



UTL7660

CMOS IC

CHARGE PUMP DC-DC VOLTAGE CONVERTER

DESCRIPTION

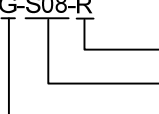
UTC **UTL7660** is a charge pump DC-DC voltage converter using AL-gate CMOS technology and optimization design. It converts a +1.5V to +10V input to a corresponding -1.5V to -10V output using only two external capacitors, eliminating inductors and their associated cost, size and EMI. The on-board oscillator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

FEATURES

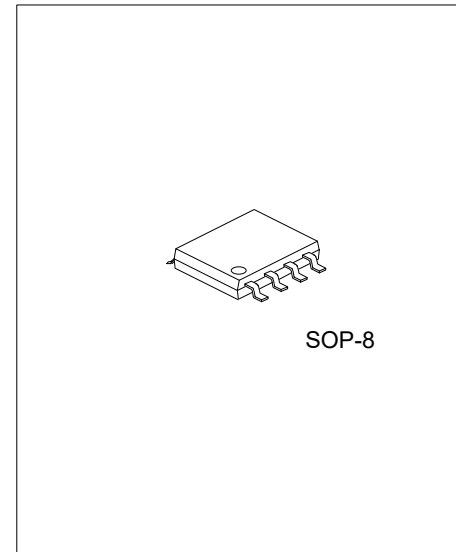
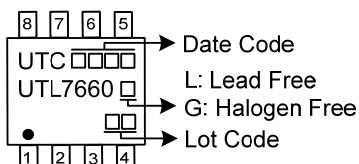
- * Converts +5V Logic supply to $\pm 5V$ double-phase electrical Voltage
- * Wide input voltage range: 1.5V~10V
- * Efficient voltage conversion: 99.9%
- * Good power efficiency: 98%
- * Low power supply: 50uA@5Vin
- * Only two external capacitors required
- * Compatible with RS232 negative power supply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

ORDERING INFORMATION

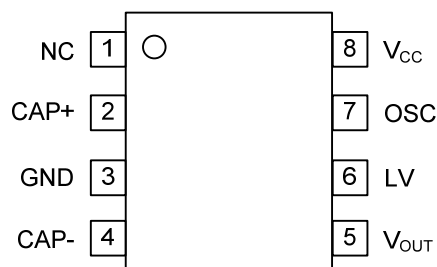
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UTL7660L-S08-R	UTL7660G-S08-R	SOP-8	Tape Reel

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
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MARKING



