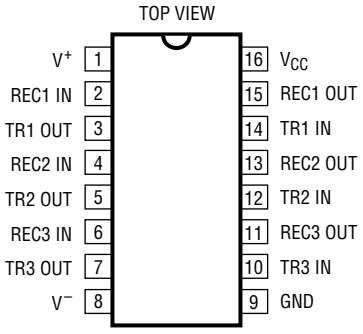
ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply Voltage
- Driver (V^+, V^-) ..... ±16V
- Receiver (V_{CC}) 7V

Logic Inputs ..... V^- to 25V
Receiver Inputs ..... ±30V
ON/$\overline{OFF}$ Input ..... GND to 12V
Driver Outputs ..... V^- + 30V to V^+ – 30V
Short-Circuit Duration ..... Indefinite
Operating Temperature Range
- LT1039AC ..... 0°C to 70°C
- LT1039AM **(OBSOLETE)** ..... –55°C to 125°C

Storage Temperature Range ..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec) ..... 300°C

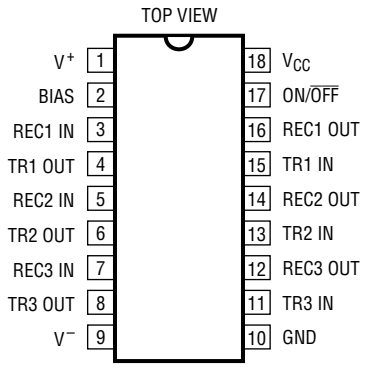
PIN CONFIGURATION



N PACKAGE
16-LEAD PDIP

SW PACKAGE
16-LEAD PLASTIC SO

T_{JMAX} = 125°C, θ_{JA} = 90°C/W, θ_{JC} = 50°C/W (N)
T_{JMAX} = 125°C, θ_{JA} = 95°C/W, θ_{JC} = 27°C/W (SW)



N PACKAGE
18-LEAD PDIP

SW PACKAGE
18-LEAD PLASTIC SO

T_{JMAX} = 125°C, θ_{JA} = 79°C/W, θ_{JC} = 36°C/W (N)
T_{JMAX} = 125°C, θ_{JA} = 90°C/W, θ_{JC} = 26°C/W (SW)

J PACKAGE
18-LEAD CERDIP
T_{JMAX} = 150°C, θ_{JA} = 88°C/W, θ_{JC} = 22°C/W (J)

OBSOLETE PACKAGE
Consider the N Package for Alternate Source

Consult LTC Marketing for parts specified with wider operating temperature ranges.

ORDER INFORMATION

LEAD FREE FINISH	TAPE AND REEL	PART MARKING*	PACKAGE DESCRIPTION	TEMPERATURE RANGE
LT1039ACSW16#PBF	LT1039ACSW16#TRPBF	LT1039ACSW16	16-Lead Plastic SO (Wide)	0°C to 70°C
LT1039ACSW#PBF	LT1039ACSW #TRPBF	LT1039ACSW	18-Lead Plastic SO (Wide)	0°C to 70°C
LT1039ACN16#PBF	N/A	LT1039ACN16	16-Lead Plastic PDIP	0°C to 70°C
LT1039ACN#PBF	N/A	LT1039ACN	18-Lead Plastic PDIP	0°C to 70°C
OBSOLETE PACKAGE				
LT1039AMJ#PBF	LT1039AMJ#TRPBF		18-Lead CERDIP	–55°C to 125°C

Consult LTC Marketing for parts specified with wider operating temperature ranges. *The temperature grade is identified by a label on the shipping container.

For more information on lead free part marking, go to: http://www.linear.com/leadfree/
For more information on tape and reel specifications, go to: http://www.linear.com/tapeandreel/

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C.

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Driver V^+ = 12V, V^- = –12V, $V_{ON/\overline{OFF}}$ = 2.5V (Note 2)						
Output Voltage Swing	Load = 3k to Ground					
	Positive	●	V^+ – 2.0	V^+ – 1.3		V
	Negative	●	V^- + 1.5	V^- + 1.0		V
Logic Input Voltage Levels	Input Low Level (V_{OUT} = High)	●		1.4	0.8	V
	Input High Level (V_{OUT} = Low)	●	2.0	1.4		V
Logic Input Current	$V_{IN} \geq 2.0V$			1	20	µA
	$V_{IN} \geq 0.8V$			5	20	µA
Output Short-Circuit Current	Sourcing Current, V_{OUT} = 0V		20	30		mA
	Sinking Current, V_{OUT} = 0V		–15	–30		mA
Output Leakage Current	Shutdown (Notes 3, 4), V_{OUT} = ±18V, V_{IN} = 0V	●		10	200	µA
Supply Leakage Current	Shutdown (Note 3)	●		1	100	µA
Slew Rate	R_L = 3k, C_L = 51pF to 2500pF		4	15	30	V/µs
Supply Current	V_{OUT} = Low			1	5	mA
Prop Delay (t_{PLH})				0.6	1.2	µs
(t_{PHL})				0.8	1.2	µs
Receiver V_{CC} = 5V, $V_{ON/\overline{OFF}}$ = 2.5V (Note 2)						
Input Voltage Thresholds	Input Low Level (V_{OUT} = High)	●	0.5	1.3		V
	Input High Level (V_{OUT} = Low)	●		1.7	2.8	V
Hysteresis		●	0.1	0.4	1.0	V
Input Resistance		●		30		kΩ
Output Voltage	Output Low, I_{OUT} = –1.6mA	●		0.4	0.5	V
	Output High, I_{OUT} = 160µA	●	3.5	4.8		V
Output Short-Circuit Current	Sourcing Current, $V_{OUT} = V_{CC}$	●	–10	–30		mA
	Sinking Current, V_{OUT} = 0V	●	15	25		mA
Output Leakage Current	Shutdown (Note 2), $0V \leq V_{OUT} \leq V_{CC}$, V_{IN} = 0V	●		1	10	µA
Supply Current	(Note 5)	●		2	5	mA
Supply Leakage Current	Shutdown (Note 3)	●		1	100	µA
ON/$\overline{OFF}$ Pin Current	$0V \leq V_{ON/\overline{OFF}} \leq 5V$	●	–15		80	µA
Prop Delay (t_{PLH})				200	600	ns
(t_{PHL})				300	600	ns

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

Note 2: $V_{ON/\overline{OFF}}$ = 5V for LT1039AM grade devices.

