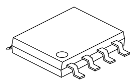
CHARGE PUMP DC-DC VOLTAGE CONVERTER



SOP-8

■ DESCRIPTION

UTC **UTL7660** is a charge pump DC-DC voltage converter using AL-gate CMOS technology and optimization design. It converters a +1.5V to +10V input to a corresponding -1.5V to -10V output using only two external capacitors, eliminating inductors and their associated cost, size and EMI. The on-board oscillator operates at a nominal frequency of 10KHZ. Operation frequency can be decreased by adding an external capacitor to the oscillator (OSC) terminal.

■ FEATURES

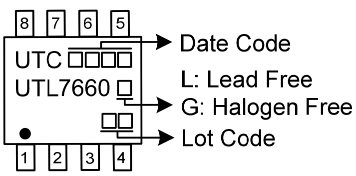
* Converts +5V Logic supply to ±5V double-phase electrical Voltage
* Wide input voltage range: 1.5V~10V
* Efficient voltage conversion: 99.9%
* Good power efficiency: 98%
* Low power supply:50uA@5Vin
* Only two external capacitors required
* Compatible with RS232 negative power supply standard
* No Dx diode needed for high voltage operation

■ ORDERING INFORMATION

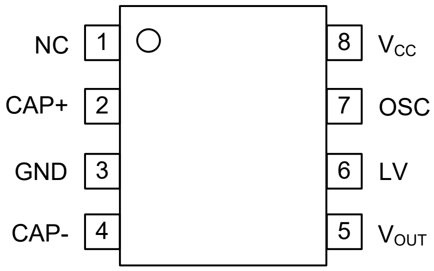
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UTL7660L-S08-R	UTL7660G-S08-R	SOP-8	Tape Reel

UTL7660G-S08-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



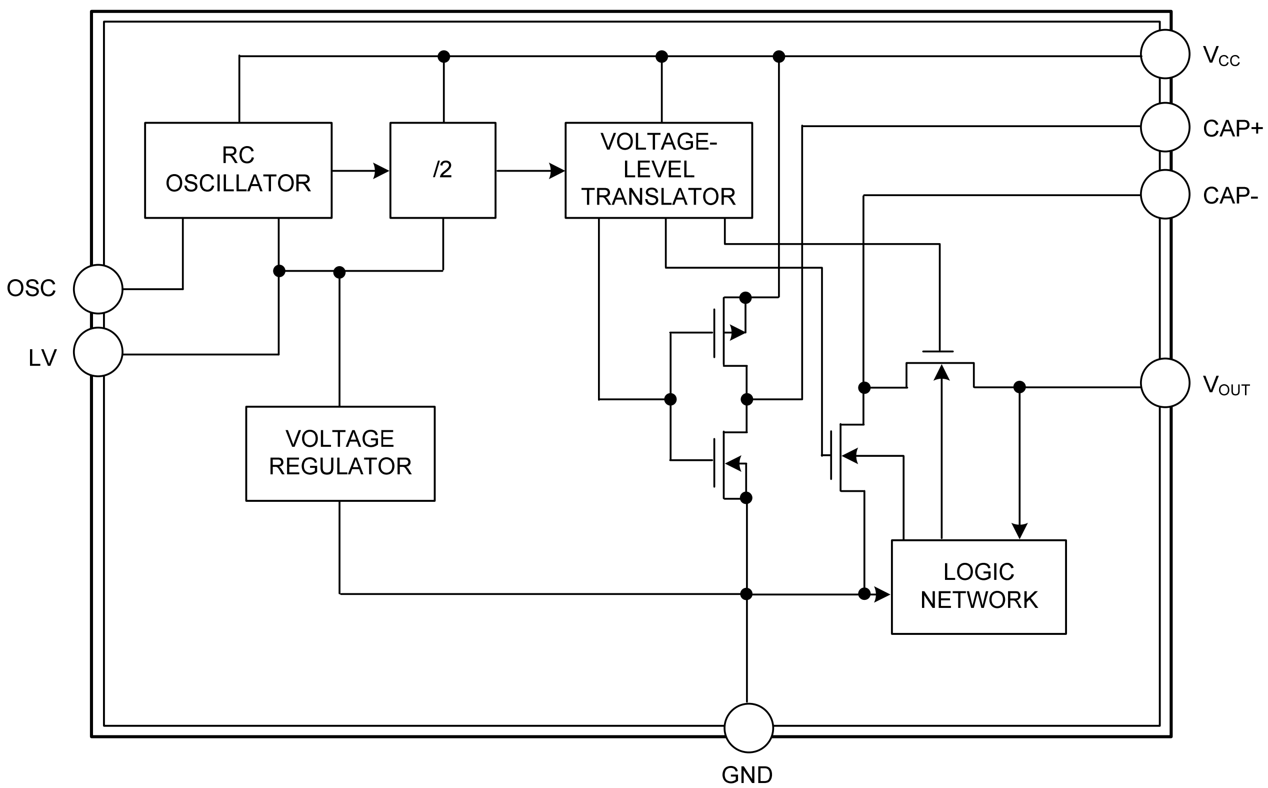
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	SYMBOL	DESCRIPTION
1	NC	No connection
2	CAP^{+}	Connection external capacitor (+) pin
3	GND	Ground Pin
4	CAP^{-}	Connection external capacitor (-) pin
5	V_{OUT}	Voltage output pin
6	LV	Low voltage selection pin
7	OSC	Connecting oscillation capacitor pin
8	V_{CC}	Power supply pin

