THE DATASHEET OF

LT1342CNW#PBF

5V RS232 Transceiver with 3V Logic Interface

FEATURES

- **ESD Protection Over ±10kV**
- 3V Logic Interface
- Uses Small Capacitors: 0.1µF, 0.2µF
- 1µA Supply Current in Shutdown
- Low Power Driver Disable Operating Mode
- Pin Compatible with LT1137A
- **120kBaud Operation for R_L = 3k, C_L = 2500pF**
- **250kBaud Operation for R_L = 3k, C_L = 1000pF**
- CMOS Comparable Low Power: 60mW
- Operates from a 5V Supply and 3V Logic Supply
- Easy PC Layout: Flowthrough Architecture
- Rugged Bipolar Design
- Outputs Assume a High Impedance State When Off or Powered Down
- Absolutely No Latchup

APPLICATIONS

- Notebook Computers
- Palmtop Computers

DESCRIPTION

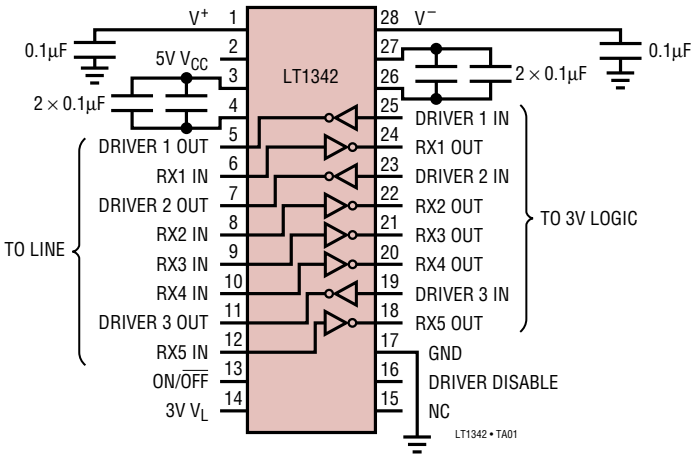
The LT®1342 is an advanced low power three-driver, five-receiver RS232 transceiver. The LT1342 operates from a 5V supply and a 3V logic supply. Receiver outputs can interface directly to 3V logic circuits. Included on the chip is a shutdown pin for reducing supply current to near zero. All receivers and drivers assume high impedance states during shutdown.

The driver disable function provides additional control of operating mode. When driver disable is high the charge pump and drivers turn off. Receivers continue to operate during driver disable.

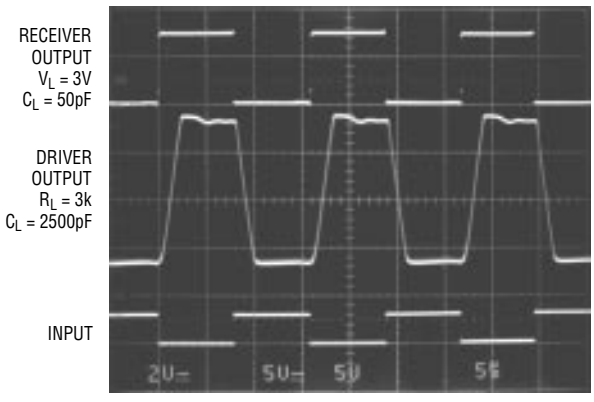
New ESD structures on the chip allow the LT1342 to survive multiple ±10kV strikes, eliminating the need for costly TransZorbs® on the RS232 line pins.

The LT1342 is fully compliant with all EIA RS232 specifications and operates in excess of 120kbaud even driving heavy capacitive loads.

TYPICAL APPLICATION



Output Waveforms

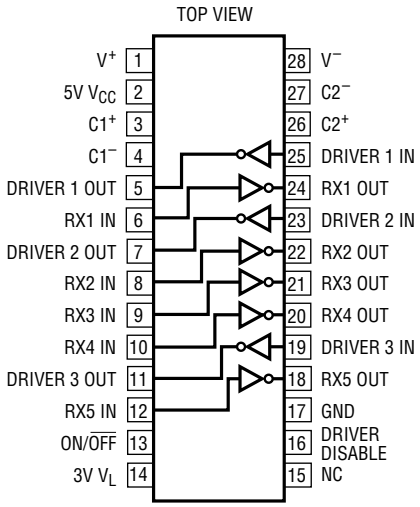


ABSOLUTE MAXIMUM RATINGS

(Note 1)