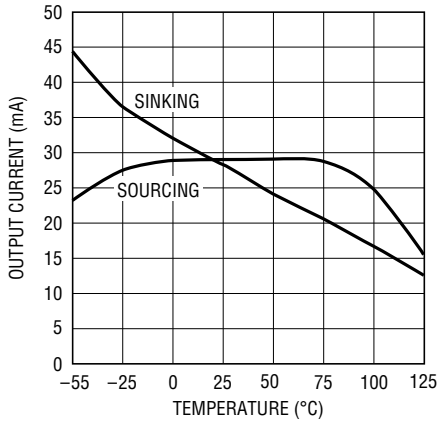
Note 3: $V_{ON/\overline{OFF}}$ = 0.4V for –55°C ≤ T_A ≤ 100°C and $V_{ON/\overline{OFF}}$ = 0.2V for 100°C ≤ T_A ≤ 125°C. Does not apply to LT1039A-16 part.

Note 4: For $T_A \geq 100°C$ leakage current is 350µA max.

Note 5: Bias pin open on 18-pin version.

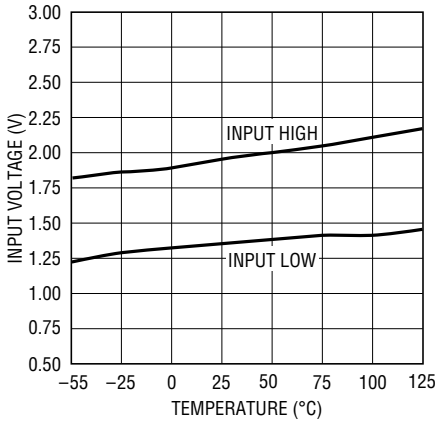
TYPICAL PERFORMANCE CHARACTERISTICS

Driver Output Short-Circuit Current



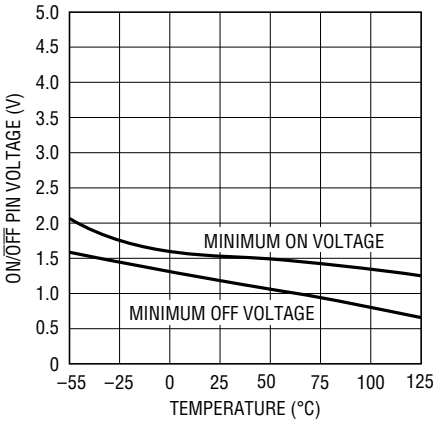
1039A G01

Receiver Input Thresholds



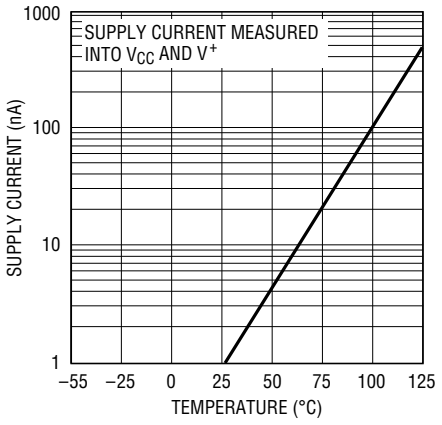
1039A G02

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



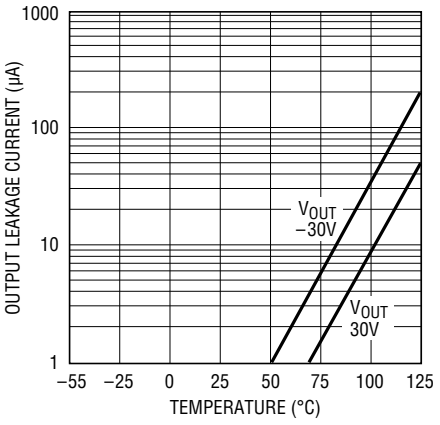
1039A G03

Supply Current in Shutdown



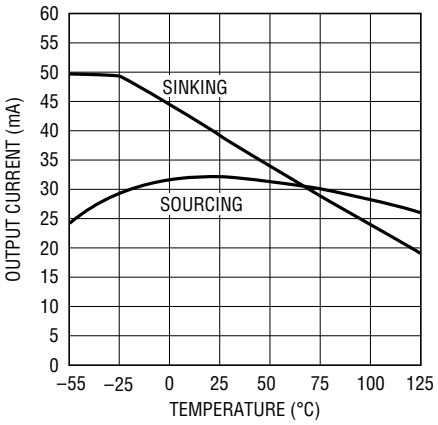
1039A G04

Driver Output Leakage in Shutdown



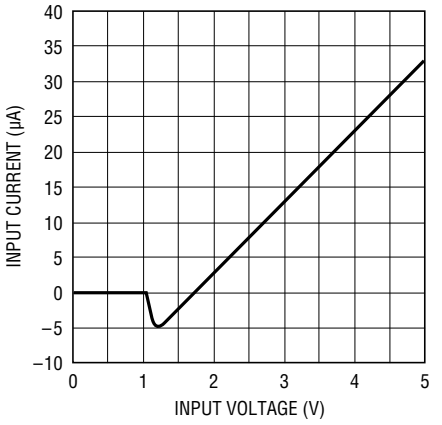
1039A G05

Receiver Output Short-Circuit Current



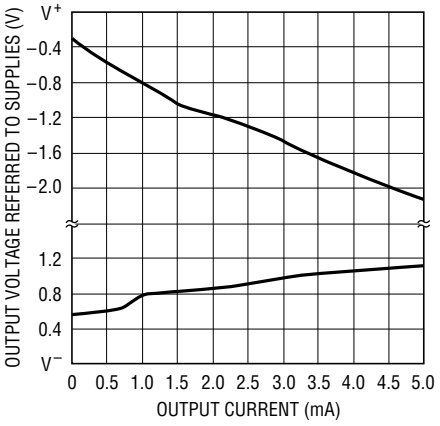
1039A G06

ON/$\overline{\text{OFF}}$ Pin Current vs Voltage



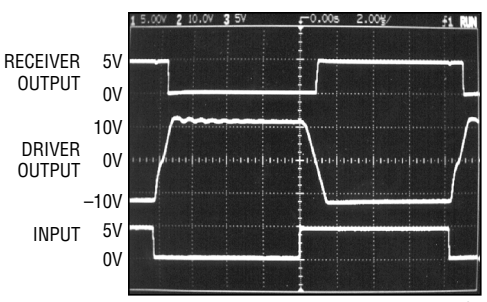
1039A G07

Driver Output Swing vs Current



1039A G08

Output Waveforms



1039A G09

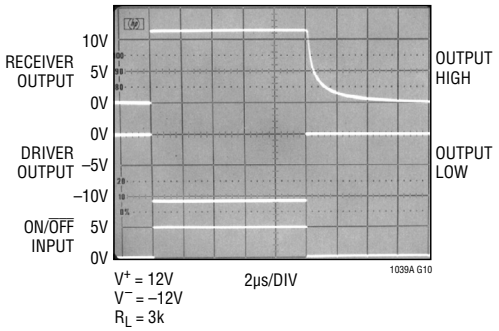
V^+ = 12V
V^- = –12V
V_{CC} = 5V
R_L = 3k

2µs/DIV

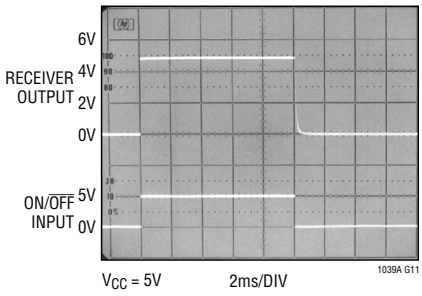
DRIVER OUTPUT CONNECTED TO RECEIVER INPUT

TYPICAL PERFORMANCE CHARACTERISTICS

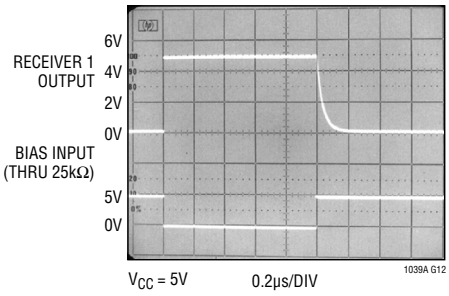
Shutdown to Driver Output



Shutdown to Receiver Output



BIAS Pin Response Time



PIN FUNCTIONS (Pin numbers listed are for 18-pin device)

V^+, V^- (Pins 1, 9): Driver Supply Pins. Supply current drops to zero in shutdown mode. Driver outputs are in a high impedance state when V^+ and V^- = 0V.

