Quad Low Power Line Driver

FEATURES

- Low Operating Voltage ±5V to ±15V
- 500μA Supply Current
- Zero Supply Current when Shut Down
- Outputs Can Be Driven ±30V
- Thermal Limiting
- Output "Open" when Off (Three-State)
- 10mA Output Drive
- Pinout Similar to 1488 (See Diagram)*

APPLICATIONS

- RS232 Driver
- Power Supply Inverter
- Micropower Interface
- Level Translator

* Check compatibility, some pins different

DESCRIPTION

The LT1032 is a RS232 and RS423 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 both current and thermal limiting. Since the output swings to within 200mV of the positive supply and 600mV of the negative supply, power supply needs are minimized.

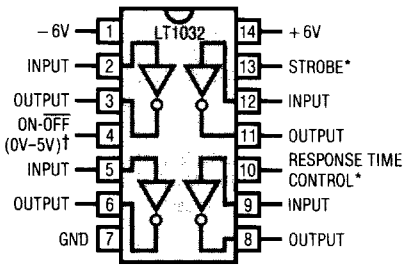
Also included is a strobe pin to force all outputs low independent of input or shutdown conditions. Further, slew rate can be adjusted with a resistor connected to the supply.

A major advantage of the LT1032 is the high impedance output state when off or powered down.

For applications requiring dual or triple RS232 driver/receiver devices, see the LT1080 (dual) or LT1039 (triple) datasheets.

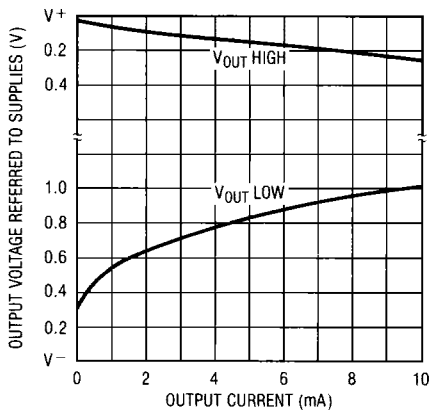
TYPICAL APPLICATION

RS232 Line Driver



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

Output Swing vs Output Current



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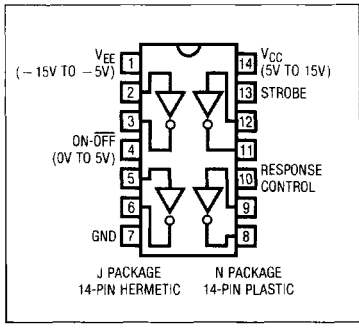
ABSOLUTE MAXIMUM RATINGS

Supply Voltage ..... ±15V
Logic Input Pins ..... V^- to 25V
On-$\overline{\text{Off}}$ Pin ..... GND to 15V
Output (Forced) ..... V^- +30V, V^+ −30V
Response Pin ..... ±6V
Short Circuit Duration (to ±30V) ..... Indefinite
Operating Temperature Range
LT1032M ..... −55°C to 125°C
LT1032C ..... 0°C to 70°C
Guaranteed Functional by Design ... −25°C to 85°C
Lead Temperature (Soldering, 10 sec) ..... 300°C

PACKAGE/ORDER INFORMATION



ORDER PART NUMBER
LT1032MJ LT1032CJ LT1032CN

ELECTRICAL CHARACTERISTICS

(Supply Voltage = ±5V to ±15V)

