LINEAR TECHNOLOGY

Quad Low Power Line Driver

FEATURES

- Low Operating Voltage ±5V to ±15V
- **Supply Current: 500μA**
- **Zero Supply Current When Shut Down**
- **Outputs Can Be Driven ±30V**
- Output "Open" When Off (Three-State)
- Output Drive: 10mA
- Pinout Similar to 1488*
- Output of Several Devices Can Be Paralleled

APPLICATIONS

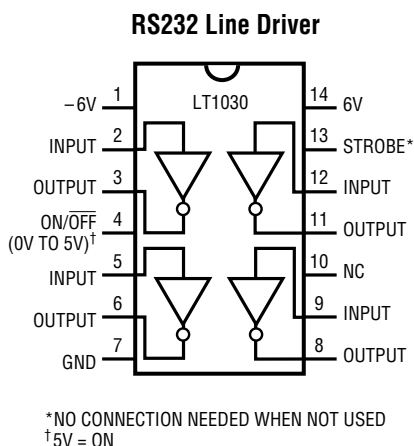- RS232 Driver
- Micropower Interface
- Level Translator

DESCRIPTION

The LT®1030 is an RS232 line driver that operates over a ±5V to ±15V range on low supply current and can be shut down to zero supply current. Outputs are fully protected from externally applied voltages of ±30V by current limiting. Since the output swings to within 200mV of the positive supply and 1V of the negative supply, power supply needs are minimized.

A major advantage of the LT1030 is the high impedance output state when off or powered down, which allows several different drivers on the same bus.
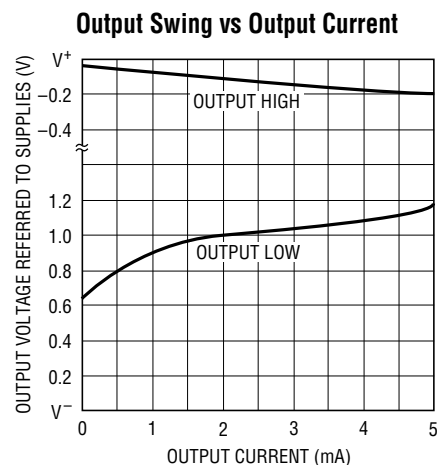
Our RS232 product line includes other high performance devices. The LT1039 is a triple low power driver/receiver with shutdown that can be powered from a 5V supply. The LT1080 is a 5V powered dual driver/receiver with on-chip ±9V power generator and shutdown.

LT, LTC and LT are registered trademarks of Linear Technology Corporation.
Check compatability (some pins may be different).

TYPICAL APPLICATION

RS232 Line Driver

Pin	Signal	Pin	Signal
1	−6V	14	6V
2	INPUT	13	STROBE*
3	OUTPUT	12	INPUT
4	ON/OFF (0V TO 5V)†	11	OUTPUT
5	INPUT	10	NC
6	OUTPUT	9	INPUT
7	GND	8	OUTPUT

LT1030

*NO CONNECTION NEEDED WHEN NOT USED
†5V = ON

LT1030 • TA01

Output Swing vs Output Current

LT1030 • TA02

ABSOLUTE MAXIMUM RATINGS

Supply Voltage .... ±15V
Logic Input Pins .... V$^-$ to 25V
On/$\overline{\text{Off}}$ Pin .... GND to 12V
Output (Forced) .... V$^-$ + 30V, V$^+$ − 30V
Short-Circuit Duration (to ±30V) .... Indefinite
Operating Temperature Range
    Commercial .... 0°C to 70°C
    Guaranteed Functional by Design .... −25°C to 85°C
Storage Temperature .... −65°C to 150°C
Lead Temperature (Soldering, 10 sec) .... 300°C

PACKAGE/ORDER INFORMATION

TOP VIEW

V$^-$ (−15V TO −5V) — 1
2
ON/$\overline{\text{OFF}}$ (0V TO 5V) — 3
4
5
6
GND — 7
8
9
10
11
12
13 — STROBE
14 — V$^+$ (5V TO 15V)

N PACKAGE
14-LEAD PDIP

S PACKAGE
14-LEAD PLASTIC SO

T$_{JMAX}$ = 125°C, θ$_{JA}$ = 90°C/W (N)
T$_{JMAX}$ = 125°C, θ$_{JA}$ = 95°C/W (S)

ORDER PART NUMBER
LT1030CN LT1030CS
LT1030CJ CONSULT FACTORY

Consult factory for Industrial and Military grade parts.

