

# SCI7660C<sub>0B</sub>/M<sub>0B</sub>

## DC-DC Converter



- 95% Typical Power Efficiency
- Doubled or Output Voltage
- Voltage Conversion (Positive  $\leftrightarrow$  Negative)

### DESCRIPTION

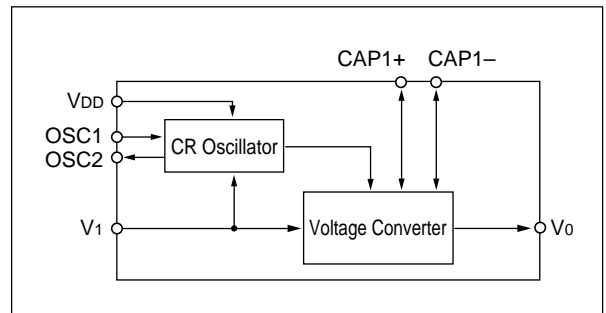
The SCI7660C<sub>0B</sub>/M<sub>0B</sub> CMOS DC-DC Converter features high operational performance with low power dissipation. The booster generates a doubled output voltage from the input.

It is possible to drive the LSI that need another power supply than main power supply. (LCD drivers•Analog LSI etc.) Its very low power requirement makes it ideal to supply handy equipments with power.

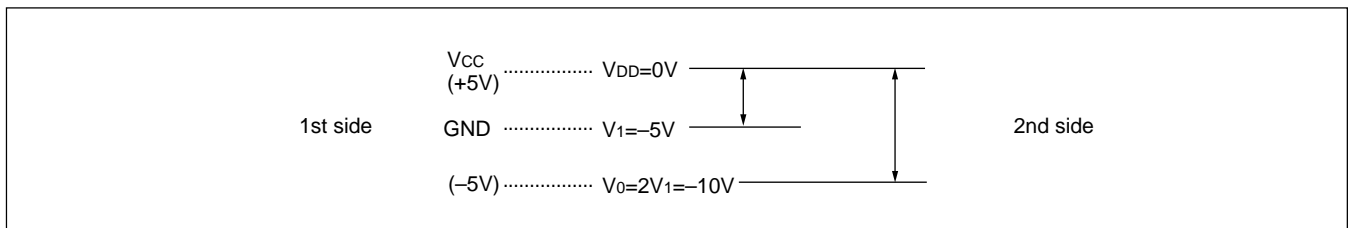
### FEATURES

- High performance with low power dissipation
- Simple conversion of V<sub>DD</sub>(-5V) to +V<sub>I</sub>(+5V), -2V<sub>I</sub>(-10V)
- Output current ..... 30mA Max. (V<sub>DD</sub> = -5V)
- Power conversion efficiency .... 95% Typ.
- Cascade connection  
(two device connected V<sub>DD</sub> = -5V, V<sub>O</sub> = -15V)
- Low power ..... Ideal for dry cell battery
- On-chip CR oscillator
- Package ..... DIP-8pin (plastic)  
SOP4-8pin (plastic)

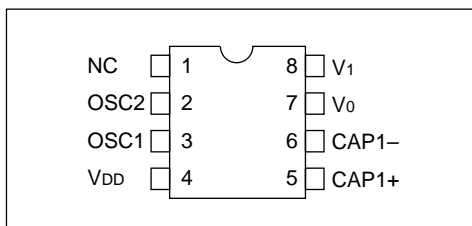
### BLOCK DIAGRAM



### VOLTAGE RELATIONS



### PIN CONFIGURATION



### PIN DESCRIPTION

Pin Name	Pin No.	Function
OSC1	3	Oscillation resistor connection terminal
OSC2	2	
V <sub>DD</sub>	4	Power supply terminal (positive, system supply V <sub>CC</sub> )
CAP1+	5	Terminal for connection of capacitor for booster (positive)
CAP1-	6	Terminal for connection of capacitor for booster (negative)
V <sub>O</sub>	7	Output terminal at doubling
V <sub>I</sub>	8	Power supply terminal (negative, system supply GND)

## ■ ABSOLUTE MAXIMAM RATINGS

(Ta = 25°C)

Rating	Symbol	Value	Unit
Input voltage	VI	-10.0 to 0.5	V
Output voltage	VO	Min. -20.0	V
Power dissipation	Pd	300 (DIP-8pin) / 150 (SOP4-8pin)	mW
Operating temperature	Topr	-40 to 85	°C
Storage temperature	Tstg	-65 to 150	°C
Soldering temperature and time	Tsol	260°C, 10s (at lead)	—

Note: When this IC is soldered in the solder-reflow process, be sure to maintain the reflow furnace at the curve shown in “Fig. 3-5 Temperature Profile for Standard SMD Package (QFP, SOP, PLCC and etc.) of this DATA BOOK. And this IC can not be exposed to high temperature of the solder dipping.