BIAS (Pin 2): Keeps receiver 1 on while the LT1309A is in the shutdown mode. Leave BIAS pin open when not in use. See Applications Information for proper use.

REC IN (Pins 3, 5, 7): Receiver Input Pins. Accepts RS232 voltage levels (±30V) and has 0.4V of hysteresis to provide noise immunity. Input impedance is nominally 30kΩ. Receiver input pins are internally protected from ESD transients. In order to insure proper functioning of the ESD protection devices, the V_{CC} and V^- supply pins must be bypassed with low ESR capacitors located close to the pins. A 0.1µF ceramic capacitor works well.

TR OUT (Pins 4, 6, 8): Driver Outputs with RS232 Voltage Levels. Outputs are in a high impedance state when in the shutdown mode or when power is off (V^+ and V^- = 0V) to allow data line sharing. Outputs are fully short-circuit protected from V^- + 30V to V^+ – 30V with power on, off or in the shutdown mode. Typical output breakdowns are greater than ±45V and higher applied voltages will not damage the device if moderately current limited. Driver-output pins are internally protected from ESD transients. In order to insure proper functioning of the ESD protection devices, the V^+ and V^- supply pins must be bypassed with low ESR capacitors located close to thepins. 0.1µF ceramic capacitors work well.

GND (Pin 10): Ground Pin.

TR IN (Pins 11, 13, 15): RS232 Driver Input Pins. Inputs are TTL/CMOS compatible. Inputs should not be allowed to float. Tie unused inputs to V_{CC}.

REC OUT (Pins 12, 14, 16): Receiver Outputs with TTL/CMOS Voltage Levels. Outputs are in a high impedance state when in the shutdown mode to allow data line sharing. Outputs are fully short-circuit protected to ground or V_{CC} with power on, off or in the shutdown mode.