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Supply Current	$V_{ON\text{-}\overline{OFF}} \geq 2.4V$, $I_{OUT} = 0$, All Outputs Low	●		500	1000	μA
Power Supply Leakage Current	$V_{ON\text{-}\overline{OFF}} \leq 0.4V$			1	10	μA
	$V_{ON\text{-}\overline{OFF}} \leq 0.1V$, $T_A = 125°C$	●		10	50	μA
Output Voltage Swing	Load = 2mA, Positive		$V^+ - 0.3V$	$V^+ - 0.1V$		V
	Load = 2mA, Negative			$V^- + 0.7V$	$V^- + 0.9V$	V
Output Current	V_{SUPPLY} ±5V to ±15V		10	22		mA
Output Overload Voltage (Forced)	Operating or Shutdown	●	$V^+ - 30V$		$V^- + 30V$	V
Output Current	Shutdown $V_{OUT} = \pm 30V$			2	100	μA
Input Overload Voltage (Forced)	Operating or Shutdown	●	V^-		30V	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	$0 \leq V_{IN} \leq 5V$	●	−10	3	50	μA
Slew Rate	$I_{RESPONSE} = 0$		4	15	30	V/μS
Change in Slew Rate (Note 2)	$I_{RESPONSE} = +50\mu A$			+50		%
	$I_{RESPONSE} = -50\mu A$			−50		%
Response Pin Leakage	$V_{SUPPLY} = \pm 6V$, $V_{ON/OFF} \leq 0.4V$, $V_{RESPONSE} = \pm 6V$			1		μA

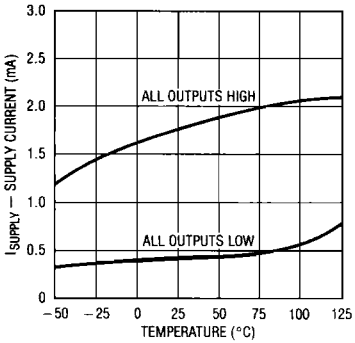
The ● denotes specifications which apply over the operating temperature range.

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.

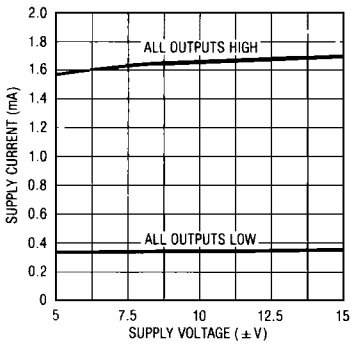
Note 2: Response can be changed by connecting a resistor to the supply. For supplies less than ±6V this current is disconnected when shut down. Leave open when not used.