## ■ ELECTRICAL CHARACTERISTICS

(VI = -5V, Ta = -40 to 85°C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Input voltage	VI		-8.0	—	-1.5	V
Output voltage	VO		-16.0	—	—	V
Booster current consumption	Iopr	RL = ∞, ROSC = 1MΩ, VI = -5V	—	20	30	μA
Stationary current	IQ	RL = ∞, VI = -8V	—	—	2.0	μA
Output impedamce	RO	IO = 10mA, VI = -5V	—	75	100	Ω
Booster power conversion efficiency	Peff	IO = 5mA, VI = -5V	90	95	—	%
Input leakage current	ILI	OSC1 terminal, VI = -8V	—	—	2.0	μA
Oscillation frequency	fOSC	ROSC = 1MΩ, VI = -5V	16	20	24	kHz

## ■ RECOMMENDED OPERATING CONDITIONS

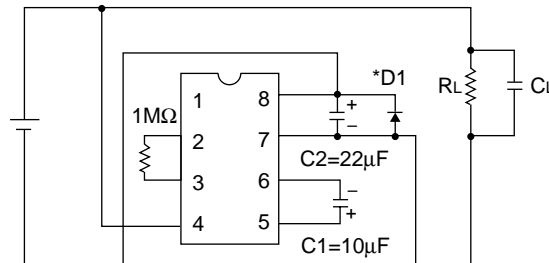
(Ta = -40 to 85°C)

Condition	Symbol	Remark	Min.	Typ.	Max.	Unit
Booster start voltage	VSTA1	ROSC = 1MΩ, CL/C2 ≤ 1/20*1 C2 ≥ 10μF Ta = -20 to 85°C	—	—	-1.5	V
	VSTA2	ROSC = 1MΩ	—	—	-2.2	V
Booster stop voltage	VSTP	ROSC = 1MΩ	-1.5	—	—	V
Output load resistance	RL		RL Min.*2	—	—	Ω
Output current	IO		—	—	30	mA
Oscillation frequency	fOSC		10	—	30	kHz
External resistance for oscillation	ROSC		680	—	2000	kΩ
Capacitor for booster	C1,C2,C3		3.3	—	—	μF

Notes: \*1: Recommended circuitry in low voltage operation is shown below.

\*2: RL Min. depends on input voltage as shown below.

Recommended circuit in low voltage operation



\*D1 ( $V_F(I_F=1\text{mA}) \leq 0.6\text{V}$ )

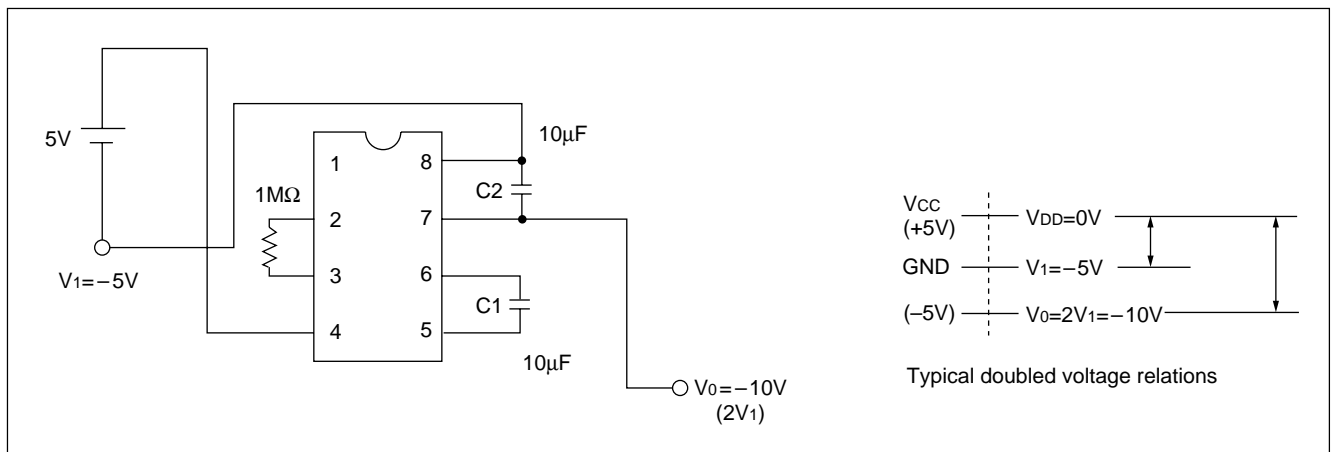
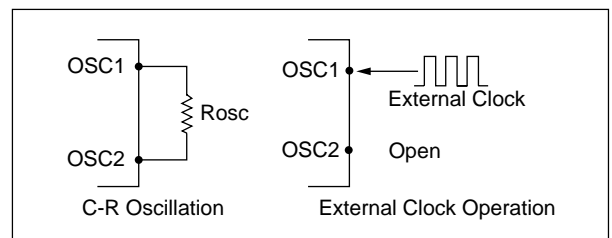
## ■ CIRCUIT DESCRIPTION