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

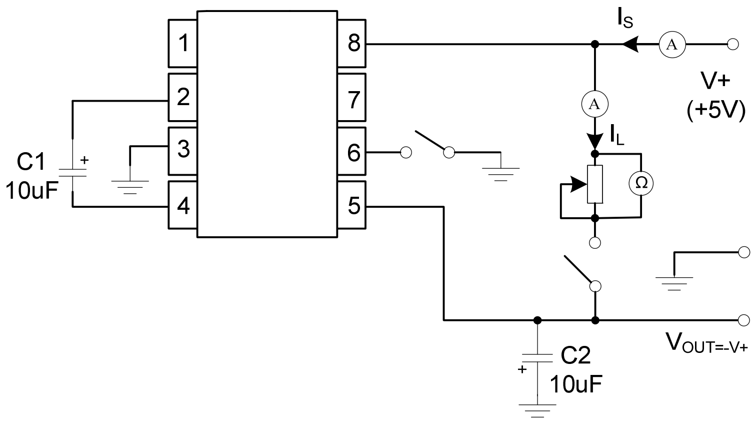
PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	10.5	V
LV and OSC Inputs Voltage	V_{CC}<5.5V	V_I	-0.3 ~ V_{CC}+0.3	V
	V_{CC}>5.5V		V_{CC}-5.5 ~ V_{CC}+0.3	V
Current Into LV	V_{CC}>3.5V	I_{LV}	20	μA
Output Short-circuit duration	V_{SUPPLY}±5.5V	t_{OS}	Continuous	
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{CC} = 5V, C_{OSC} = 0, LV = Open						
Supply Current	I_{CC}	$R_L=\infty$		45	110	uA
Supply Voltage Range (Low)	V_{CC_LOW}	R_L=10KΩ, LV=GND	1.5		3.5	V
Supply Voltage Range (high)	V_{CC_HIGH}	R_L=10KΩ, LV Open	3		10	V
Output Source Resistance	R_{OUT}	I_O=20mA		55		Ω
		V_{CC}=2V, I_O=3mA, LV=GND		160		Ω
Oscillator Frequency	f_{OSC}			10		kHz
Power Efficiency	η_{POWER}	R_L=5KΩ	95	98		%
Voltage Conversion Efficiency	η_{VOUT}	$R_L=\infty$	99	99.9		%
V_{CC} = 3V, C_{OSC} = 0, LV = GND						
Supply Current	I_{CC}	$R_L=\infty$		24	50	uA
Output Source Resistance	R_{OUT}	I_O=10mA		80		Ω
Oscillator Frequency	f_{OSC}	C_{OSC}=0	5	9		kHz
Power Efficiency	η_{POWER}	R_L=5KΩ	95	98		%
Voltage Conversion Efficiency	η_{VOUT}	$R_L=\infty$	99			%