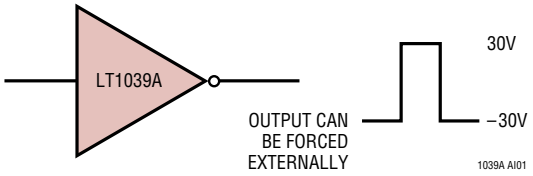
$\overline{\text{ON/OFF}}$ (Pin 17): Controls the operation mode of the LT1039A and is TTL/CMOS compatible. A logic low puts the device in the shutdown mode which reduces input supply current to zero and places both driver and receiver outputs in a high impedance state.

V_{CC} (Pin 18): 5V Power for Receivers.

APPLICATIONS INFORMATION

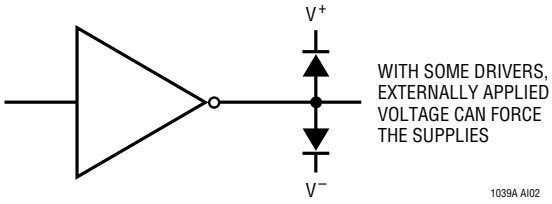
The driver output stage of the LT1039A offers significantly improved protection over older bipolar and CMOS designs. In addition to current limiting, the driver output can be externally forced to ±30V with no damage or excessive current flow.

LT1039A Driver



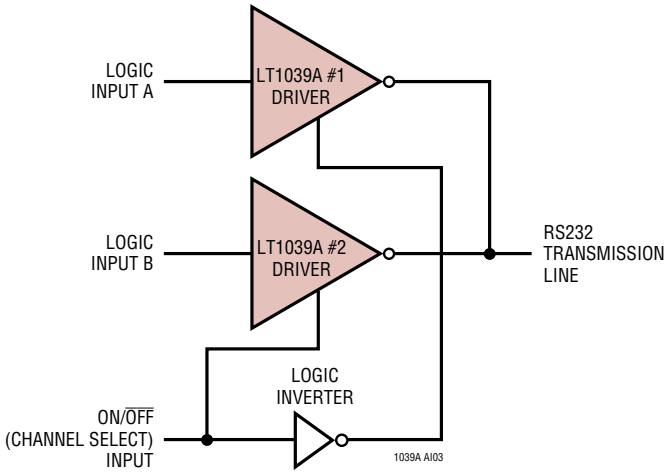
The driver outputs utilize high impedance overvoltage protection, eliminating the flow of fault currents into supplies, as will happen with conventional diode clamp-configurations.

Older RS232 Drivers and Other CMOS Drivers

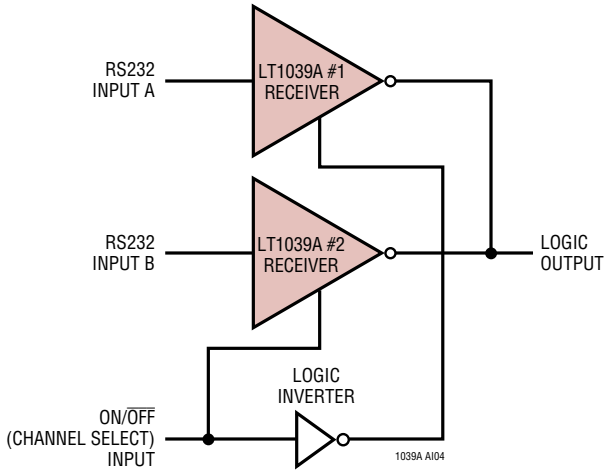


Placing the LT1039A in the shutdown mode (Pin 17 low) puts both the driver and receiver outputs in a high impedance state. This allows data line sharing and transceiver-applications.

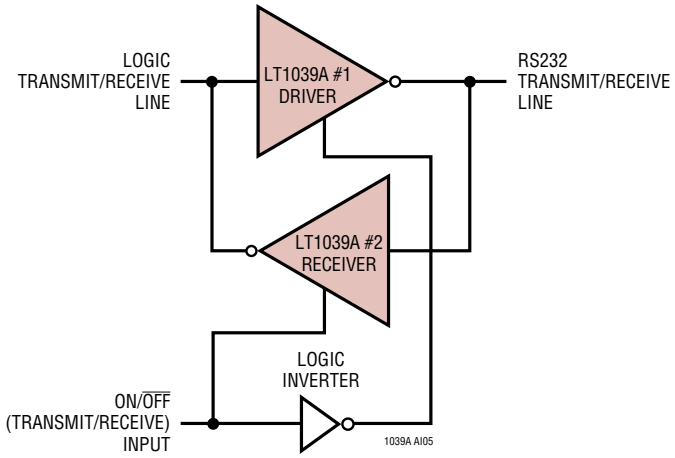
Sharing a Transmitter Line



Sharing a Receiver Line



Transceiver

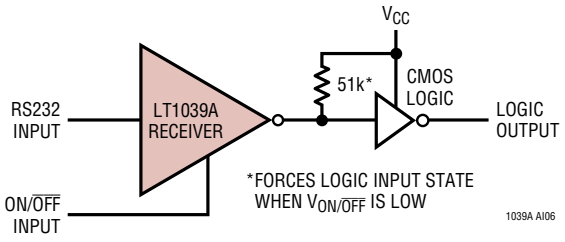


The shutdown mode also drops all supply currents (V_{CC}, V^+, V^-) to zero for power conscious systems.