Supply Voltage (V_{CC}) 6V
Supply Voltage (V_L) 6V
V^+ 13.2V
V^- ..... –13.2V
Input Voltage
  Driver ..... V^- to V^+
  Receiver ..... –30V to 30V
Output Voltage
  Driver ..... –30V to 30V
  Receiver ..... –0.3V to V_{CC} + 0.3V
Short-Circuit Duration
  V^+ ..... 30 sec
  V^- ..... 30 sec
  Driver Output ..... Indefinite
  Receiver Output ..... Indefinite
Operating Temperature Range ..... 0°C to 70°C
Storage Temperature Range ..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec)..... 300°C

PACKAGE/ORDER INFORMATION



G PACKAGE
28-LEAD PLASTIC SSOP

NW PACKAGE
28-LEAD WIDE PDIP

SW PACKAGE
28-LEAD WIDE PLASTIC SO

T_{JMAX} = 125°C, θ_{JA} = 96°C/W (G)
T_{JMAX} = 125°C, θ_{JA} = 56°C/W (NW)
T_{JMAX} = 125°C, θ_{JA} = 85°C/W (SW)

ORDER PART NUMBER
LT1342CG
LT1342CNW
LT1342CSW

Consult factory for Industrial and Military grade parts.

ELECTRICAL CHARACTERISTICS (Note 2)

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Power Supply Generator						
V^+ Output				8.6		V
V^- Output				–7		V
Supply Current (V_{CC})	(Note 3)			12	17	mA
Logic Supply Current (V_L)	(Note 4)			0.1	1	mA
Supply Current When OFF (V_{CC})	Shutdown (Note 5) Driver Disable	● 		1 3	10 	µA mA
Logic Supply Current (V_L) When OFF	Shutdown (Note 5) Driver Disable	● 		1 0.1	10 1	µA mA
Supply Rise Time Shutdown to Turn-On	C1 = C2 = 0.2µF, $C^+ = C^-$ = 0.1µF			0.2		ms
ON/$\overline{OFF}$ Pin Thresholds	Input Low Level (Device Shutdown) Input High Level (Device Enabled)	● ●	 2.4	1.4 1.4	0.8 	V V
ON/$\overline{OFF}$ Pin Current	0V ≤ $V_{ON/\overline{OFF}}$ ≤ 5V	●	–15		80	µA
DRIVER DISABLE Pin Thresholds	Input Low Level (Drivers Enabled) Input High Level (Drivers Disabled)	● ●	 2.4	1.4 1.4	0.8 	V V
DRIVER DISABLE Pin Current	0V ≤ $V_{DRIVER\ DISABLE}$ ≤ 5V	●	–10		500	µA
Oscillator Frequency				130		kHz

ELECTRICAL CHARACTERISTICS (Note 2)

PARAMETER	CONDITIONS			MIN	TYP	MAX	UNITS
Any Driver							
Output Voltage Swing	Load = 3k to GND	Positive	●	5	7.3		V
		Negative	●		–6.5	–5	V
Logic Input Voltage Level	Input Low Level (V_{OUT} = High)		●		1.4	0.8	V
	Input High Level (V_{OUT} = Low)		●	2	1.4		V
Logic Input Current	$0.8V \le V_{IN} \le 2V$		●		5	20	µA
Output Short-Circuit Current	V_{OUT} = 0V			±9	17		mA
Output Leakage Current	Shutdown, V_{OUT} = ±30V (Note 5)		●		10	100	µA
Data Rate (Note 8)	R_L = 3k, C_L = 2500pF			120			kBaud
	R_L = 3k, C_L = 1000pF			250			kBaud
Slew Rate	R_L = 3k, C_L = 51pF				15	30	V/µs
	R_L = 3k, C_L = 2500pF			4	6		V/µs
Propagation Delay	Output Transition t_{HL} High to Low (Note 6)				0.6	1.3	µs
	Output Transition t_{LH} Low to High				0.5	1.3	µs
Any Receiver							
Input Voltage Thresholds	Input Low Threshold (V_{OUT} = High)			0.8	1.3		V
	Input High Threshold (V_{OUT} = Low)				1.7	2.4	V
Hysteresis			●	0.1	0.4	1	V
Input Resistance				3	5	7	kΩ
Output Leakage Current	Shutdown (Note 4) $0 \le V_{OUT} \le V_{CC}$		●		1	10	µA
Receivers 1 Through 4							
Output Voltage	Output Low, I_{OUT} = –1.6mA		●		0.2	0.4	V
	Output High, I_{OUT} = 160µA		●	2.7	2.9		V
Output Short-Circuit Current	Sinking Current, $V_{OUT} = V_{CC}$				–20	–10	mA
	Sourcing Current, V_{OUT} = 0V			10	20		mA
Propagation Delay	Output Transition t_{HL} High to Low (Note 7)				250	600	ns
	Output Transition t_{LH} Low to High				350	600	ns
Receiver 5							
Output Voltage	Output Low, I_{OUT} = –500µA		●		0.2	0.4	V
	Output High, I_{OUT} = 160µA		●	2.7	2.9		V
Output Short-Circuit Current	Sinking Current, $V_{OUT} = V_{CC}$				–4	–2	mA
	Sourcing Current, V_{OUT} = 0V			2	4		mA
Propagation Delay	Output Transition t_{HL} High to Low (Note 7)				1	3	µs
	Output Transition t_{LH} Low to High				1	3	µs