ELECTRICAL CHARACTERISTICS (Supply Voltage = ±5 to ±15V)

PARAMETER	CONDITIONS			MIN	TYP	MAX	UNITS
Supply Current	V$_{ON/\overline{OFF}}$ ≥ 2.4V, I$_{OUT}$ = 0, All Outputs Low		●		500	1000	µA
Power Supply Leakage Current	V$_{ON/\overline{OFF}}$ ≤ 0.4V				1	10	µA
	V$_{ON/\overline{OFF}}$ ≤ 0.1V		●		10	150	µA
Output Voltage Swing	Load = 2mA	Positive		V$^+$ − 0.3V	V$^+$ − 0.1V		V
		Negative			V$^-$ + 0.9V	V$^-$ + 1.4V	V
Output Current	V$_{SUPPLY}$ ± 5V to ±15V			5	12		mA
Output Overload Voltage (Forced)	Operating or Shutdown		●	V$^+$ − 30V		V$^-$ + 30V	V
Output Current	Shutdown	V$_S$ = 0V, V$_{OUT}$ = ±30V			2	100	µA
		V$_S$ = ±15V, V$_{OUT}$ = ±20V			2	100	µA
Input Overload Voltage (Forced)	Operating or Shutdown		●	V$^-$		15	V
Logic Input Levels	Low Input (V$_{OUT}$ = High)		●		1.4	0.8	V
	High Input (V$_{OUT}$ = Low)		●	2	1.4		V
Logic Input Current	V$_{IN}$ > 2.0V				2	20	µA
	V$_{IN}$ < 0.8V				10	20	µA
On/$\overline{\text{Off}}$ Pin Current	0 ≤ V$_{IN}$ ≤ 5V		●	−10	30	65	µA
Slew Rate				4	15	30	V/µS

The ● denotes specifications which apply over the full operating temperature range.

Note 1: 3V applied to the Strobe pin will force all outputs low. Strobe pin input impedance is about 2k to ground. Leave open when not used.

PIN FUNCTIONS

V$^-$(Pin 1): Operates −15V to −2V.

LOGIC INPUT (Pins 2, 5, 9, 12): Operate properly on TTL or CMOS levels. Output valid from (V$^-$ + 2V) ≤ V$_{IN}$ ≤ 15V. Connect to 5V when not used.
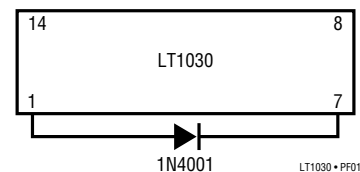
OUTPUT (Pins 3, 6, 8, 11): Line drive outputs.

ON/$\overline{\text{OFF}}$ (Pin 4): Shuts down entire circuit. Cannot be left open. For "normally on" operation, connect between 5V to 10V.

GND (Pin 7): Ground must be more positive than V$^-$.

STROBE (Pin 13): Forces all outputs low. Drive with 3V.

V$^+$ (Pin 14): Positive supply 5V to 15V.