APPLICATIONS INFORMATION

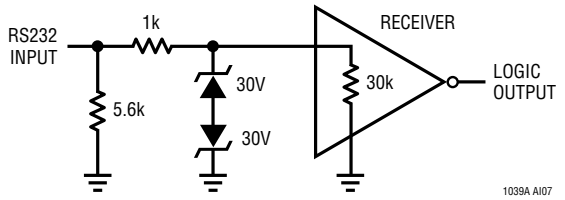
When driving CMOS logic from a receiver that will be used in the shutdown mode and there is no other active receiver on the line, a 51k resistor can be placed from the logic input to V_{CC} to force a definite logic level when the receiver output is in a high impedance state.

Driving CMOS Logic from a Receiver



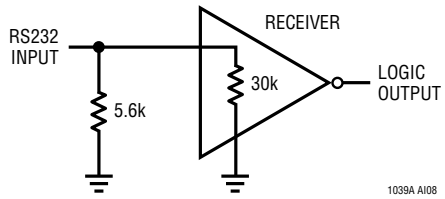
To protect against receiver input overloads in excess of ±30V, a voltage clamp can be placed on the data line and still maintain RS232 compatibility.

Input Overvoltage Protection



The receiver input impedance of the LT1039A is nominally 30kΩ. For applications requiring a 5kΩ input impedance, a 5.6k resistor can be connected from the receiver input to ground.

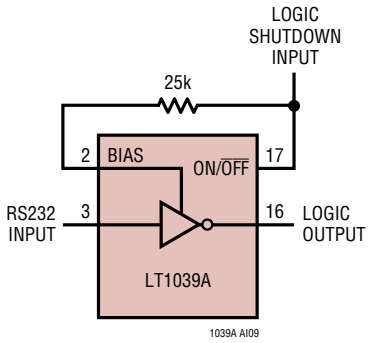
5kΩ Impedance Matching



Driver inputs should not be allowed to float. Any unused inputs should be tied to V_{CC}.

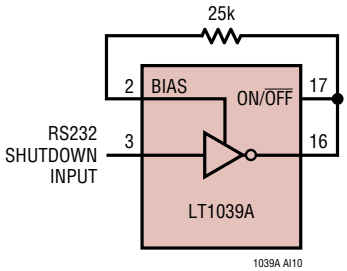
The BIAS pin is used to "keep alive" one receiver while in the shutdown mode (all other circuitry being inactive). This allows a system to be in shutdown and still have one active receiver for transferring data.

Keeping Alive One Receiver While in Shutdown



It can also be used to make an RS232 compatible shutdown control line. Driving the BIAS pin low through a resistance of 24k to 30k keeps the receiver active. Do not drive the BIAS pin directly from a logic output without the series resistor. An unused BIAS pin should be left open.

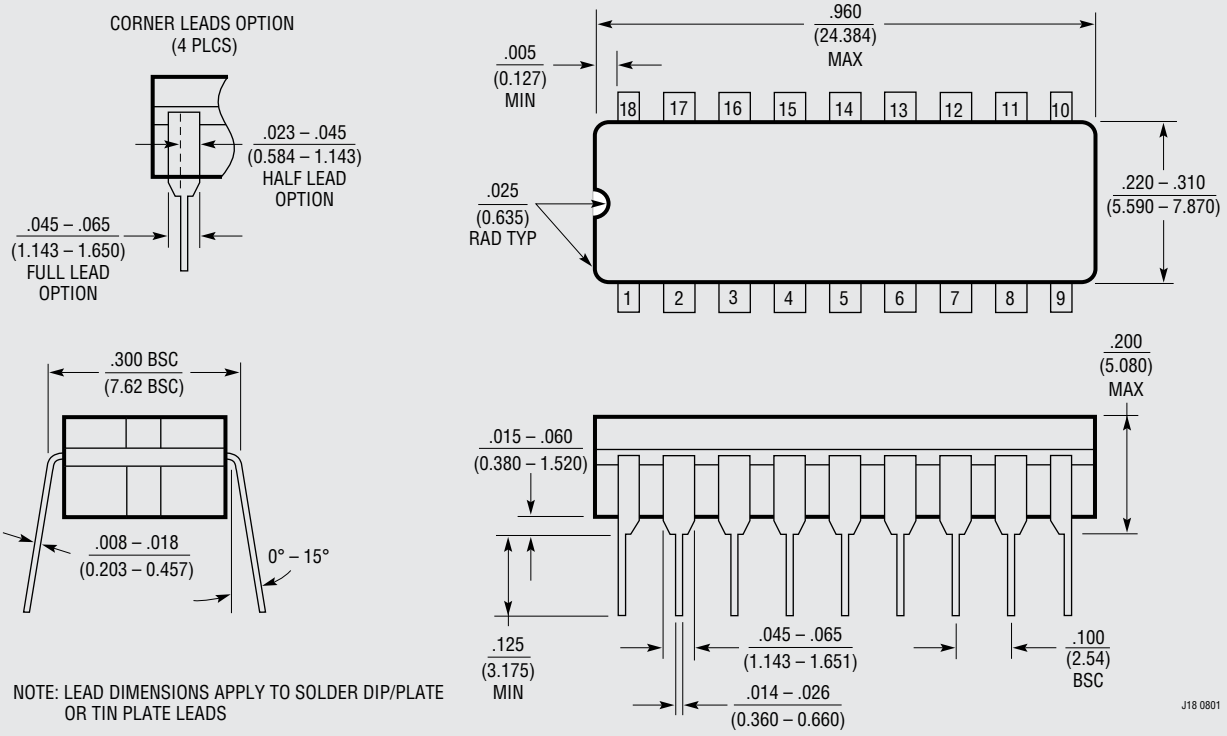
RS232 Compatible Shutdown Control Line



PACKAGE DESCRIPTION

Please refer to http://www.linear.com/designtools/packaging/ for the most recent package drawings.