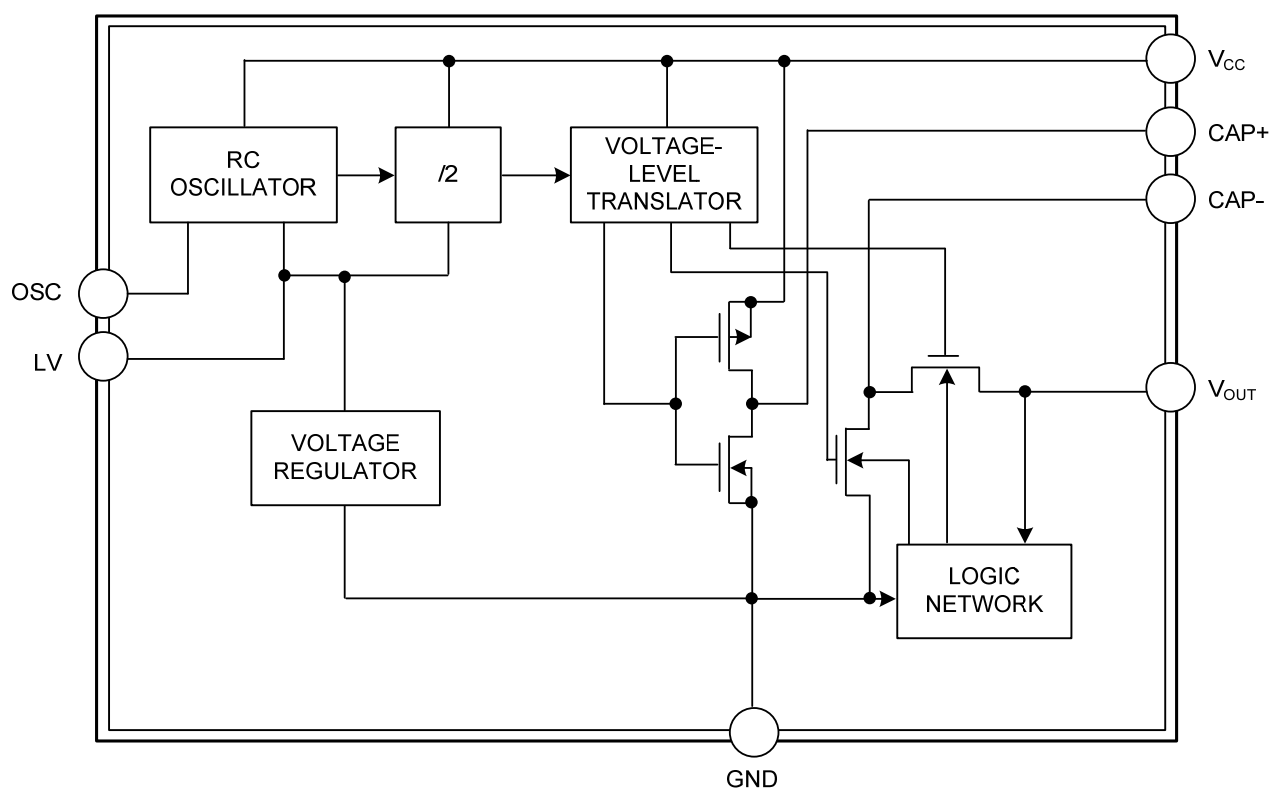
PIN CONFIGURATION



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

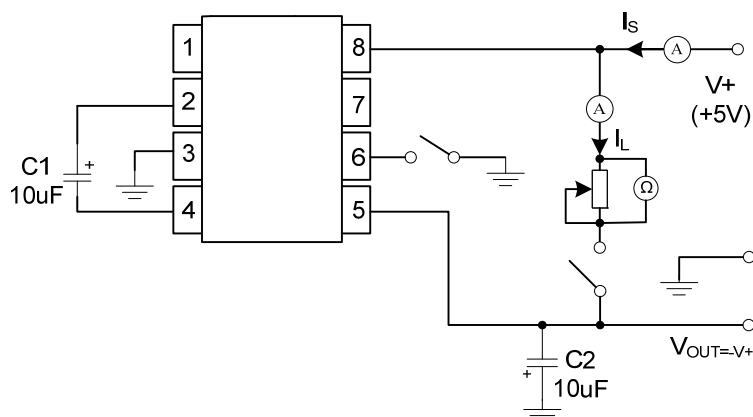
PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	10.5	V
LV and OSC Inputs Voltage	$V_{CC} < 5.5V$	V_I	$-0.3 \sim V_{CC} + 0.3$	V
	$V_{CC} > 5.5V$		$V_{CC} - 5.5 \sim V_{CC} + 0.3$	V
Current Into LV	$V_{CC} > 3.5V$	I_{LV}	20	μA
Output Short-circuit duration	$V_{SUPPLY} \pm 5.5V$	t_{OS}	Continuous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

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 ($T_A = 25^{\circ}C$, 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	μA
Supply Voltage Range (Low)	V_{CC_LOW}	$R_L = 10K\Omega$, LV=GND	1.5		3.5	V
Supply Voltage Range (high)	V_{CC_HIGH}	$R_L = 10K\Omega$, LV Open	3		10	V
Output Source Resistance	R_{OUT}	$I_O = 20mA$		100		Ω
		$V_{CC} = 2V$, $I_O = 3mA$, LV=GND		210		Ω
Oscillator Frequency	f_{OSC}			10		kHz
Power Efficiency	η_{POWER}	$R_L = 5K\Omega$	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	μA
Output Source Resistance	R_{OUT}	$I_O = 10mA$		140		Ω
Oscillator Frequency	f_{OSC}	$C_{OSC} = 0$	5	9		kHz
Power Efficiency	η_{POWER}	$R_L = 5K\Omega$	95	98		%
Voltage Conversion Efficiency	η_{VOUT}	$R_L = \infty$	99			%

