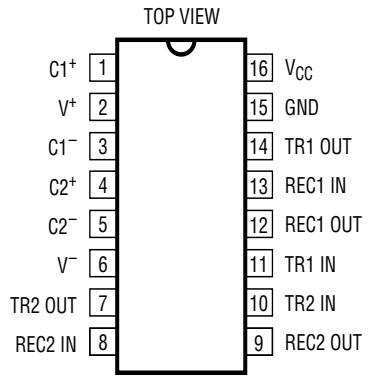
ABSOLUTE MAXIMUM RATINGS

(Note 1)

Supply Voltage (V_{CC}) 6V
V^+ 13.2V
V^- ..... –13.2V
Input Voltage
  Driver ..... V^- to V^+
  Receiver ..... –30V to 30V
Output Voltage
  Driver ..... (V^+ – 30V) to (V^- + 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
  LT1381C ..... 0°C to 70°C
  LT1381I ..... –40°C to 85°C
Storage Temperature Range ..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec) ..... 300°C

PACKAGE/ORDER INFORMATION



N PACKAGE
16-LEAD PLASTIC DIP

S PACKAGE
16-LEAD PLASTIC SOIC

T_{JMAX} = 125°C, θ_{JA} = 90°C/W, θ_{JC} = 46°C/W (N)
T_{JMAX} = 125°C, θ_{JA} = 110°C/W, θ_{JC} = 34°C/W (S)

ORDER PART NUMBER
LT1381CN LT1381CS LT1381IS

Consult factory for Military grade parts.

ELECTRICAL CHARACTERISTICS **(Note 2)**

PARAMETER	CONDITIONS			MIN	TYP	MAX	UNITS
Power Supply Generator							
V^+ Output					7.9		V
V^- Output					–7.0		V
Supply Current (V_{CC})	(Note 3), T_A = 25°C		 ●		8	14 16	mA mA
Supply Rise Time	C1 = C2 = C3 = C4 = 0.1µF				0.2		ms
Oscillator Frequency					130		kHz
Driver							
Output Voltage Swing	Load = 3k to GND	Positive Negative	● ●	5.0	7.5 –6.3	 –5.0	V V
Logic Input Voltage Level	Input Low Level (V_{OUT} = High) Input High Level (V_{OUT} = Low)		● ●	 2.0	1.4 1.4	0.8 	V V
Logic Input Current	0.8V ≤ V_{IN} ≤ 2.0V		●		5	20	µA
Output Short-Circuit Current	V_{OUT} = 0V			9	17		mA
Output Leakage Current	Power Off V_{OUT} = ±15V		●		10	100	µA
Data Rate	R_L = 3k, C_L = 2500pF R_L = 3k, C_L = 1000pF			120 250			kBaud kBaud
Slew Rate	R_L = 3k, C_L = 51pF R_L = 3k, C_L = 2500pF			 4	15 6	30 	V/µs V/µs
Propagation Delay	Output Transition t_{HL} High to Low (Note 4) Output Transition t_{LH} Low to High				0.6 0.5	1.3 1.3	µs µs

ELECTRICAL CHARACTERISTICS (Note 2)

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Receiver						
Input Voltage Thresholds	Input Low Threshold (V_{OUT} = High) Input High Threshold (V_{OUT} = Low)		0.8	1.3 1.7	 2.4	V V
Hysteresis		●	0.1	0.4	1.0	V
Input Resistance	(Note 6)		3	5	7	kΩ
Output Voltage	Output Low, I_{OUT} = –1.6mA Output High, I_{OUT} = 160µA (V_{CC} = 5V)	● ●	 3.5	0.2 4.2	0.4	V V
Output Short-Circuit Current	Sinking Current, V_{OUT} = V_{CC} Sourcing Current, V_{OUT} = 0V		 10	–20 20	–10	mA mA
Propagation Delay	Output Transition t_{HL} High-to-Low (Note 5) Output Transition t_{LH} Low-to-High			250 350	600 600	ns ns

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

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, unless otherwise specified.

Note 3: Supply current is measured as the average over several charge pump cycles. $C^+ = C^- = C1 = C2 = 0.1\mu F$. All outputs are open, with all driver inputs tied high.