J Package
18-Lead CERDIP (Narrow .300 Inch, Hermetic)
(Reference LTC DWG # 05-08-1110)



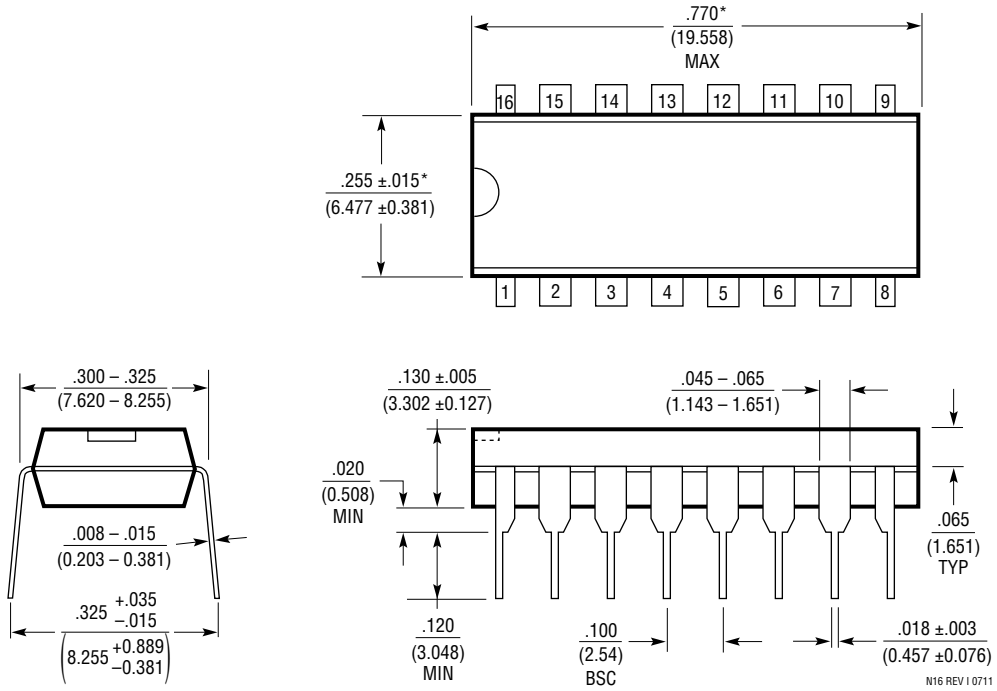
NOTE: LEAD DIMENSIONS APPLY TO SOLDER DIP/PLATE OR TIN PLATE LEADS

OBSOLETE PACKAGE

PACKAGE DESCRIPTION

Please refer to http://www.linear.com/designtools/packaging/ for the most recent package drawings.

N Package
16-Lead PDIP (Narrow .300 Inch)
(Reference LTC DWG # 05-08-1510 Rev I)



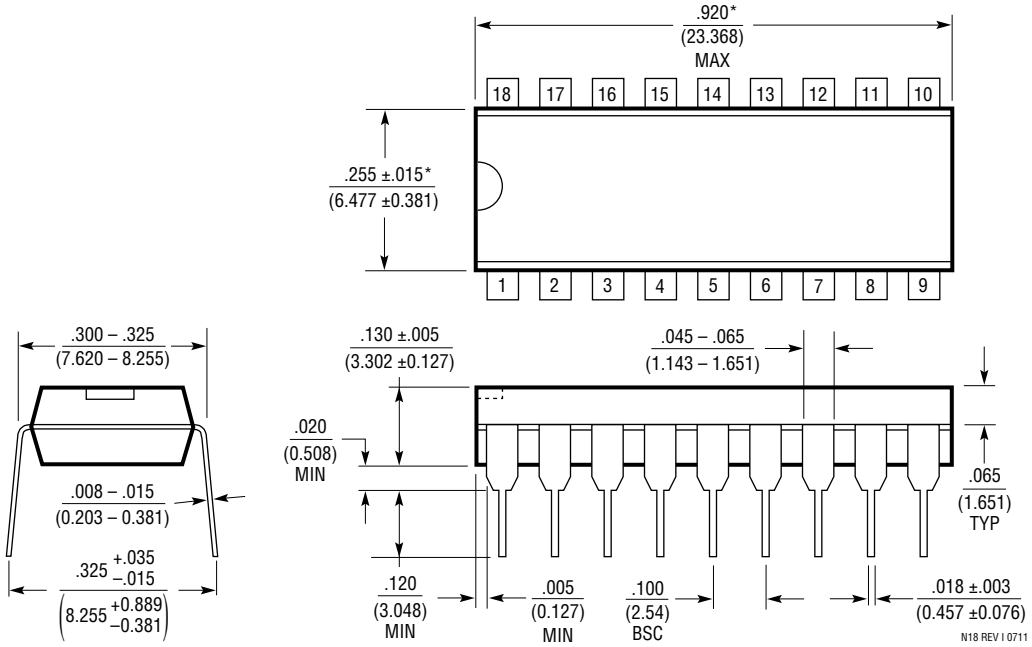
NOTE:
1. DIMENSIONS ARE INCHES / MILLIMETERS

*THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .010 INCH (0.254mm)

PACKAGE DESCRIPTION

Please refer to http://www.linear.com/designtools/packaging/ for the most recent package drawings.