■ TESTING CIRCUIT

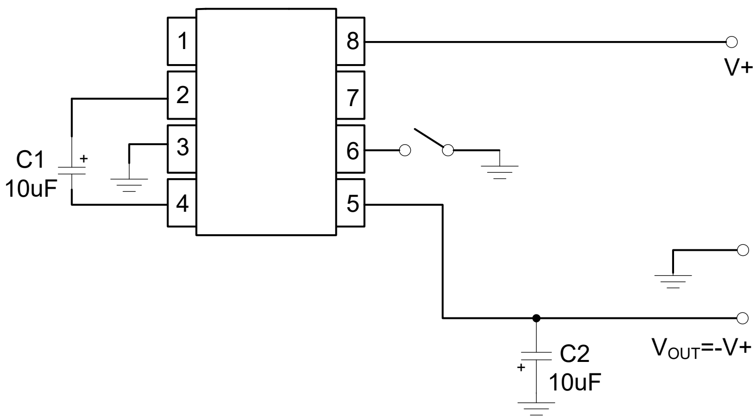


■ APPLICATION INFORMATION

Do's and Don'ts

1. Do not exceed maximum supply voltages.
2. Do not connect terminal-6(LV) to terminal-3(GND) when supply voltages greater than 3.5V.
3. Do not make the terminal-5 (V_{OUT}) short to terminal-8 (V_{CC}) for supply voltages above 5.5V for extended periods.
4. When using polarized capacitors, the positive terminal of C1 must be connected to terminal-2 (CAP+), and the positive terminal of C2 must be connected to GND.
5. If the voltage supply has a large source impedance (25Ω – 30Ω), then a 2.2μF capacitor from terminal-8(V_{CC}) to ground may be required to limit rising-rate of input voltage to less than 2V/uS.
6. Ensure that the terminal-5 (V_{OUT}) does not go more positive than terminal-3 (GND). Device latch up occurs under these conditions. A UTC 1N4148 or similar diode placed in parallel with C2 prevents the device from latching up under these conditions (anode to terminal 5, cathode to terminal 3)

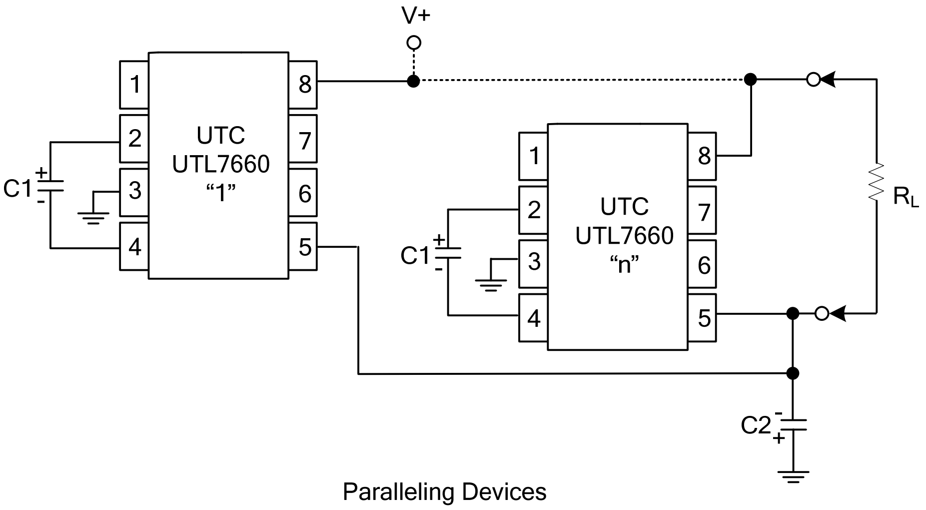
■ TYPICAL APPLICATION CIRCUIT



Above figure is the basic application circuit to provide a negative supply from -1.5V ~ -10V while a positive supply from +1.5V ~ +10V is available. When V_{CC}=+5V, the output resistance is about 100Ω; The output voltage is -4V while the load current is 10mA.

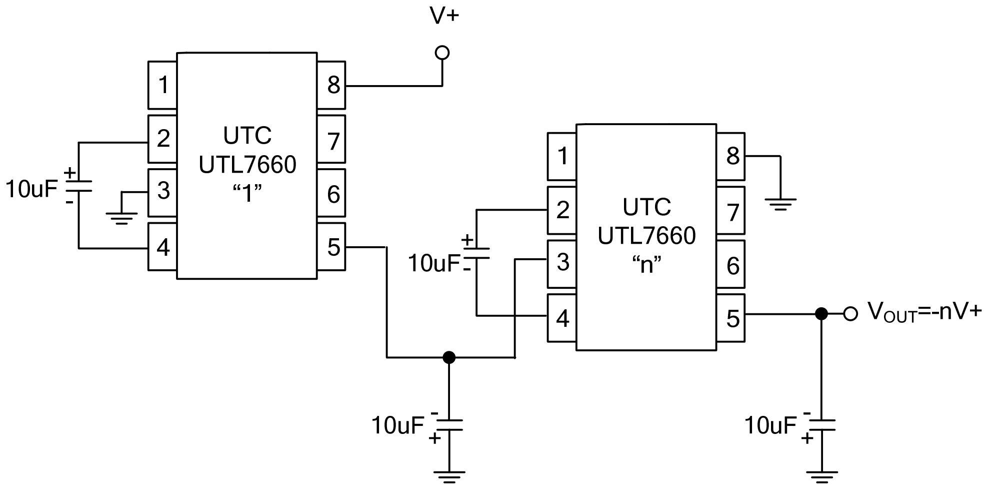
■ TYPICAL APPLICATION CIRCUIT (Cont.)

R_{OUT} = R_{OUT} (of **UTL7660**) /n (number of devices)



Paralleling Devices

V_{OUT} = –n (V_{IN})



Cascading Devices for Increased Output Voltage