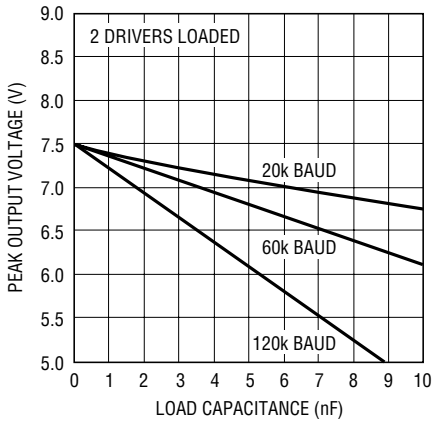
Note 4: For driver delay measurements, R_L = 3k and C_L = 51pF. Trigger points are set between the driver's input logic threshold and the output transition to the zero crossing (t_{HL} = 1.4V to 0V and t_{LH} = 1.4V to 0V).

Note 5: 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).

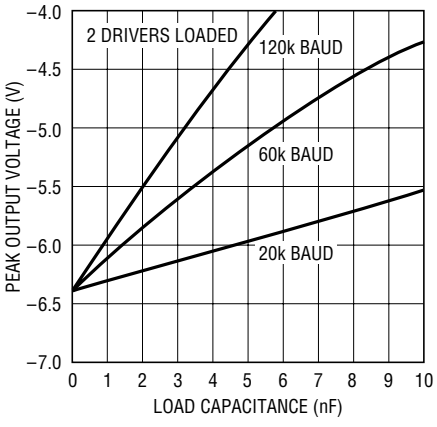
Note 6: Tested at V_{IN} = ±10V.

TYPICAL PERFORMANCE CHARACTERISTICS

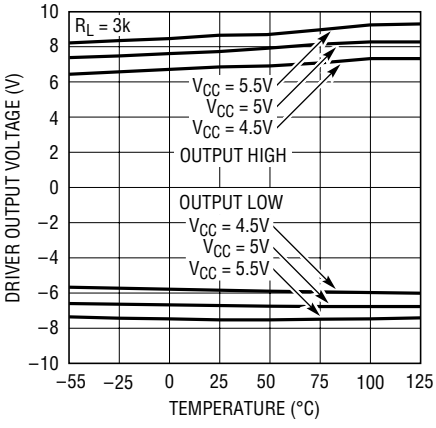
Driver Maximum Output Voltage vs Load Capacitance



