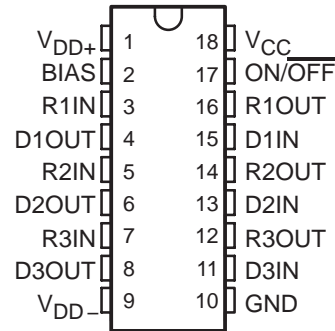


# LT1039 TRIPLE EIA-232 LINE TRANSCEIVER

SLLS105B – D3627, FEBRUARY 1991 – REVISED JANUARY 1992

- **Meets All EIA-232-D (Revision of RS-232-C) Specifications**
- **Three Independent Drivers and Receivers Per Package**
- **EIA-232 Inputs and Outputs Withstand  $\pm 30$  V**
- **3-State Outputs**
- **All Outputs Are Short-Circuit Protected**
- **Virtually Zero Supply Current When Shutdown**
- **Output of Several Devices Can Be Paralleled**
- **Operates From  $\pm 5$ -V to  $\pm 15$ -V Supplies**
- **Designed to Be Interchangeable With Linear Technology LT1039**

**DW OR N PACKAGE  
(TOP VIEW)**



## description

The LT1039 is a triple EIA-232 line transceiver designed to meet the requirements of Standard EIA-232-D. All outputs are fully protected against an overload or short to ground. A major advantage of the LT1039 is high-impedance output states when the device is off or powered down. This feature allows several different devices to be connected together on the same bus.

The bias pin provides a receiver to be kept alive when the LT1039 is shutdown ( $\text{ON}/\overline{\text{OFF}} = \text{low}$ ).

The LT1039 is characterized for operation from 0°C to 70°C.

### AVAILABLE OPTIONS

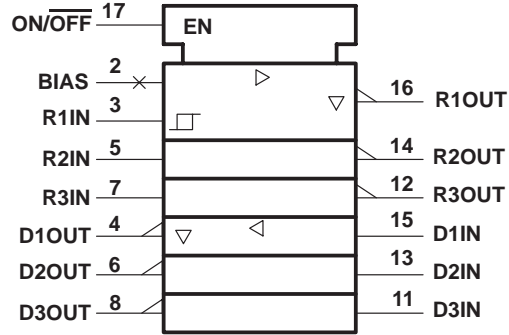
T <sub>A</sub>	PACKAGE	
	SMALL OUTLINE (DW)	PLASTIC DIP (N)
0°C to 70°C	LT1039CDW	LT1039CN

The DW package is available taped and reeled. Add the suffix R to the device type (i.e., LT1039CDWR).

# LT1039 TRIPLE EIA-232 LINE TRANSCEIVER

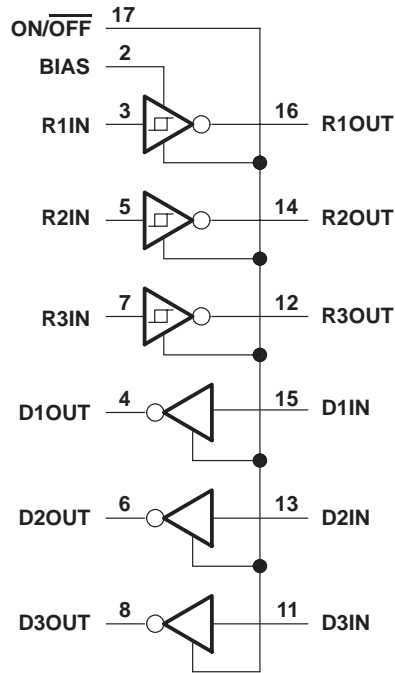
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## logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## logic diagram



### Terminal Functions

PIN NAME	NO.	DESCRIPTION
BIAS	2	Keeps receiver 1 alive while the LT1039 is in the shutdown mode. Leave BIAS open when not in use.
D1IN, D2IN, D3IN	15, 13, 11	Line driver inputs. Operate properly on TTL or CMOS levels. Output valid from $V_I = (V_{DD-}) + (2 \text{ to } 15 \text{ V})$ . Connect to 5 V when not used.
D1OUT, D2OUT, D3OUT	4, 6, 8	Line driver outputs
GND	10	Ground
ON/OFF	17	Shuts down entire circuit. Cannot be left open. If $V_{IL}$ is at or near 0.8 V, significant settling time may be required.
R1IN, R2IN, R3IN	3, 5, 7	Receiver inputs. Input impedance is normally 30 k $\Omega$ . Accepts EIA-232 voltage levels and has 0.4 V of hysteresis to provide noise immunity.
R1OUT, R2OUT, R3OUT	16, 14, 12	Receiver outputs with TTL/CMOS voltage levels
$V_{DD+}$	1	Positive supply voltage for driver
$V_{DD-}$	9	Negative supply voltage for driver
$V_{CC}$	18	5-V supply voltage for receivers