14
LT1030
1
8
7
1N4001
LT1030 • PF01

Note: As with other bipolar ICs, forward biasing the substrate diode can cause problems. The LT1030 will draw high current from V$^+$ to ground if the V$^-$ pin is open circuited or pulled above ground. If this is possible, connecting a diode from V$^-$ to ground will prevent the high current state. Any low cost diode can be used.
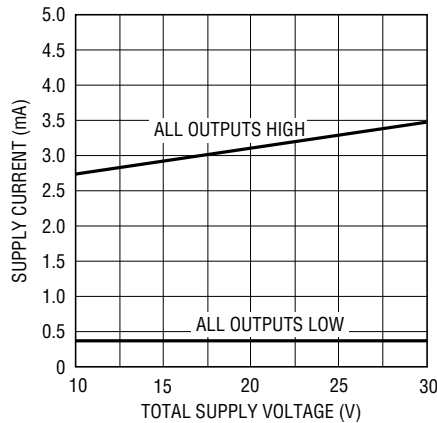
TYPICAL PERFORMANCE CHARACTERISTICS
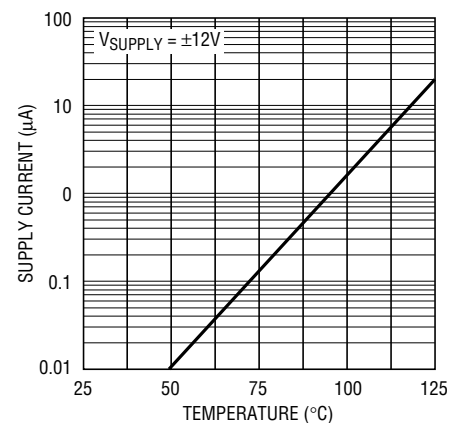
On Supply Current vs Temperature
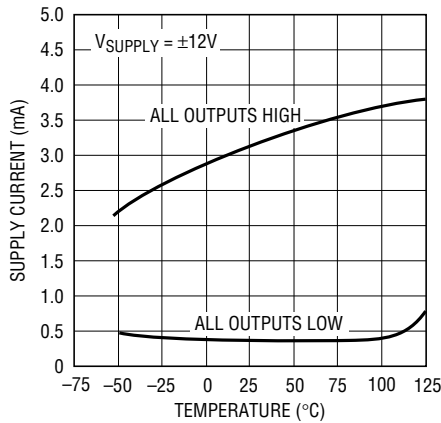
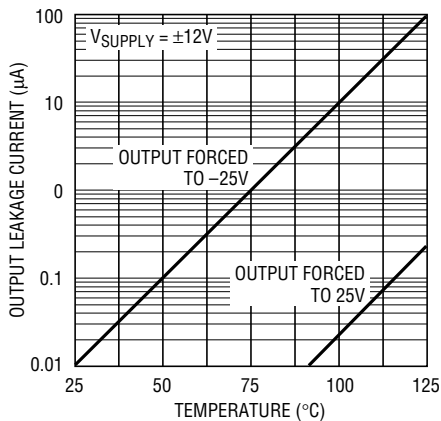LT1030 • TPC01