TYPICAL PERFORMANCE CHARACTERISTICS

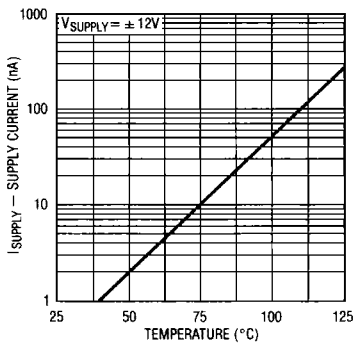
On Supply Current vs Temperature



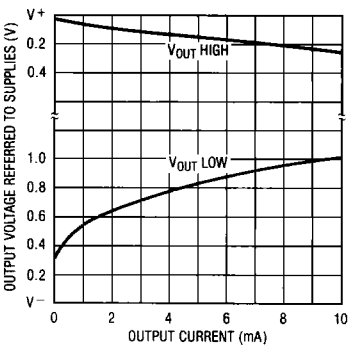
Supply Current vs Supply Voltage



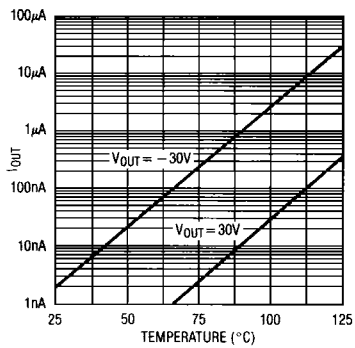
Off Supply Current vs Temperature



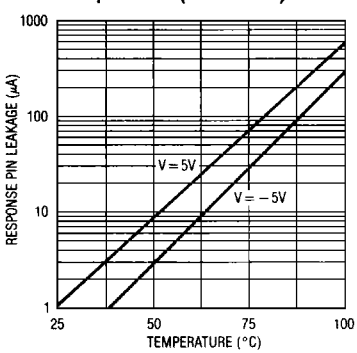
Output Swing vs Output Current



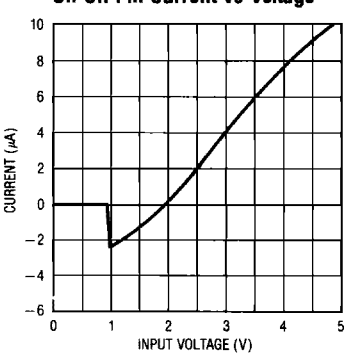
Output Leakage vs Temperature



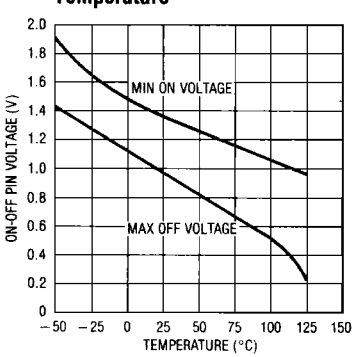
Response Pin Leakage vs Temperature (Device Off)



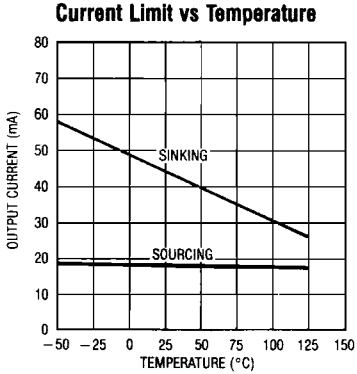
On-$\overline{\text{Off}}$ Pin Current vs Voltage



Shutdown Pin Voltage vs Temperature



Current Limit vs Temperature



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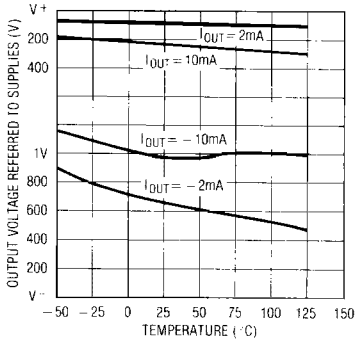
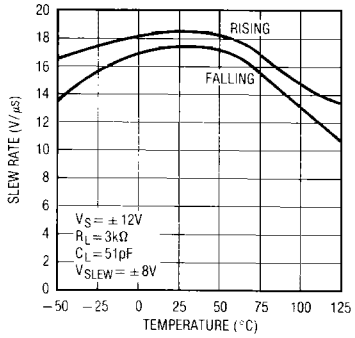
TYPICAL PERFORMANCE CHARACTERISTICS

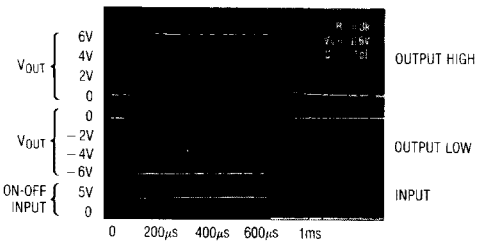
Output Swing vs Temperature



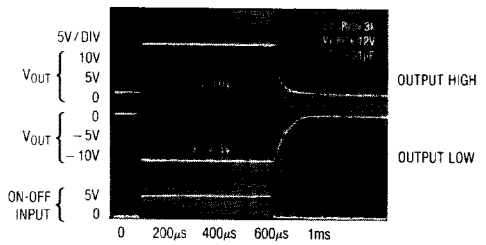
Slew Rate vs Temperature



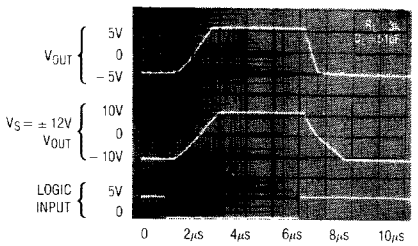
On-$\overline{\text{Off}}$ Response Time