The ● denotes specifications which apply over the full operating temperature range ($0°C \le T_A \le 70°C$ for commercial grade).

Note 1: Absolute Maximum Ratings are those values beyond which the life of the device may be impaired.

Note 2: Testing done at V_{CC} = 5V, V_L = 3.3V and $V_{ON/\overline{OFF}}$ = 3V.

Note 3: Supply current is measured with external capacitors $C^+ = C^-$ = 0.1µF, C1 = C2 = 0.2µF. All outputs are open with all driver inputs tied high.

Note 4: V_L supply current is measured with all receiver outputs high.

Note 5: Supply current and leakage measurements in shutdown are performed with $V_{ON/\overline{OFF}} \le 0.1V$. Supply current measurements using driver disable are performed with $V_{DRIVER\ DISABLE} \ge 3V$.

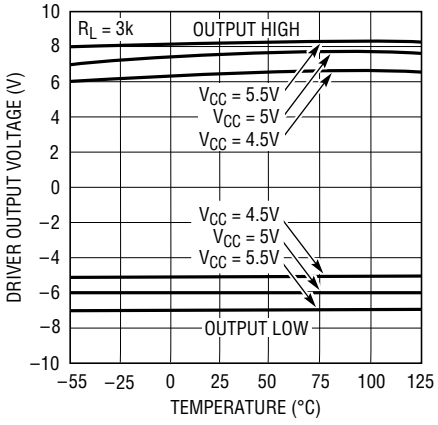
Note 6: For driver delay measurements, R_L = 3k and C_L = 51pF. Trigger points are set between the driver's input logic threshold and the output transition to the zero crossing (t_{HL} = 1.4V to 0V and t_{LH} = 1.4V to 0V).

Note 7: For receiver delay measurements, C_L = 51pF. Trigger points are set between the receiver's input logic threshold and the output transition to standard TTL/CMOS logic threshold (t_{HL} = 1.3V to 2.4V and t_{LH} = 1.7V to 0.8V).

Note 8: Data rate operation guaranteed by slew rate, short-circuit current and propagation delay tests.