Driver Minimum Output Voltage vs Load Capacitance

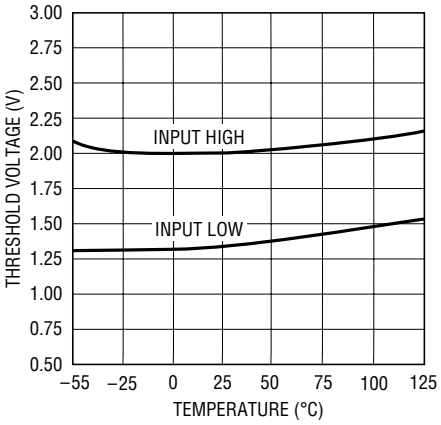


Driver Output Voltage



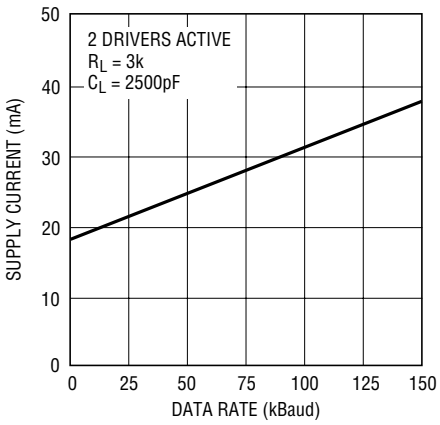
TYPICAL PERFORMANCE CHARACTERISTICS

Receiver Input Threshold



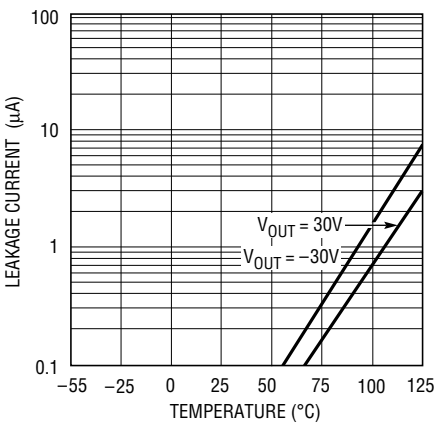
LT1381 • TPC04

Supply Current vs Data Rate



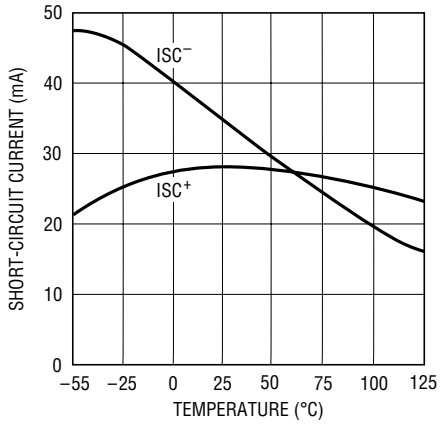
LT1381 • TPC05

Driver Leakage in Shutdown



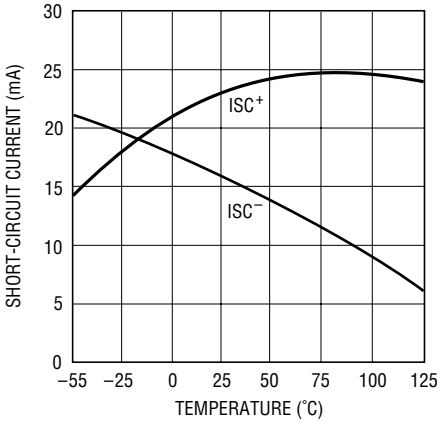
LT1381 • TPC06

Receiver Short-Circuit Current



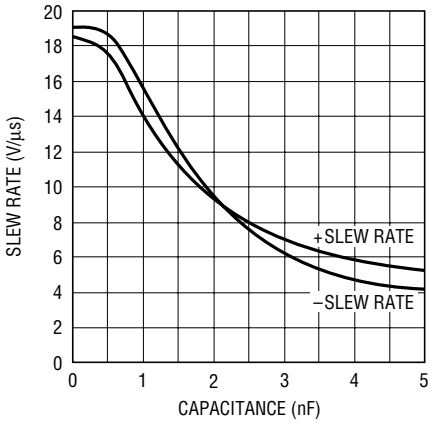
LTLT1381 • TPC07

Driver Short-Circuit Current



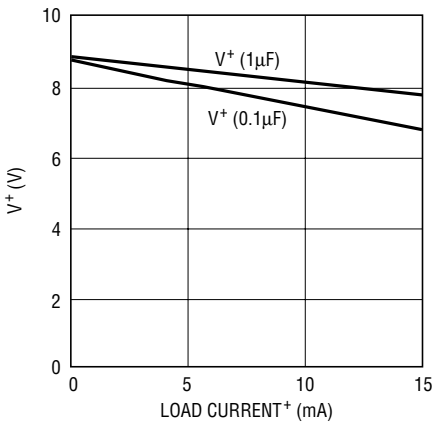
LT1381 • TPC08

Slew Rate vs Load Capacitance



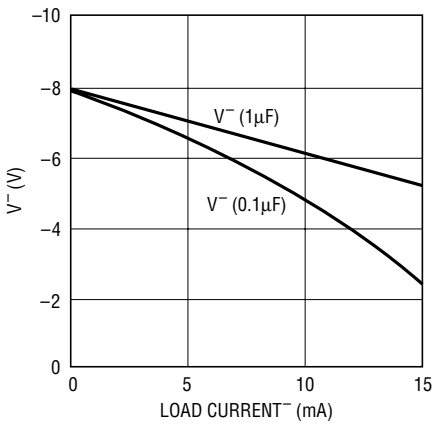
LT1381 • TPC09

V+ Compliance Curve



LT1381 • TPC10

V– Compliance Curve



LT1381 • TPC11

PIN FUNCTIONS

$C1^+$, $C1^-$, $C2^+$, $C2^-$ (Pins 1, 3, 4, 5): Commutating Capacitor Inputs. These pins require two external capacitors $C \geq 0.1\mu F$: one from $C1^+$ to $C1^-$ and another from $C2^+$ to $C2^-$. C1 may be deleted if a separate 12V supply is available and connected to pin $C1^+$.

