Data Sheet
June 1998

microelectronics group

Lucent Technologies
Bell Labs Innovations

L7590C Telephone Ringing Driver

Features

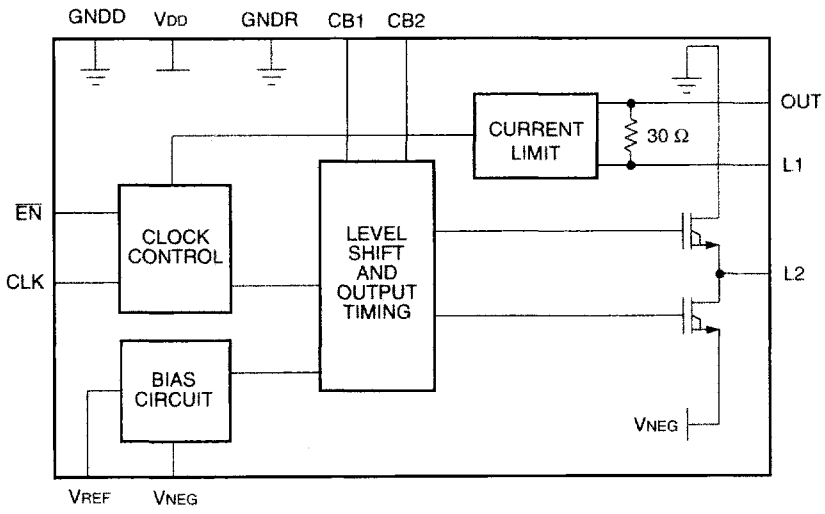
- Applies a battery-backed, single-ended, sinusoidal ringing signal to the telephone loop
- Ringing capability:
  — 40 Vrms into 5 North American REN
  — 30 mApeak into 4 German REN
- Built-in current limiting
- Low power dissipation in idle and ringing modes
- Requires 5 V, a high-value negative dc supply, and a digital input sequence

Description

The L7590C Telephone Ringing Driver produces a low-frequency sinusoidal ringing signal for analog telephone loops. This is accomplished by producing an output pulse stream that is an amplified replica of the digital input. The output is then filtered to produce a sine wave. The peak-to-peak output level is determined by the magnitude of the negative high-voltage dc applied to the device (up to –170 V).

The required input is a 100 kHz CMOS-compatible pulse stream, pulse-width modulated (PWM) at the desired ringing frequency. The output stage consists of one upper and one lower drive transistor with an internal control circuit.

The L7590C IC is optimized for low power dissipation and is available in a 16-pin, surface-mount package.



12-3057a (f)

Figure 1. Block Diagram

Pin Information

Pin	Symbol	Type	Name/Function
14	V_{DD}	—	**+5 V Power Supply.**
3	GNDD	—	**Digital Ground.**
12	GNDR	—	**Ringing Ground.**
8	V_{NEG}	—	**Negative Power Supply.** Determines the swing of the ringing generator. Connect a 1 µF capacitor from V_{NEG} to V_{REF}.
5	V_{REF}	—	**Internal Reference Voltage.** Connect a 1 µF capacitor from V_{REF} to V_{NEG}.
16	CLK	I	**Clock.** Modulated pulse stream. Low = 0 V. High = V_{DD}.
7	OUT	O	**Ringing Generator Output.** Connect to ringing relay contact through a filter.
1	CB1	—	**Bootstrap Capacitor.** Connect a 0.1 µF capacitor between CB1 and CB2.
2	CB2	—	**Bootstrap Capacitor.** Connect a 0.1 µF capacitor between CB1 and CB2.
9	L1	—	**Filter Inductor.** Connect an inductor to pin L2.
10	L2	—	**Filter Inductor.** Connect an inductor to pin L1.
15	$\overline{EN}$	—	**Not Enable.** A logic low activates the internal circuitry. A logic high puts the device in a low-power powerdown mode.

Absolute Maximum Ratings (T_A = 25 °C)

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this data sheet. Exposure to absolute maximum ratings for extended periods may adversely affect device reliability.

Parameter	Min	Typ	Max	Unit
V_{DD}	—	7.0	—	V
V_{NEG}	—	–200	—	V
Timing Input Voltage	–0.5	—	7.0	V
Storage Temperature Range	–40	—	125	°C
Maximum Junction Temperature	—	150	—	°C
Relative Humidity Range	5	—	95	%

Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Ambient Temperature	–40	—	85	°C
V_{DD} Supply Voltage	4.75	5.0	5.25	V
V_{NEG} Supply Voltage	–170	—	–130	V

Electrical Characteristics

Electrical characteristics apply for 25 °C. Unless noted, V_{DD} = +5 V, V_{NEG} = –170 V, $\overline{EN}$ = low, L1 = 20 mH (Rdc = 20 Ω, Ceff = 20 pF), CLK = 100 kHz. Positive currents flow into the device. Typical is defined as 25 °C.

Parameter	Min	Typ	Max	Unit
Power Supply—Idle (CLK = H or L, $\overline{EN}$ = high, dc): I				