■ TESTING CIRCUIT

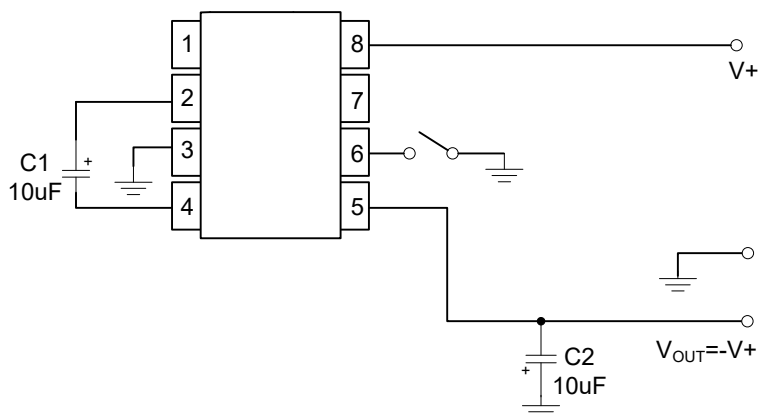


■ APPLICATION INFORMATION

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 ($25\Omega - 30\Omega$), then a $2.2\mu F$ capacitor from terminal-8(V_{CC}) to ground may be required to limit rising-rate of input voltage to less than $2V/\mu S$.
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)

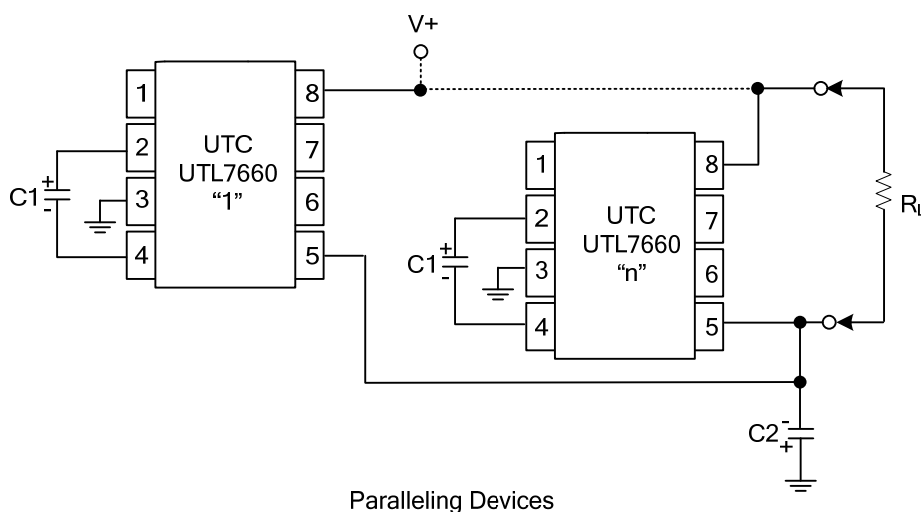
■ TYPICAL APPLICATION CIRCUIT



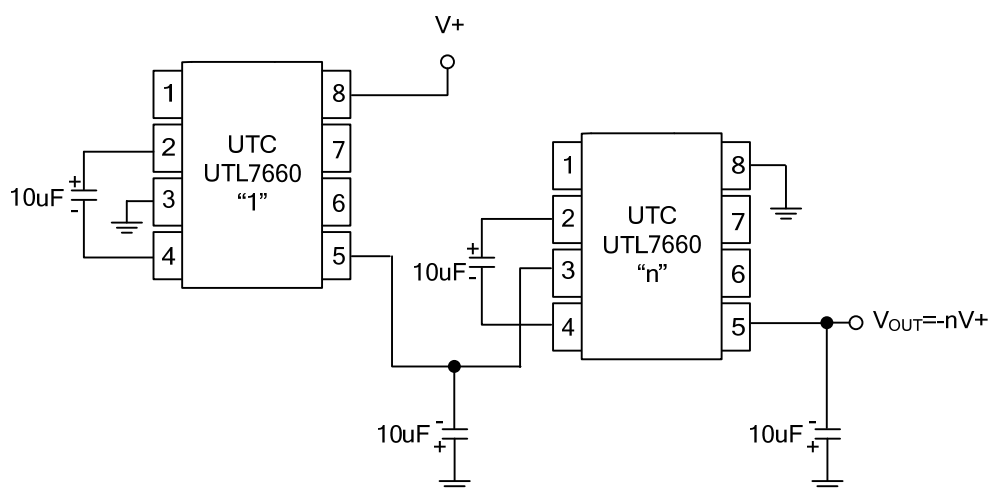
Above figure is the basic application circuit to provide a negative supply from $-1.5V \sim -10V$ while a positive supply from $+1.5V \sim +10V$ is available. When $V_{CC}=+5V$, the output resistance is about 100Ω ; The output voltage is $-4V$ while the load current is $10mA$.

■ TYPICAL APPLICATION CIRCUIT (Cont.)

$R_{OUT} = R_{OUT} \text{ (of UTL7660) } / n \text{ (number of devices)}$



$V_{OUT} = -n (V_{IN})$



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