N Package
18-Lead PDIP (Narrow .300 Inch)
(Reference LTC DWG # 05-08-1510 Rev I)



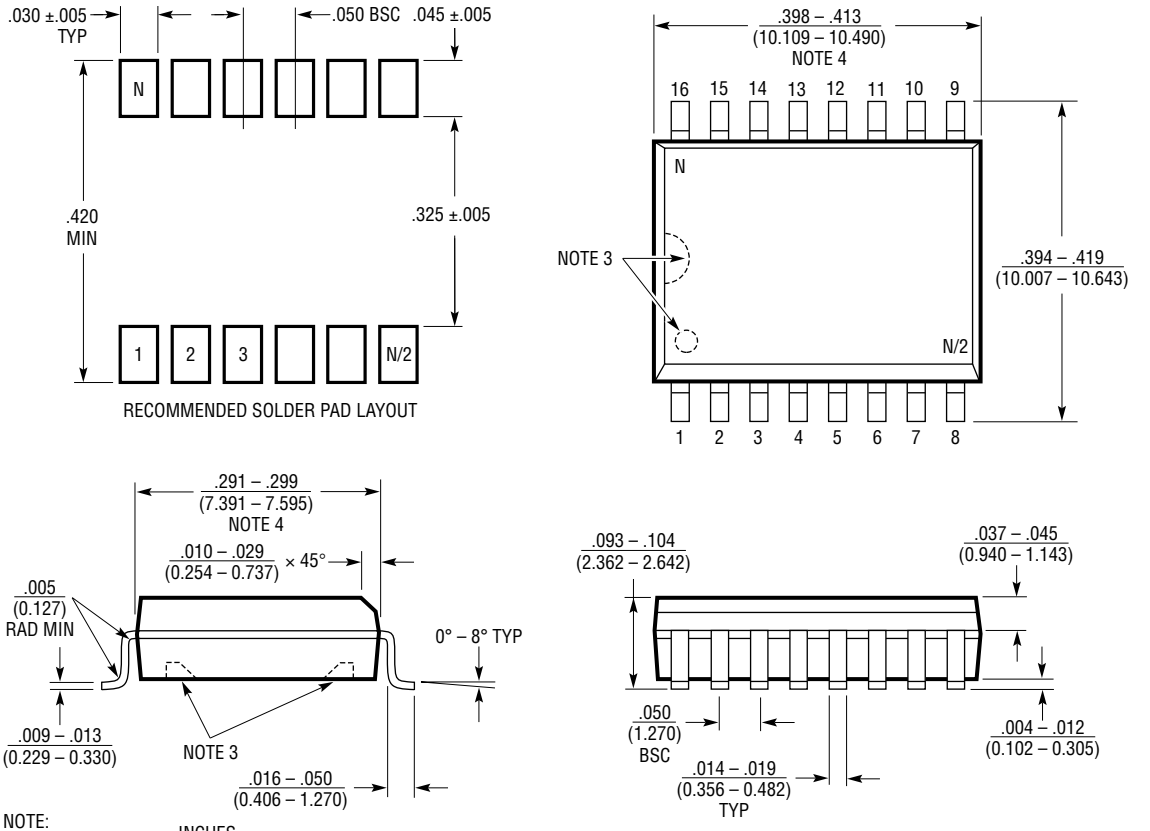
NOTE:
1. DIMENSIONS ARE $\frac{\text{INCHES}}{\text{MILLIMETERS}}$

*THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .010 INCH (0.254mm)

PACKAGE DESCRIPTION

Please refer to http://www.linear.com/designtools/packaging/ for the most recent package drawings.

SW Package
16-Lead Plastic Small Outline (Wide .300 Inch)
(Reference LTC DWG # 05-08-1620)