### ● C-R Oscillator

The SCI7660C<sub>0B</sub>/M<sub>0B</sub> contains a C-R oscillator for internal oscillation. It consists of an external resistor  $R_{osc}$  connected between the OSC1 pin and OSC2 pin.

### ● Voltage Converters

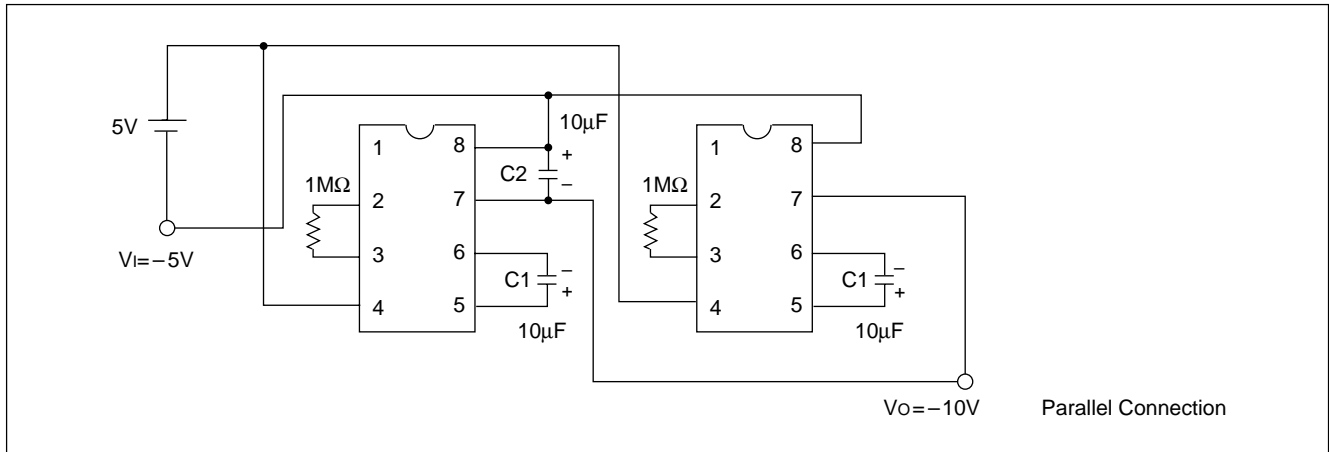
The voltage converters double the input supply voltage ( $V_i$ ) using clocks generated by the C-R oscillator. A doubled voltage can be obtained with a booster capacitor between CAP+ and CAP-, and with an external smoothing capacitor between  $V_i$  and  $V_o$ .