V^+ (Pin 2): Positive Supply Output (RS232 Drivers). $V^+ \approx 2V_{CC} - 2.1V$. This pin requires an external charge storage capacitor $C \geq 0.1\mu F$, tied to ground or V_{CC}. Larger value capacitors may be used to reduce supply ripple. With multiple transceivers, the V^+ and V^- pins may be paralleled into common capacitors.

V^- (Pin 6): Negative Supply Output (RS232 Drivers). $V^- \approx -(2V_{CC} - 3V)$. This pin requires an external charge storage capacitor $C \geq 0.1\mu F$. Larger value capacitors may be used to reduce supply ripple. With multiple transceivers, the V^+ and V^- pins may be paralleled into common capacitors.

TR2 OUT, TR1 OUT (Pin 7, 14): 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 $V_{CC} = 0V$. Outputs are fully short-circuit protected from V^- + 25V to V^+ – 25V. 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 ±10kV for human body model discharges.

REC2 IN, REC1 IN (Pins 8, 13): 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.

REC2 OUT, REC1 OUT (Pins 9, 12): Receiver Outputs with TTL/CMOS Voltage Levels. Outputs are fully short-circuit protected to ground or V_{CC} with the power ON or OFF.

TR2 IN, TR1 IN (Pins 10, 11): RS232 Driver Input Pins. These inputs are TTL/CMOS compatible. Inputs should not be allowed to float. Tie unused inputs to V_{CC}.

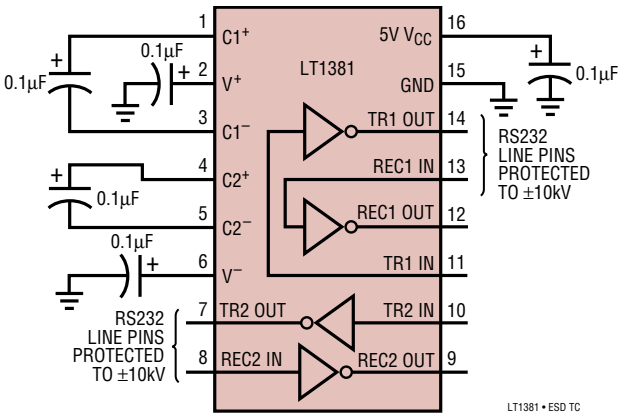
GND (Pin 15): Ground Pin.

V_{CC} (Pin 16): 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.