#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage range, $V_{DD+}$ (see Note 1)	0 V to 15 V
Supply voltage range, $V_{DD-}$	0 V to -15 V
Supply voltage, $V_{CC}$	7 V
Input voltage range, driver input	$V_{DD-}$ to 25 V
receiver input	$\pm 30$ V
Input voltage range, ON/OFF	0 V to 12 V
Output voltage range, driver output	$V_{DD+} - 30$ V to $V_{DD-} + 30$ V
Duration of output short circuit at (or below) $T_A = 25^\circ\text{C}$ (to $\pm 30$ V, see Note 2)	unlimited
Continuous total dissipation	See Dissipation Rating Table
Operating free-air temperature range, $T_A$	$0^\circ\text{C}$ to $70^\circ\text{C}$
Storage temperature range	$-65^\circ\text{C}$ to $150^\circ\text{C}$
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	$260^\circ\text{C}$

NOTES: 1. All voltage values, except differential voltages, are with respect to the GND terminal.

2. The output may be shorted to either supply. Temperature and/or supply voltages must be limited to ensure that the maximum dissipation rating is not exceeded.

**DISSIPATION RATING TABLE**

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING
DW	1025 mW	8.2 mW/ $^\circ\text{C}$	656 mW
N	1150 mW	9.2 mW/ $^\circ\text{C}$	736 mW

# LT1039

## TRIPLE EIA-232 LINE TRANSCEIVER

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### recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, $V_{DD+}$	5	12	15	V
Supply voltage, $V_{DD-}$	-5	-12	-15	V
Supply voltage, $V_{CC}$	4.75	5	5.25	V
High-level input voltage, $V_{IH}$ (see Note 3)	2			V
Low-level input voltage, $V_{IL}$ (see Note 3)			0.8	V
Operating free-air temperature, $T_A$	0		70	°C

NOTE 3:  $V_{IH}$  and  $V_{IL}$  specifications apply only for inputs D1IN to D3IN.

### DRIVER SECTION

electrical characteristics over recommended operating free-air temperature range,  $V_{DD\pm} = \pm 11.4$  V to  $\pm 12.6$  V, ON/OFF at 2.5 V (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
$V_{OM+}$ Maximum positive peak output voltage swing	Load = 3 k $\Omega$ to GND	$V_{DD+} - 0.4$	$V_{DD+} - 0.4$		V
$V_{OM-}$ Maximum negative peak output voltage swing		$V_{DD-} + 1.0$	$V_{DD-} + 1.5$		
$I_{IH}$ High-level input current	$V_I \geq 2$ V		1	20	$\mu$ A
$I_{IL}$ Low-level input current	$V_I \leq 0.8$ V		5	20	$\mu$ A
	$V_I = 0$			15	
	$V_I = 5$ V			80	
	Sourcing current, $V_O = 0$	5	15		
	Sinking current, $V_O = 0$	-5	-15		
$I_{OZ}$ Off-state output current	$V_O = \pm 18$ V, $V_I = 0$ , ON/OFF at 0.4 V		$\pm 10$	$\pm 200$	$\mu$ A
$I_{CC}$ Supply current	$I_O = 0$		4	8	mA
$I_{CC(off)}$ Off-state supply current	ON/OFF at 0.4 V		1	100	$\mu$ A
SR Slew rate	$R_L = 3$ k $\Omega$ , $C_L = 51$ pF	4	15	30	V/ $\mu$ s

† All typical values are at  $V_{DD\pm} = \pm 12$  V,  $T_A = 25^\circ$ C.



**RECEIVER SECTION**

**electrical characteristics over recommended ranges of supply voltage and operating free-air temperature, ON/OFF at 2.5 V (unless otherwise noted)**

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
$V_{T-}$	Negative-going input threshold voltage		0.5	1.3		V
$V_{T+}$	Positive-going input threshold voltage			1.7	2.8	V
$V_{hys}$	Hysteresis ( $V_{T+} - V_{T-}$ )		0.1	0.4	1	V
$V_{OL}$	Low-level output voltage	$I_O = -1.6$ mA		0.4	0.5	V
$V_{OH}$	High-level output voltage	$I_O = 160$ $\mu$ A	3.5	4.8		V
$I_{OS}$	Short-circuit output current	Sinking current, $V_O = V_{CC}$	-10			mA
		Sourcing current, $V_O = 0$	0.5	1		
$I_{OZ}$	Off-state (high-impedance state) output current	$V_O = 0$ to $V_{CC}$ , $V_I = 0$ , ON/OFF at 0.4 V		$\pm 1$	$\pm 10$	$\mu$ A
$I_{CC}$	Supply current	$I_O = 0$		4	7	mA
$I_{CC(off)}$	Off-state supply current	ON/OFF at 0.4 V		1	100	$\mu$ A

† All typical values ground are at  $V_{CC} = 5$  V,  $T_A = 25^\circ$ C.



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