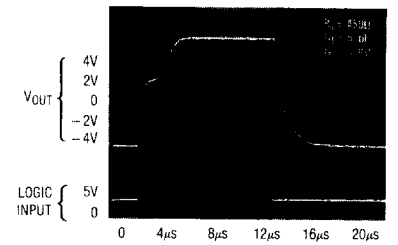
On-$\overline{\text{Off}}$ Response Time



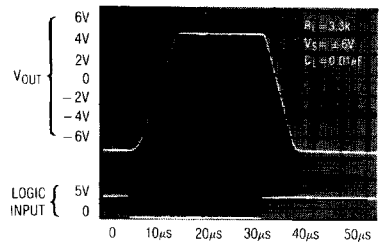
Output Waveform



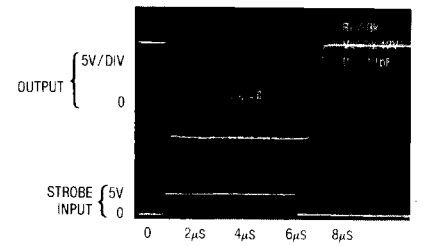
Output Waveform



Output Waveform Driving Capacitive Load



Strobe Pin Response



APPLICATIONS INFORMATION

Application Hints

The LT1032 is exceptionally easy to use when compared to older drivers. Operating supply voltage can be as low as ±3V or as high as ±15V. Input levels are referred to ground.

The logic inputs are internally set at TTL levels. Outputs are valid for input voltages from 1V above V^- to 25V. Driving the logic inputs to V^- turns off the output stage. The "on-off" control completely turns off all supply current of the LT1032. The levels required to drive the device on or off are set by internal emitter-base voltages. Since the current into the "on-$\overline{\text{off}}$" pin is so low, TTL or CMOS drivers have no problem controlling the device.

The strobe pin is not fully logic compatible. The impedance of the strobe pin is about 2kΩ to ground. Driving the strobe pin positive forces the output stages low—even if the device is shut off. Under worst-case conditions, 3V minimum at 2mA are needed driving the strobe pin to insure strobing.

The response pin can be used to make some adjustment in slew rate. A resistor can be connected between the response pin and the power supplies to drive 50μA to 100μA into the pin. The response pin is a low impedance point operating at about 0.75V above ground. For supply voltage up to ±6V, current is turned off when the device is turned off. For higher supply voltages, a zener should be connected in series with the resistor to limit the voltage applied to the response pin to 6V. Also, for temperatures above 100°C, using the response pin is not recommended. The leakage current into the response pin at high temperatures is excessive.

Outputs are well protected against shorts or externally applied votlage. Tested limits are ±30V, but the device can withstand external voltages up to the breakdown of the transistors (typically about 50V). The LT1032 is usually immune to ESD up to 2500V on the outputs with no damage (limit of LTC tester).

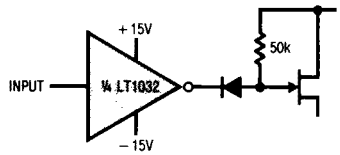
PIN FUNCTION

PIN	FUNCTION	COMMENT
1	Minus Supply	Operates −2V to −15V
2,5,9,12	Logic Input	Operates properly on TTL or CMOS levels. Output valid from $(V^- + 2V) \leq V_{IN} \leq 15V$. Connect to ground when not used.
3,6,8,11	Output	Line drive output.
4	On-$\overline{\text{Off}}$	Shuts down entire circuit. Cannot be left open. For "normally on" operation, connect to V+.
7	Ground	Ground must be more positive than V^-
10	Response Control	Allows limited change of slew rate. Leave open when not used.
13	Strobe	Forces all outputs low. Drive with 3V.
14	Positive Supply	Operates 5V to 15V