ESD PROTECTION

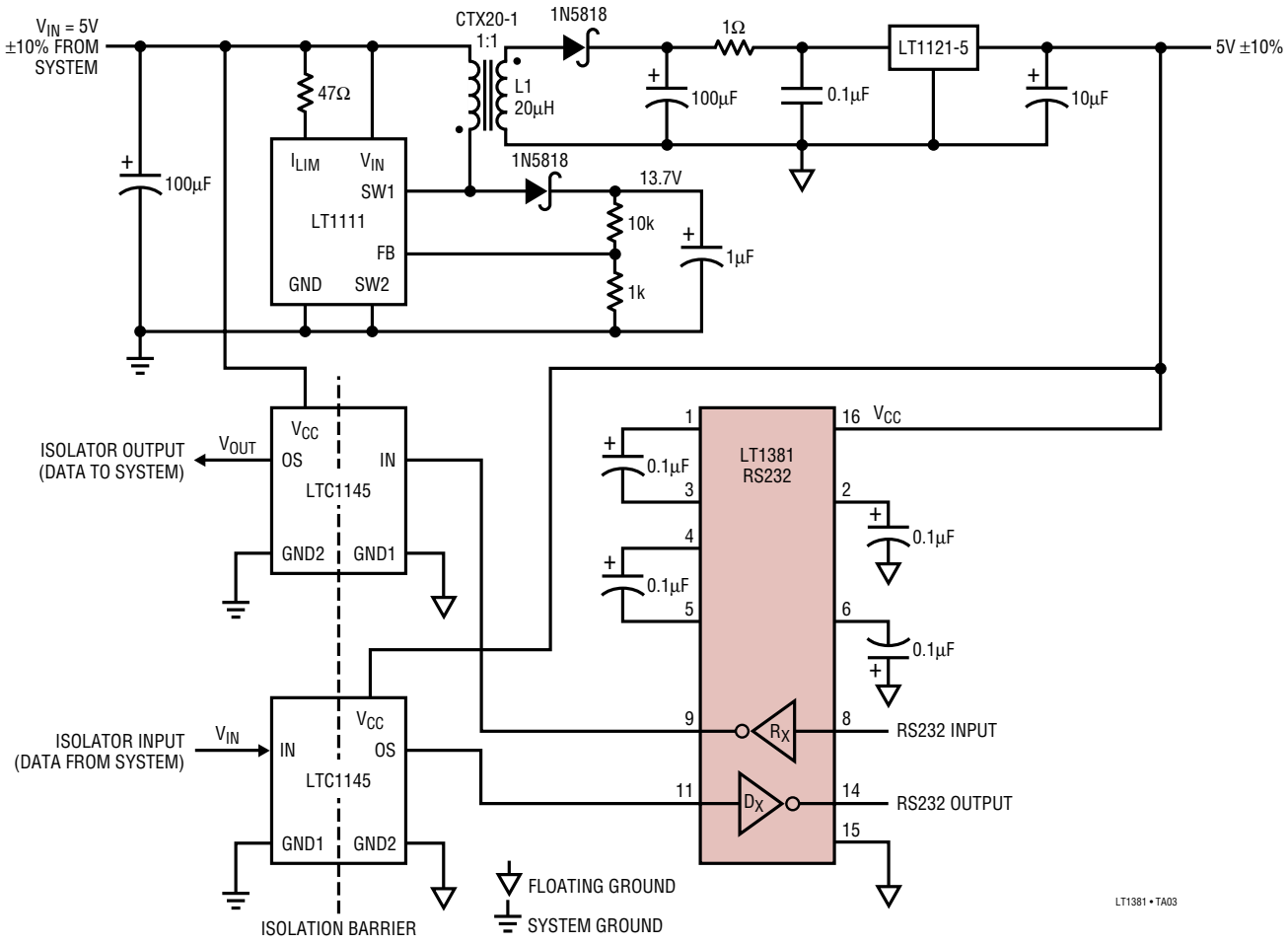
The RS232 line inputs of the LT1381 have on-chip protection from ESD transients up to ±10kV. The protection structures act to divert the static discharge safely to system ground. In order for the ESD protection to function effectively, the power supply and ground pins of the circuit must be connected 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