On Supply Current vs Supply Voltage

LT1030 • TPC02

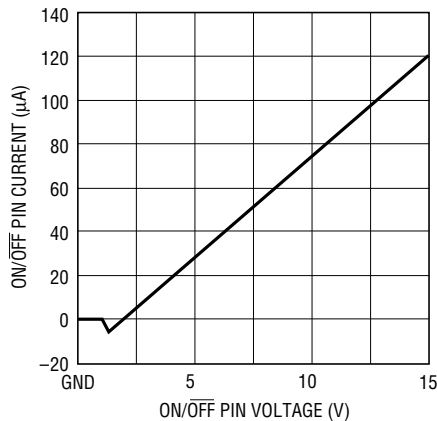### Off Supply Current vs Temperature

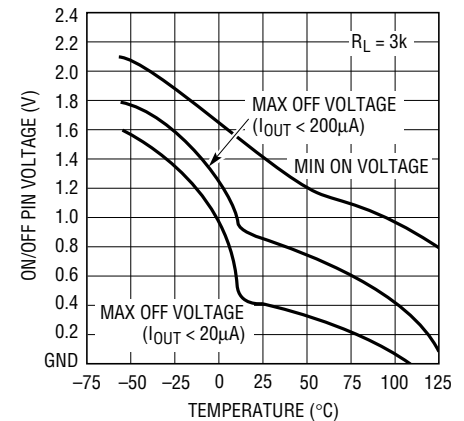LT1030 • TPC03

Off Output Leakage vs Temperature

LT1030 • TPC04

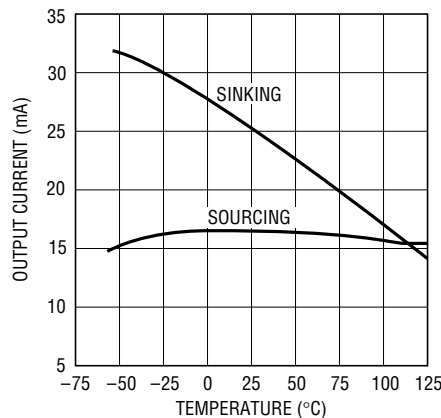### On/Off Pin Current vs Voltage

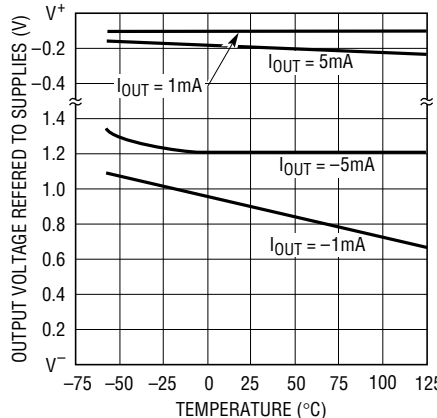LT1030 • TPC05

Shutdown Voltage vs Temperature

LT1030 • TPC06
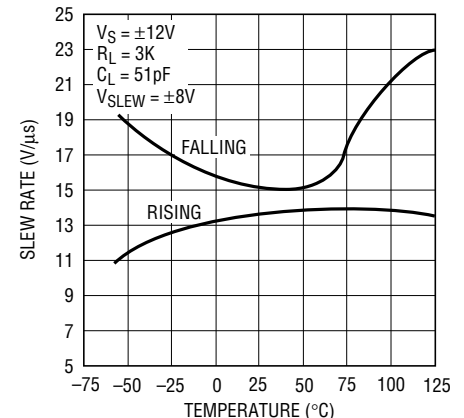
Current Limit vs Temperature

LT1332 • TPC06
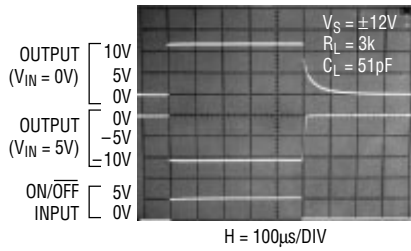
Output Swing vs Temperature
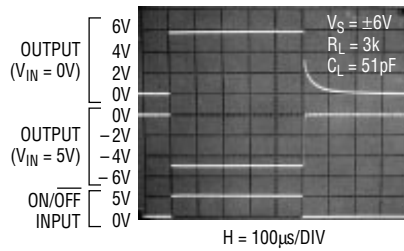

LT1030 • TPC08

Slew Rate vs Temperature
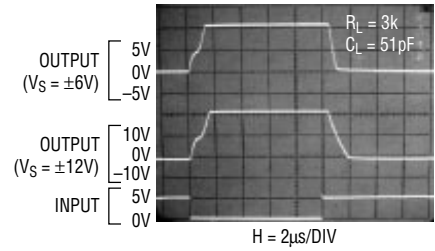

LT1030 • TPC09

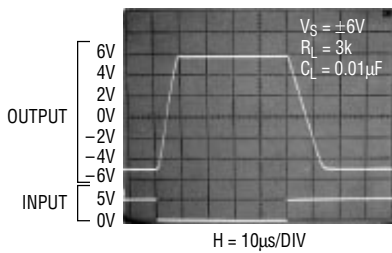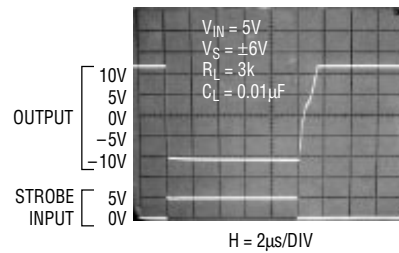# TYPICAL PERFORMANCE CHARACTERISTICS