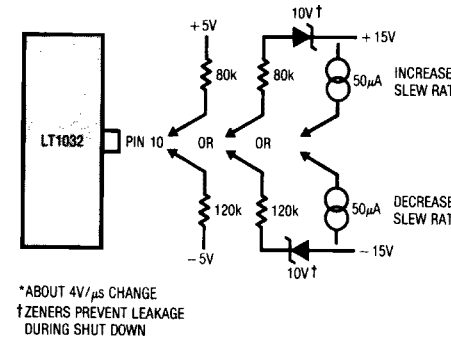
TYPICAL APPLICATIONS

Protecting Against More than ±30V Output Overload

FET Driver

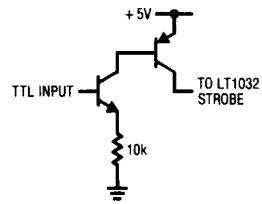


Slew Rate Adjustment*

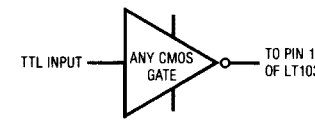


*ABOUT 4V/μs CHANGE
†ZENERS PREVENT LEAKAGE DURING SHUT DOWN

TTL/CMOS Compatible Strobe

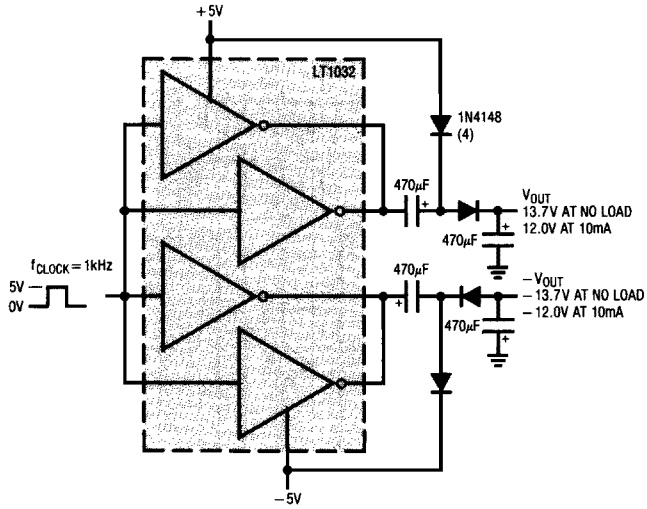


Strobing with CMOS

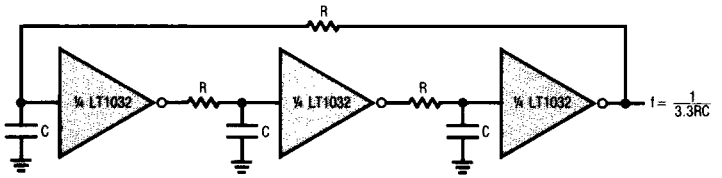


TYPICAL APPLICATIONS

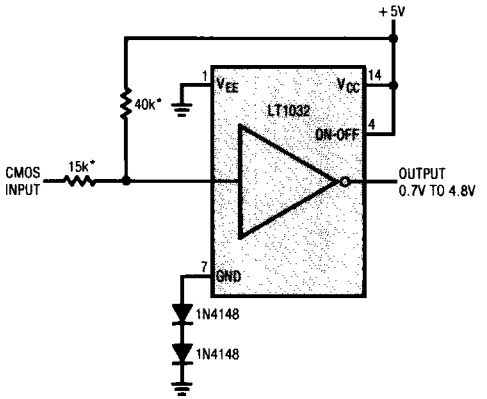
±5V to ±15V Voltage Multiplier