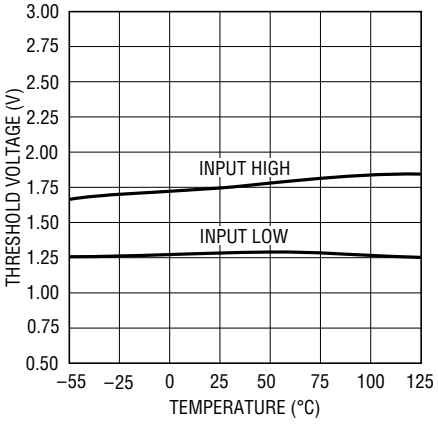
TYPICAL PERFORMANCE CHARACTERISTICS

Driver Output Voltage



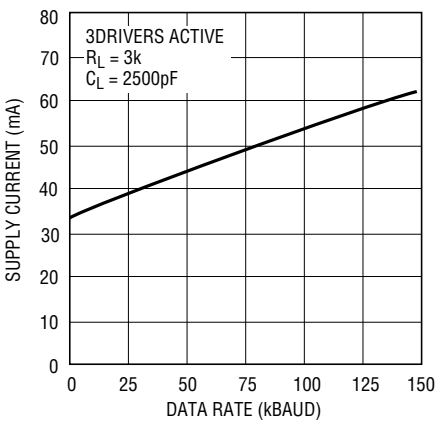
LT1342 • TPC01

Receiver Input Thresholds



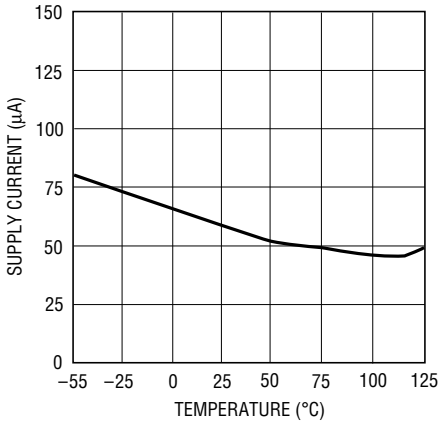
LT1342 • TPC02

Supply Current vs Data Rate



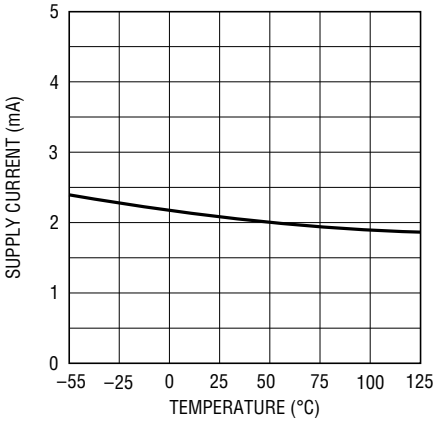
LT1342 • TPC03

Supply Current in Shutdown



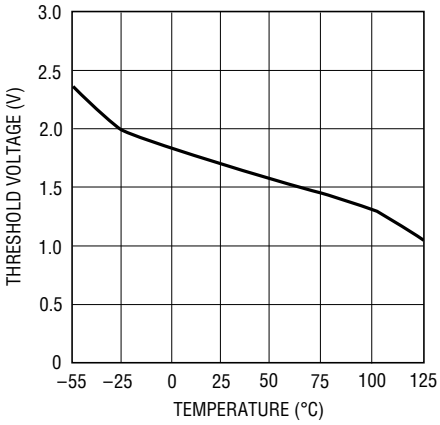
LT1342 • TPC04

Supply Current in Driver Disable



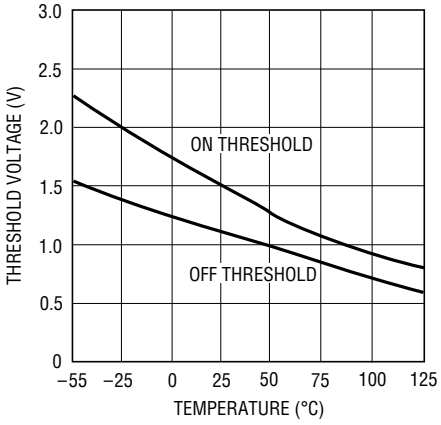
LT1342 • TPC05

Driver Disable Threshold



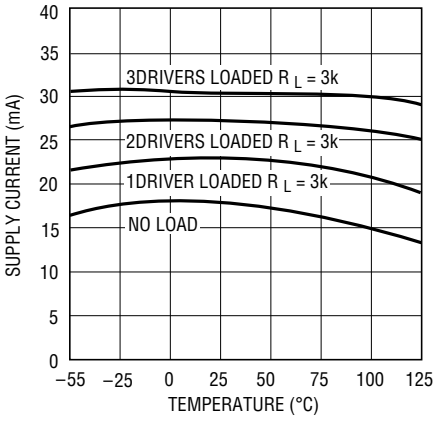
LT1342 • TPC06

ON/$\overline{\text{OFF}}$ Thresholds



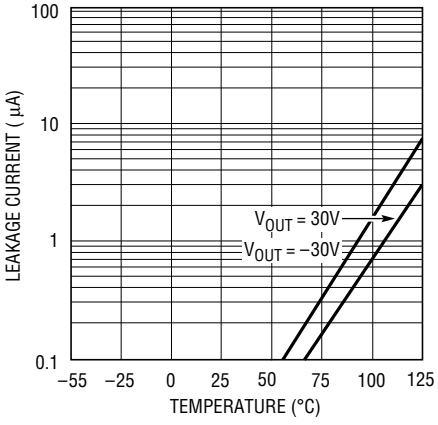
LT1342 • TPC07

Supply Current



LT1341 • TPC08

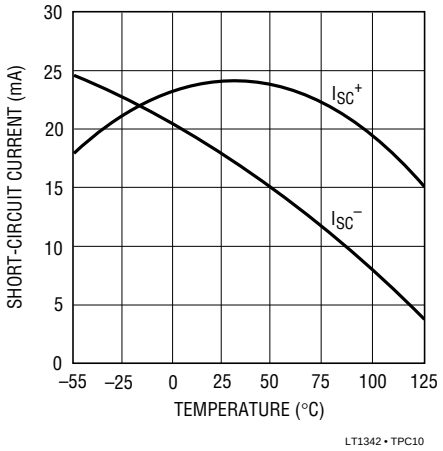
Driver Leakage in Shutdown



LT1342 • TPC09

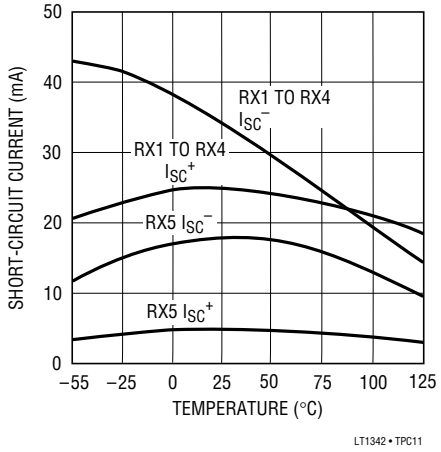
TYPICAL PERFORMANCE CHARACTERISTICS

Driver Short-Circuit Current



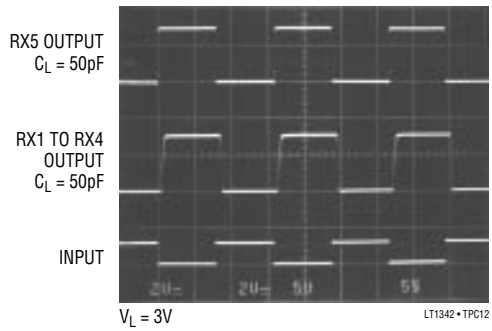
LT1342 • TPC10

Receiver Short-Circuit Current



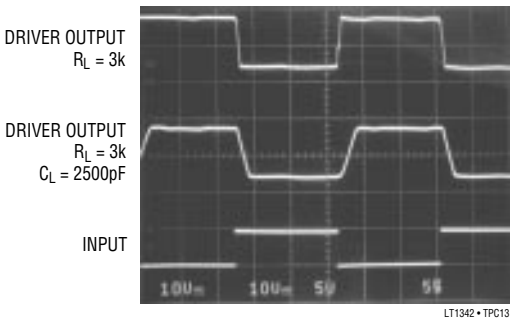
LT1342 • TPC11

Receiver Output Waveforms



LT1342 • TPC12

Driver Output Waveforms



LT1342 • TPC13

PIN FUNCTIONS

V_{CC}: 5V Input Supply Pin. This pin should be decoupled with a 0.1µF ceramic capacitor close to the package pin. Insufficient supply bypassing can result in low output drive levels and erratic charge pump operation.