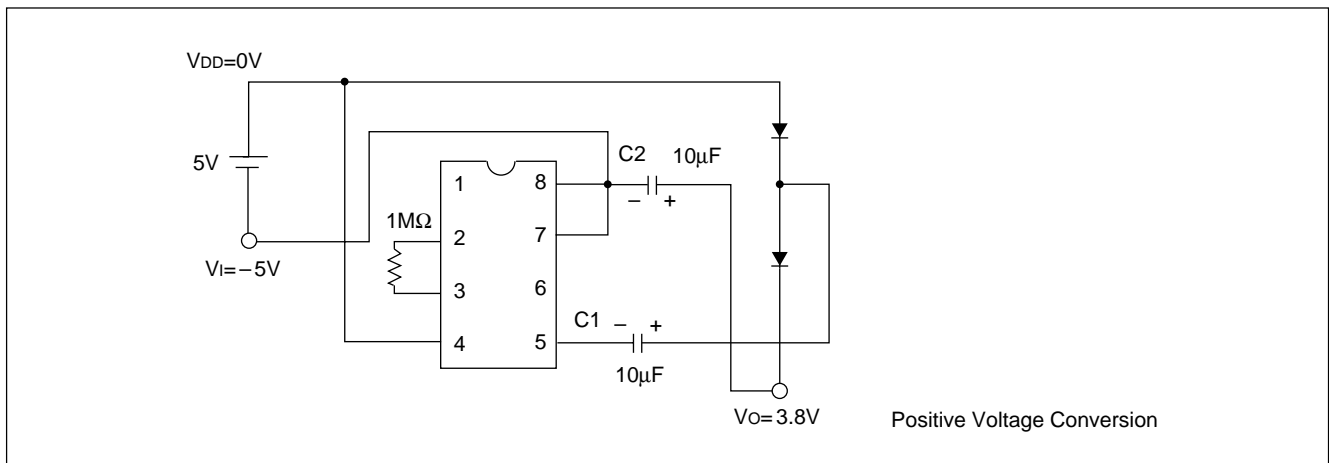
# SCI7660C<sub>0B</sub>/M<sub>0B</sub>

## ■ BASIC EXTERNAL CONNECTION

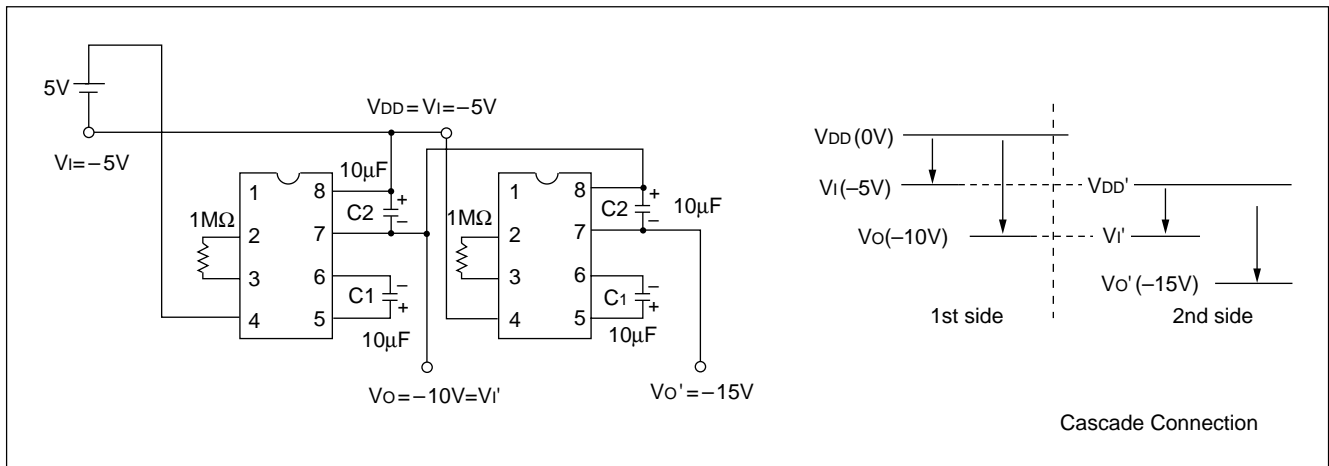
- **Parallel Connection** (Output impedance can be reduced by parallel connections.)



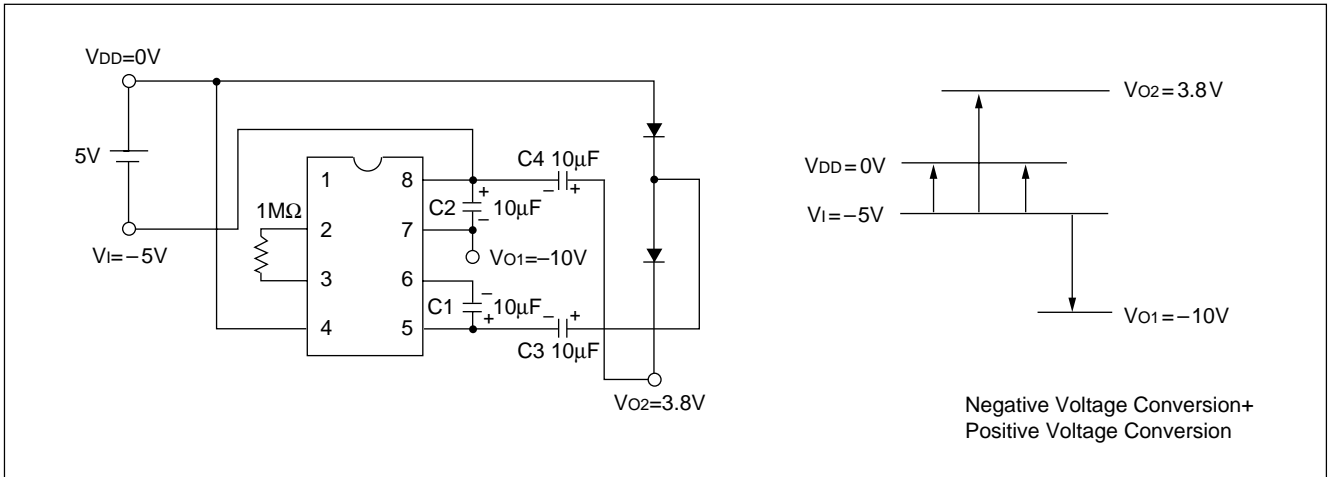
- **Positive Voltage Conversion** (Input voltage can be doubled toward the positive side with diode.)