Phase Shift Oscillator



Operating from a Single 5V Supply



*LEVEL SHIFTING RESISTORS NEEDED FOR EACH INPUT

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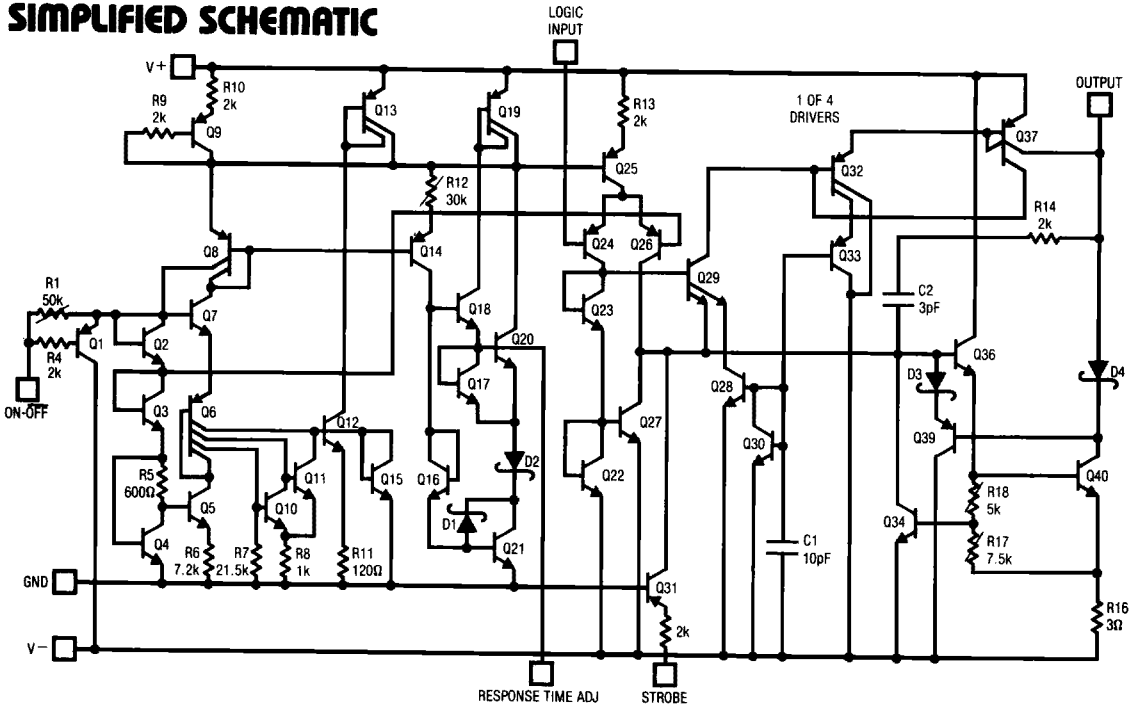
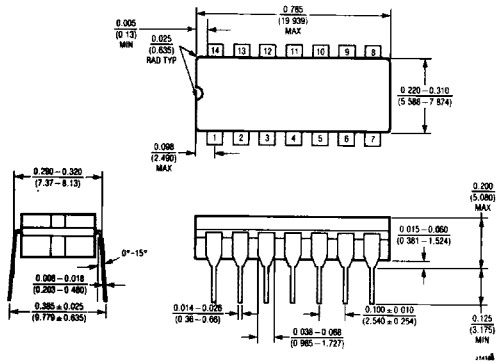
SIMPLIFIED SCHEMATIC

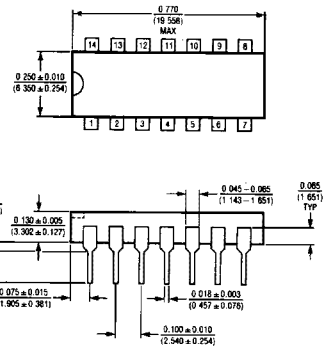


PACKAGE DESCRIPTION

J Package
14-Lead Ceramic DIP



N Package
14-Lead Plastic DIP



	T_{jmax}	Θ_{jA}	Θ_{jC}
LT1032MJ	150°C	100°C/W	60°C/W
LT1032CJ	85°C	100°C/W	60°C/W
LT1032CN	85°C	100°C/W	60°C/W