V_L: 3V Logic Supply Pin. Provides power to the receiver outputs. Decouple with a 0.1µF ceramic capacitor.

GND: Ground Pin.

ON/$\overline{OFF}$: A TTL/CMOS Compatible Operating Mode Control. A logic low puts the device in the low power shutdown mode. Drivers and receivers assume a high impedance state in shutdown. The transceiver consumes almost no supply current while in shutdown. A logic high fully enables the transceiver. An ON/$\overline{OFF}$ logic low signal supersedes the state of the DRIVER DISABLE pin.

DRIVER DISABLE: This pin provides an alternate control for the charge pump and RS232 drivers. A logic high on this pin shuts down the charge pump and places all drivers in a high impedance state. All five receivers remain active under these conditions. Floating the DRIVER DISABLE pin or driving it to a logic low level fully enables the transceiver. A logic low on the ON/$\overline{OFF}$ pin supersedes the state of the DRIVER DISABLE pin. Supply current drops to 3mA when in driver disable mode.

V^+: Positive Supply Output (RS232 Drivers). $V^+ \approx 2V_{CC} - 1.5V$. This pin requires an external charge storage capacitor $C \geq 0.1\mu F$, tied to ground or V_{CC}. With multiple transceivers, the V^+ and V^- pins may be paralleled into common charge storage capacitors. Larger value capacitors may be used to reduce supply ripple.