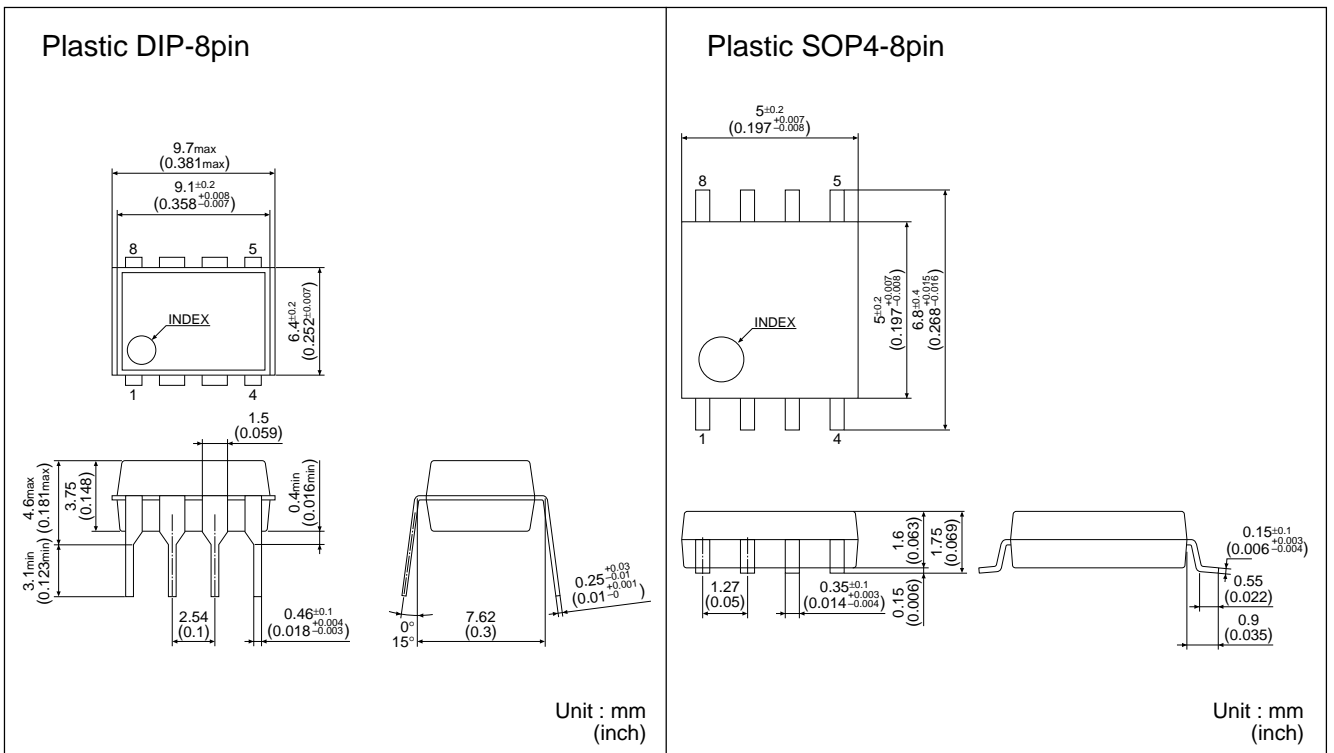
- **Cascade Connection** (Cascade Connection of SCI7660C<sub>0B</sub>/M<sub>0B</sub> further increase the output voltage. Note, however, that the cascade connection increase the output impedance.)



- Negative Voltage Conversion + Positive Voltage Conversion** (This circuit produces outputs of -10V and +3.8V from the -5V input by combination of voltage doubler circuit and positive voltage conversion circuit.)



## ■ PACKAGE DIMENSIONS



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