On-Off Response Time

OUTPUT (V$_{IN}$ = 0V) 10V / 5V / 0V

OUTPUT (V$_{IN}$ = 5V) 0V / –5V / –10V

ON/OFF INPUT 5V / 0V

V$_S$ = ±12V
R$_L$ = 3k
C$_L$ = 51pF

H = 100µs/DIV

On-Off Response Time

OUTPUT (V$_{IN}$ = 0V) 6V / 4V / 2V / 0V

OUTPUT (V$_{IN}$ = 5V) 0V / –2V / –4V / –6V

ON/OFF INPUT 5V / 0V

V$_S$ = ±6V
R$_L$ = 3k
C$_L$ = 51pF

H = 100µs/DIV

Output Waveforms

OUTPUT (V$_S$ = ±6V) 5V / 0V / –5V

OUTPUT (V$_S$ = ±12V) 10V / 0V / –10V

INPUT 5V / 0V

R$_L$ = 3k
C$_L$ = 51pF

H = 2µs/DIV

Output Waveform Driving Capacitive Load

OUTPUT 6V / 4V / 2V / 0V / –2V / –4V / –6V

INPUT 5V / 0V

V$_S$ = ±6V
R$_L$ = 3k
C$_L$ = 0.01µF

H = 10µs/DIV

Strobe Pin Response Time

OUTPUT 10V / 5V / 0V / –5V / –10V

STROBE INPUT 5V / 0V

V$_{IN}$ = 5V
V$_S$ = ±6V
R$_L$ = 3k
C$_L$ = 0.01µF

H = 2µs/DIV

PACKAGE DESCRIPTION Dimension in inches (millimeters) unless otherwise noted.

**N Package
14-Lead Plastic DIP**

0.300 – 0.325
(7.620 – 8.255)

0.009 – 0.015
(0.229 – 0.381)

0.325 $^{+0.025}_{-0.015}$
(8.255 $^{+0.635}_{-0.381}$)

0.130 ± 0.005
(3.302 ± 0.127)

0.015
(0.380)
MIN

0.125
(3.175)
MIN

0.005
(0.125)
MIN

0.100 ± 0.010
(2.540 ± 0.254)

0.045 – 0.065
(1.143 – 1.651)

0.065
(1.651)
TYP

0.018 ± 0.003
(0.457 ± 0.076)

0.770*
(19.558)
MAX

0.255 ± 0.015*
(6.477 ± 0.381)

N14 0695

*THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.010 INCH (0.254mm)

**S Package
14-Lead Plastic SO**

0.010 – 0.020
(0.254 – 0.508) × 45°

0.008 – 0.010
(0.203 – 0.254)

0° – 8° TYP

0.016 – 0.050
(0.406 – 1.270)

0.053 – 0.069
(1.346 – 1.752)

0.014 – 0.019
(0.355 – 0.483)

0.050
(1.270)
TYP

0.004 – 0.010
(0.101 – 0.254)

0.337 – 0.344*
(8.560 – 8.738)

0.228 – 0.244
(5.791 – 6.197)

0.150 – 0.157**
(3.810 – 3.988)

S14 0695

*DIMENSION DOES NOT INCLUDE MOLD FLASH. MOLD FLASH
SHALL NOT EXCEED 0.006" (0.152mm) PER SIDE
**DIMENSION DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD
FLASH SHALL NOT EXCEED 0.010" (0.254mm) PER SIDE

RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LT1180A	Dual 5V RS232 Transceiver with Shutdown	Shutdown Plus 10kV ESD
LTC®1321	Programmable RS232/RS485 Transceiver	Low Supply Current, High Speed Data Transmission
LT1134A	4-Driver/4-Receiver RS232 Tranceiver	Single 5V Supply, 10kV ESD Protection, 0.1µF Charge Pump Capacitor
LTC1383	Micropower Dual 5V RS232 Transceiver	Lowest Power 2-Driver/2-Receiver Solution