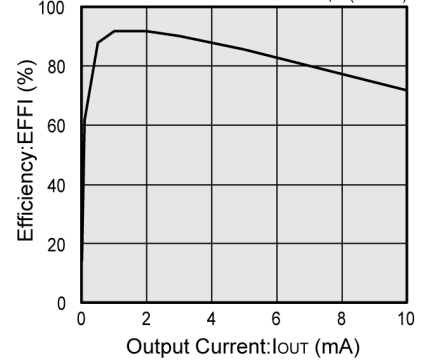V_{IN}=5.0V,C_1=C_2=1.0 μF(ceramic)
C_{IN}=1.0 μF(ceramic)

XC6351A120MR (120kHz)
V_{IN}=3.0V,C_1=C_2=1.0 μF(ceramic)
C_{IN}=1.0 μF(ceramic)

XC6351A120MR (120kHz)
V_{IN}=2.0V,C_1=C_2=1.0 μF(ceramic)
C_{IN}=1.0 μF(ceramic)

(3) Oscillation Frequency vs. Ambient Temperature

XC6351A120MR (120kHz)
V_{IN}=5.0V,C_1=C_2=1.0 μF(ceramic)
C_{IN}=1.0 μF(ceramic)

(4) Oscillation Frequency vs. Input Voltage
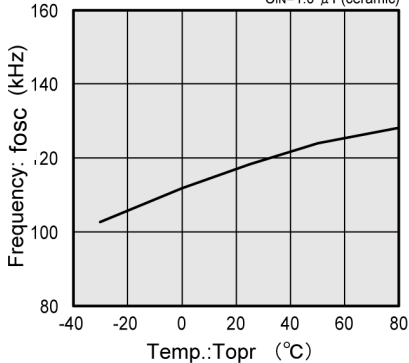
XC6351A120MR (120kHz)
C_1=C_2=1.0 μF(ceramic),T_{opr}=25 (C)
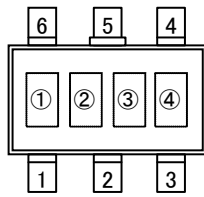C_{IN}=1.0 μF(ceramic)
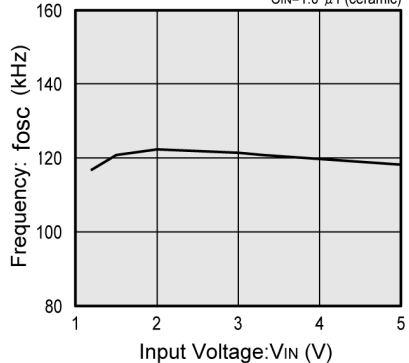
■PACKAGING INFORMATION

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

TOREX

■MARKING RULE

●SOT-26

SOT-26
(TOP VIEW)

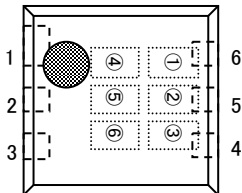① represents product series

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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