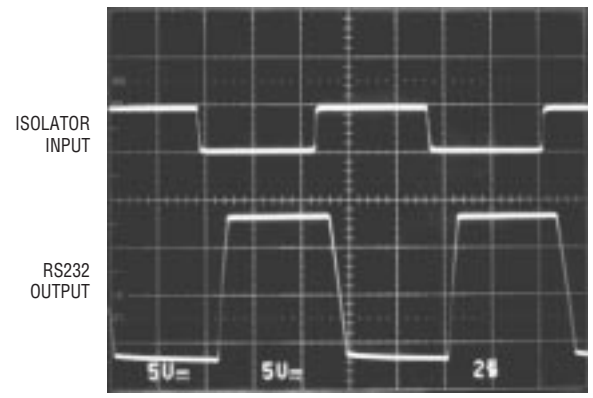


TYPICAL APPLICATIONS

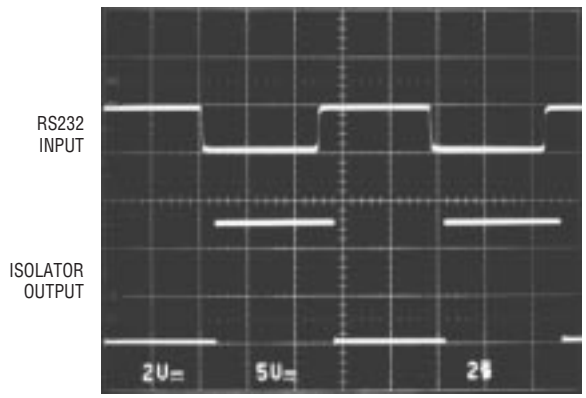
Isolated RS232 Driver/Receiver



Data Transmission Across Isolation Barrier



1381 TA04

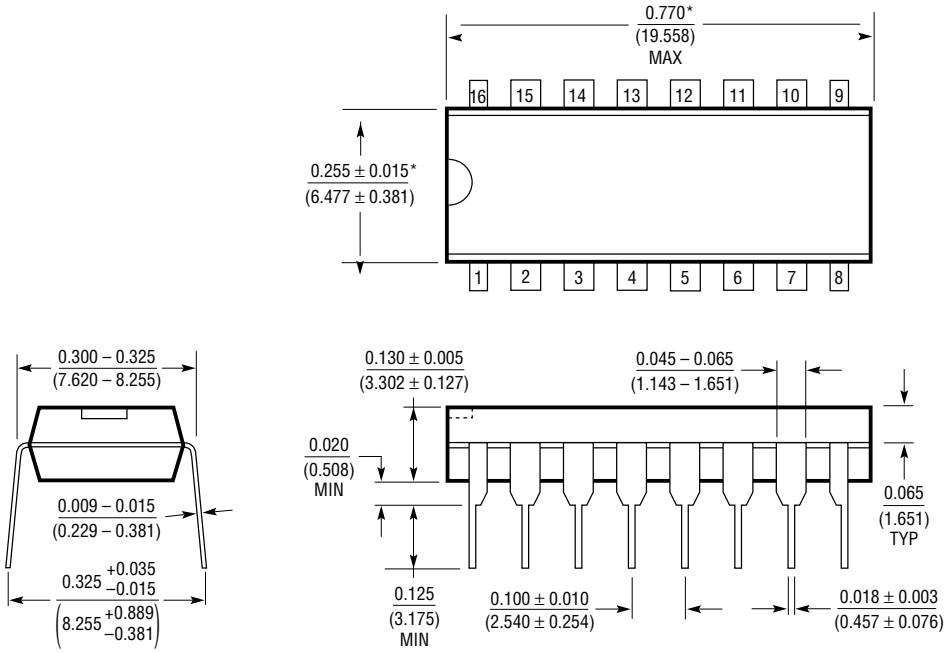


1381 TA05

PACKAGE DESCRIPTION

Dimensions in inches (millimeters) unless otherwise noted.

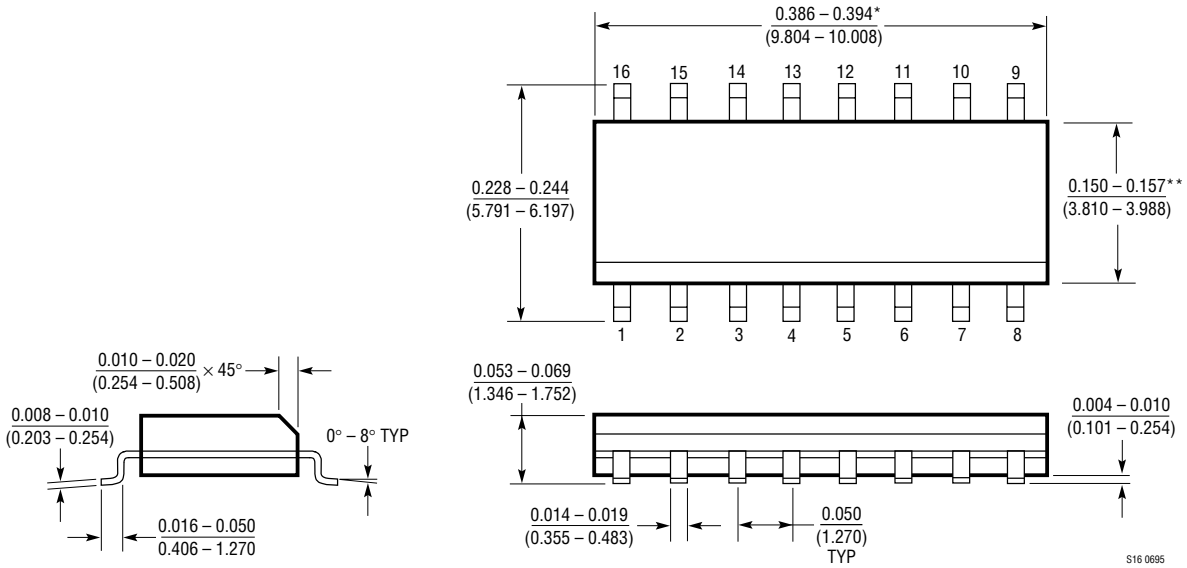
N Package
16-Lead PDIP (Narrow 0.300)
(LTC DWG # 05-08-1510)