PIN FUNCTIONS

V^-: Negative Supply Output (RS232 Drivers). $V^- \approx -(2V_{CC} - 2.5V)$. This pin requires an external charge storage capacitor $C \geq 0.1\mu F$. To reduce supply ripple, increase the size of the storage capacitor.

$C1^+$, $C1^-$, $C2^+$, $C2^-$: Commutating Capacitor Inputs. These pins require two external capacitors $C \geq 0.2\mu F$: one from $C1^+$ to $C1^-$, and another from $C2^+$ to $C2^-$. The capacitor's effective series resistance should be less than 2Ω. For $C \geq 1\mu F$, low ESR tantalum capacitors work well in this application, although small value ceramic capacitors may be used with a minimal reduction in charge pump compliance. For operation with an external 12V supply, omit C1 and connect the 12V supply to pin $C1^+$. Pin V^+ may also be shorted to $C1^+$ when a separate supply is used. The 12V supply must be bypassed with a 0.1F capacitor.

DRIVER IN: RS232 Driver Input Pins. These inputs are compatible with TTL or CMOS logic. Tie unused inputs to V_{CC} or V_L.

DRIVER OUT: Driver Outputs at RS232 Voltage Levels. Driver output swing meets RS232 levels for loads up to 3k. Slew rates are controlled for lightly loaded lines. Output current capability is sufficient for load conditions up to 2500pF. Outputs are in a high impedance state when in shutdown mode, V_{CC} = 0V, or when the DRIVER DISABLE pin is active. Outputs are fully short-circuit protected from V^- + 30V to V^+ – 30V. Applying higher voltages will not damage the device if the overdrive is moderately current limited. Short circuits on one output can load the power supply generator and may disrupt the signal levels of the other outputs. The driver outputs are protected against ESD to ±10V for human body model discharges.

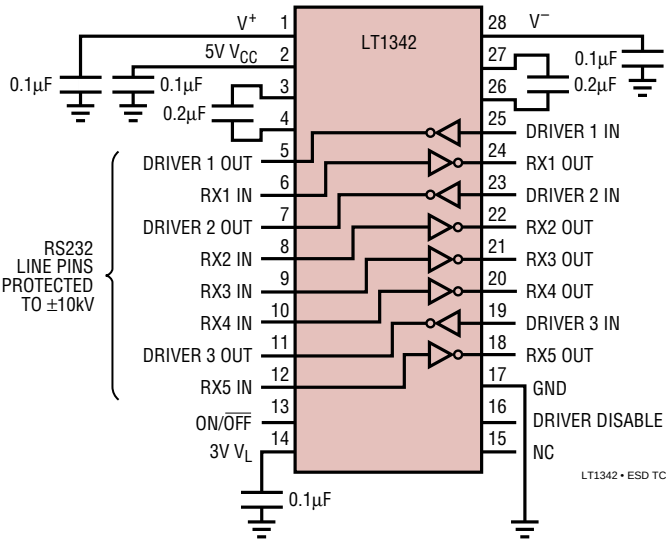
RX IN: Receiver Inputs. These pins accept RS232 level signals (±30V) into a protected 5k terminating resistor. The receiver inputs are protected against ESD to ±10kV for human body model discharges. Each receiver provides 0.4V of hysteresis for noise immunity. Open receiver inputs assume a logic low state.

RX OUT: Receiver Outputs with 3.3V Logic Compatible Voltage Levels. Outputs are in a high impedance state when in shutdown mode to allow data line sharing. Outputs are fully short-circuit protected to ground or V_{CC} or V_L with the power on, off, or in shutdown mode. Receiver output level is determined by V_L supply voltage. Use V_L = 3.3V for interfacing with 3.3V logic, V_L = 5V for interfacing with 5V logic.

ESD PROTECTION

The RS232 line inputs of the LT1342 have on-chip protection from ESD transients up to ±10kV. The protection structures act to divert the static discharge safely to system ground. In order for the ESD protection to function effectively, the power supply and ground pins of the LT1342 must be connected to ground through low impedances. The power supply decoupling capacitors and charge pump storage capacitors provide this low impedance in normal application of the circuit. The only constraint is that low ESR capacitors must be used for bypassing and charge storage. ESD testing must be done with pins V_{CC}, V^+, V^- and GND shorted to ground or connected with low ESR capacitors.