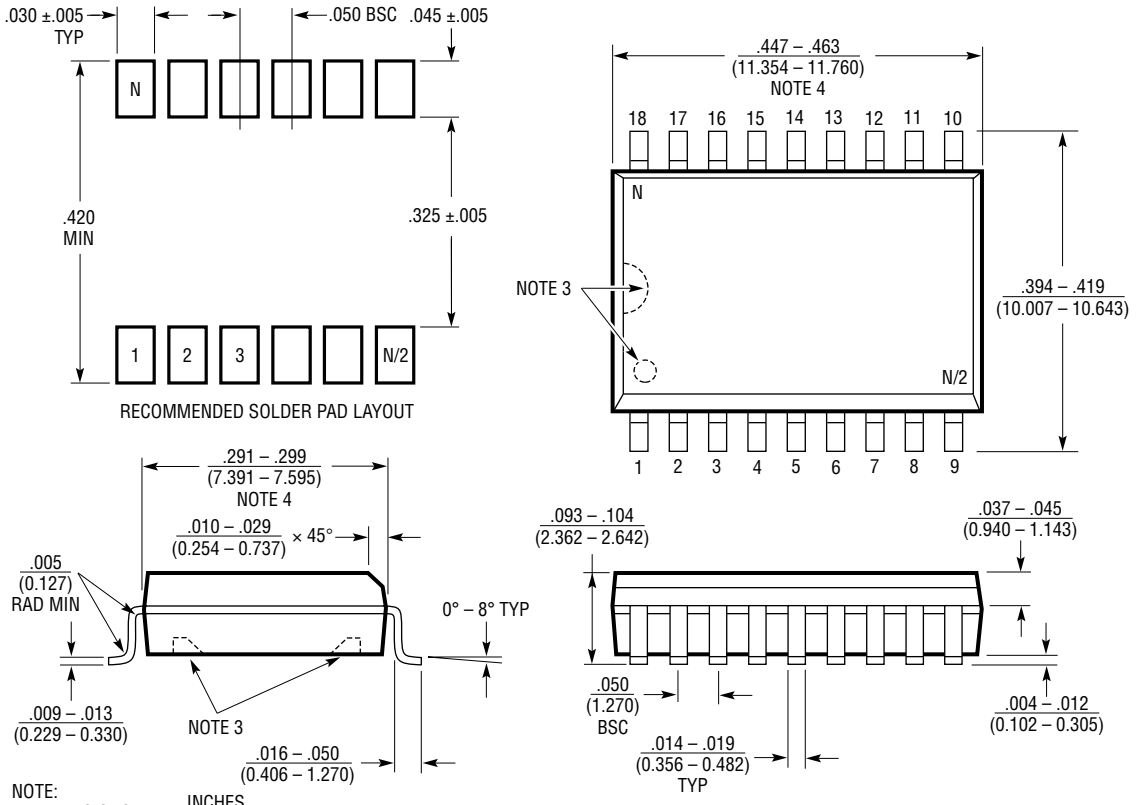


NOTE:
1. DIMENSIONS IN $\frac{\text{INCHES}}{(\text{MILLIMETERS})}$
2. DRAWING NOT TO SCALE
3. PIN 1 IDENT, NOTCH ON TOP AND CAVITIES ON THE BOTTOM OF PACKAGES ARE THE MANUFACTURING OPTIONS. THE PART MAY BE SUPPLIED WITH OR WITHOUT ANY OF THE OPTIONS
4. THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .006" (0.15mm)

PACKAGE DESCRIPTION

Please refer to http://www.linear.com/designtools/packaging/ for the most recent package drawings.

SW Package
18-Lead Plastic Small Outline (Wide .300 Inch)
(Reference LTC DWG # 05-08-1620)



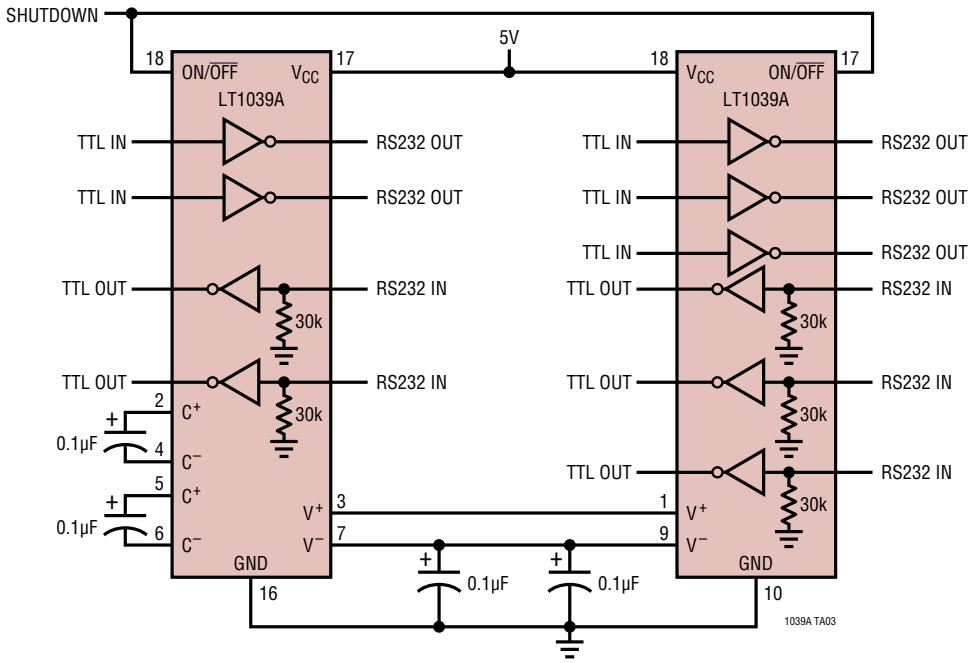
NOTE:
1. DIMENSIONS IN INCHES (MILLIMETERS)
2. DRAWING NOT TO SCALE
3. PIN 1 IDENT, NOTCH ON TOP AND CAVITIES ON THE BOTTOM OF PACKAGES ARE THE MANUFACTURING OPTIONS. THE PART MAY BE SUPPLIED WITH OR WITHOUT ANY OF THE OPTIONS
4. THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .006" (0.15mm)

REVISION HISTORY (Revision history begins at Rev B)

REV	DATE	DESCRIPTION	PAGE NUMBER
B	12/12	Removed LT1039AI from Abs Max Ratings and Package/Order Information	2
		Updated N and SW Package Descriptions	9-12

TYPICAL APPLICATION

LT1180A (Driver/Receiver with Power Supply) Driving an LT1039A



RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LTC®485	Low Power RS485 Transceiver	Industry Standard
LT1137A	5V 3 Driver/5 Receiver RS232 Transceiver	±15kV ESD Protection
LT1180A/LT1181A	5V 2 Driver/2 Receiver RS232 Transceiver	Industry Standard, 0.1µF Capacitors
LTC1345	V.35 Transceiver	Single 5V Supply Using 0.1µF Capacitors
LTC1348	3.3V 3 Driver/5 Receiver RS232 Transceiver	Operates from 3.3V to 5V Supplies, 5 Receivers Active in Shutdown
LTM2882	Dual Isolated RS232 µModule Transceiver + Power	1Mbps, ±10kV HBM ESD, 2500V_{RMS}
LTC2870/LTC2871	RS232/RS485 Multiprotocol Transceivers with Integrated Termination	20Mbps RS485 and 500kbps RS232, ±26kV ESD, 3V to 5V Operation
LTC2862/LTC2863/ LTC2864/LTC2865	±60V Fault Protected 3V to 5.5V RS485/RS422 Transceivers	20Mbps or 250kbps ±15kV HBM ESD, ±25V Common Mode Range

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LT 0213 REV B • PRINTED IN USA