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

N16 1197

S Package
16-Lead Plastic Small Outline (Narrow 0.150)
(LTC DWG # 05-08-1610)



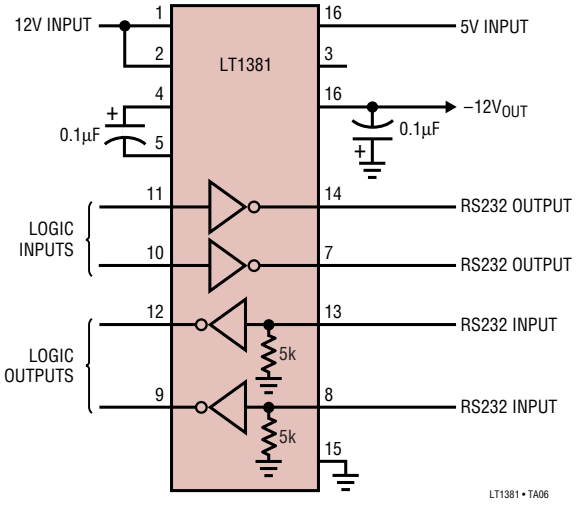
S16 0695

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

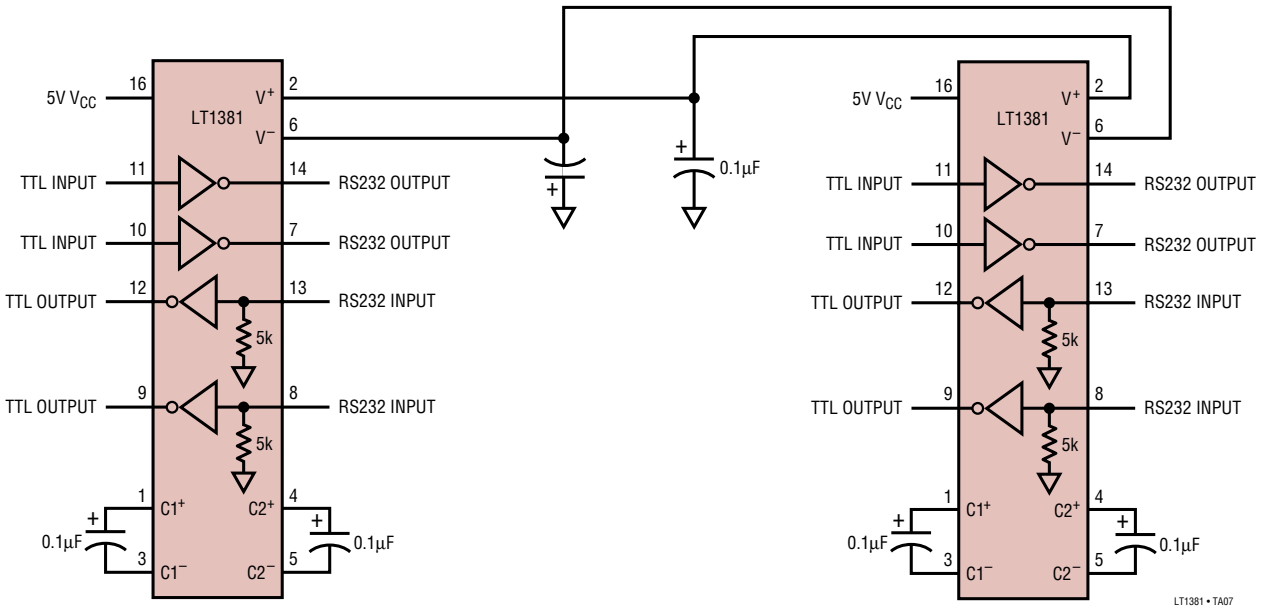
**DIMENSION DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010" (0.254mm) PER SIDE

TYPICAL APPLICATIONS

Operation Using 5V and 12V Power Supplies



Sharing Capacitors



RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LT1180A/LT1181A	5V 2-Driver/2-Receiver RS232 Transceivers	Pin Compatible with LT1280A/LT1280A
LT1280A/LT1281A	5V 2-Driver/2-Receiver RS232 Transceivers	Pin Compatible with LT1180A/LT1181A
LT1780/LT1781	5V 2-Driver/2-Receiver RS232 Transceivers	IEC 1000-4-2 Level 4 Compliance

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