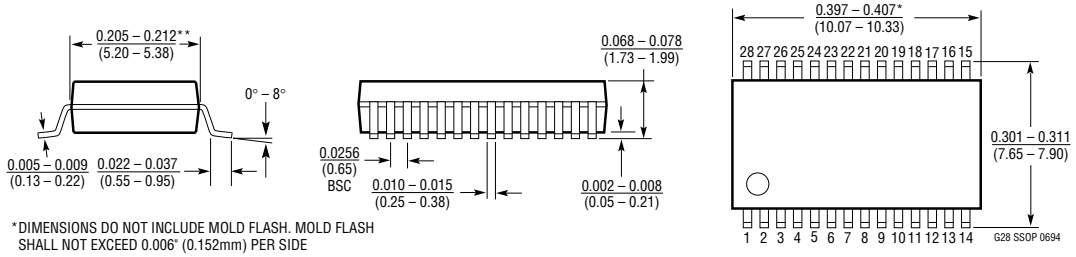
ESD Test Circuit



PACKAGE DESCRIPTION

Dimensions in inches (millimeters) unless otherwise noted.

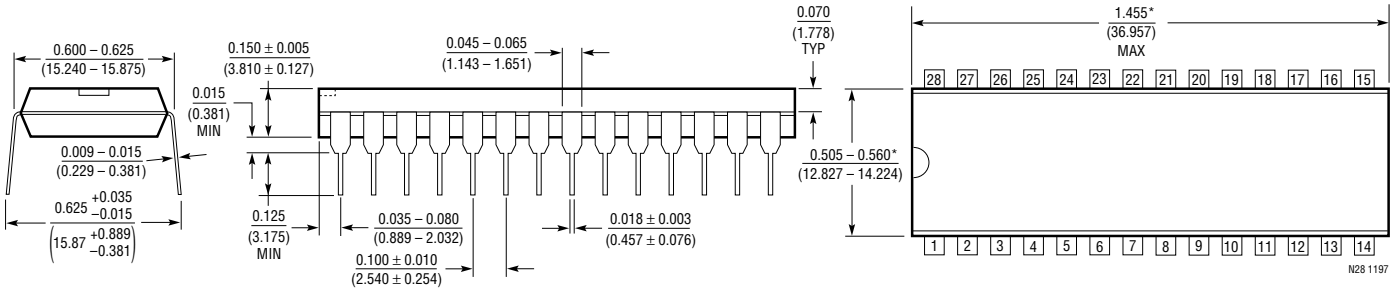
G Package
28-Lead Plastic SSOP (0.209)
(LTC DWG # 05-08-1640)



*DIMENSIONS DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.006" (0.152mm) PER SIDE

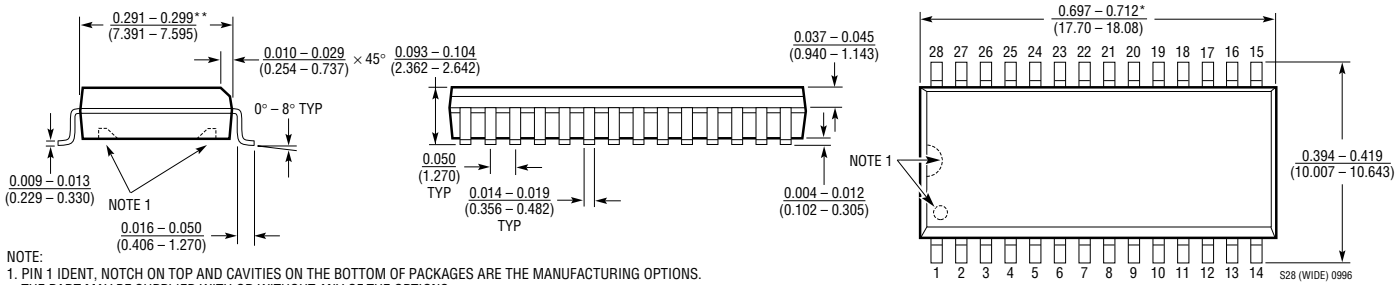
**DIMENSIONS DO NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010" (0.254mm) PER SIDE

NW Package
28-Lead PDIP (Wide 0.600)
(LTC DWG # 05-08-1520)



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

SW Package
28-Lead Plastic Small Outline (Wide 0.300)
(LTC DWG # 05-08-1620)



NOTE:

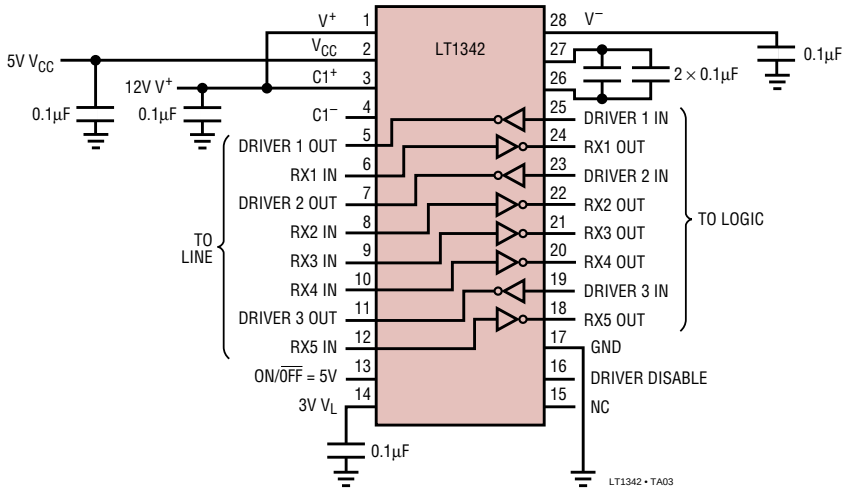
1. PIN 1 IDENT, NOTCH ON TOP AND CAVITIES ON THE BOTTOM OF PACKAGES ARE THE MANUFACTURING OPTIONS. THE PART MAY BE SUPPLIED WITH OR WITHOUT ANY OF THE OPTIONS

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

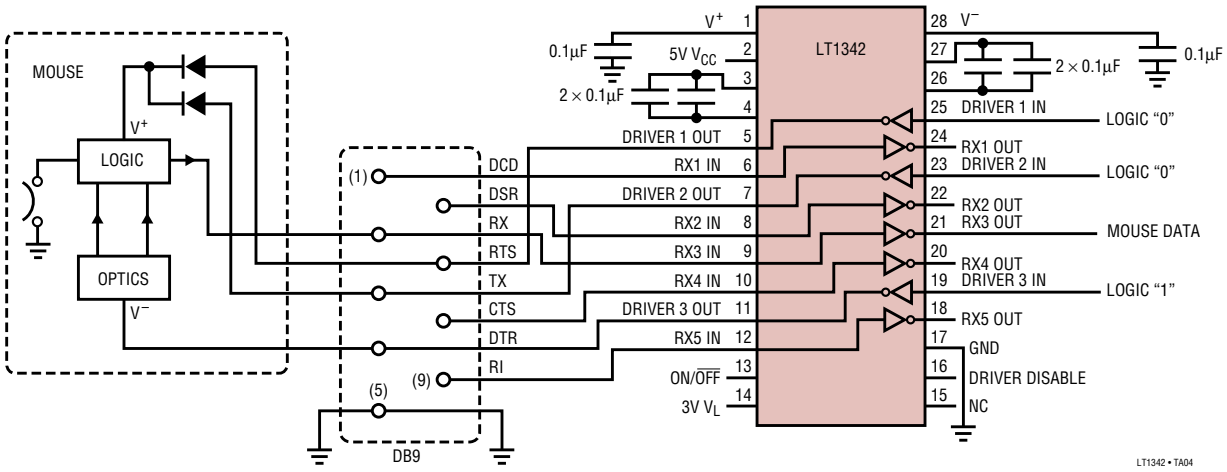
**DIMENSION DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010" (0.254mm) PER SIDE

TYPICAL APPLICATIONS

Operation Using 5V and 12V Power Supplies



Typical Mouse Driving Application



RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LT1137A	3-DR/5-RX RS232 Transceiver	±15kV IEC-1000-4-2 ESD Protection
LTC1327	3-DR/5-RX RS562 Transceiver	3.3V Operation
LT1330	3-DR/5-RX RS232	3V Logic Interface
LT1331	3-DR/5-RX RS232/RS562 Transceiver	5V RS232 or 3V RS562 Operation
LTC1347	3-DR/5-RX Micropower RS232 Transceiver	5 Receivers Active in Shutdown
LTC1348	3-DR/5-RX RS232 Transceiver	True RS232 from 3V

Linear Technology Corporation
1630 McCarthy Blvd., Milpitas, CA 95035-7417
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- Shortage Management
- Alternative Solution
- Excess Inventory Management