Jameco Part Number 1748563

LTC1383

5V Low Power
RS232 Transceiver

FEATURES

- **Operates from a Single 5V Supply**
- **Low Supply Current: I_{CC} = 220μA**
- **ESD Protection Over ±10kV**
- Available in 16-Pin SOIC Narrow Package
- Uses Small Capacitors: 0.1μF
- Operates to 120kBaud
- Output Overvoltage Does Not Force Current Back into Supplies
- RS232 I/O Lines Can Be Forced to ±25V Without Damage
- Pin Compatible with LT1181A and MAX232A

# APPLICATIONS

- Notebook Computers
- Palmtop Computers

DESCRIPTION

The LTC®1383 is an ultra-low power 2-driver/2-receiver RS232 transceiver that operates from a single 5V supply. The charge pump requires only four space-saving 0.1μF capacitors. The supply current (I_{CC}) of the transceiver is only 220μA with driver outputs unloaded.
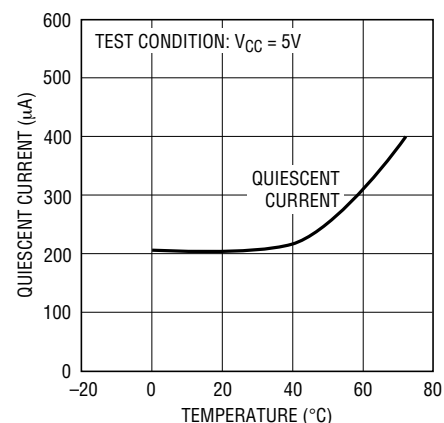
The LTC1383 is fully compliant with all data rate and overvoltage RS232 specifications. The transceiver can operate up to 120kbaud with a 2500pF, 3kΩ load. Both driver outputs and receiver inputs can be forced to ±25V without damage and can survive multiple ±10kV ESD strikes.

TYPICAL APPLICATION
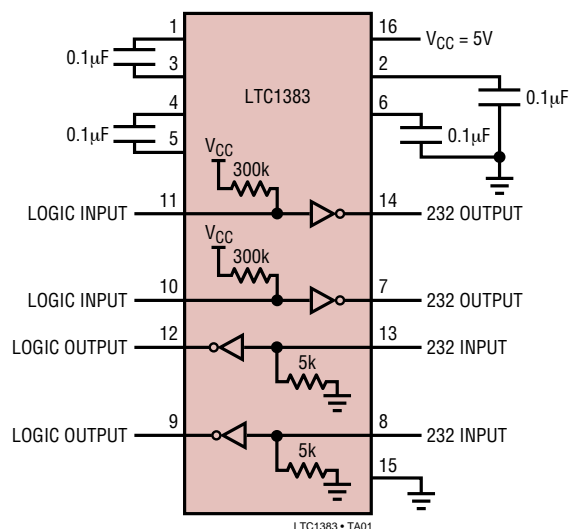
LTC1383 • TA01

Quiescent Supply Current vs Temperature
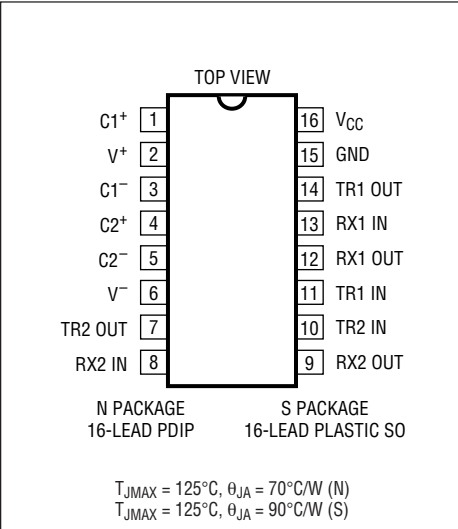
LTC1383 • TA02

LTC1383

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC}) 6V
Input Voltage
    Driver .... −0.3V to V_{CC} + 0.3V
    Receiver .... −25V to 25V
    Digital Input .... −0.3V to V_{CC} + 0.3V
Output Voltage
    Driver .... −25V to 25V
    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
    LTC1383C .... 0°C to 70°C
    LTC1383I .... −40°C to 85°C
Storage Temperature Range .... −65°C to 150°C
Lead Temperature (Soldering, 10 sec) .... 300°C

PACKAGE/ORDER INFORMATION

TOP VIEW

C1⁺	1	16	V_{CC}
V⁺	2	15	GND
C1⁻	3	14	TR1 OUT
C2⁺	4	13	RX1 IN
C2⁻	5	12	RX1 OUT
V⁻	6	11	TR1 IN
TR2 OUT	7	10	TR2 IN
RX2 IN	8	9	RX2 OUT

N PACKAGE   S PACKAGE
16-LEAD PDIP   16-LEAD PLASTIC SO

T_{JMAX} = 125°C, θ_{JA} = 70°C/W (N)
T_{JMAX} = 125°C, θ_{JA} = 90°C/W (S)

ORDER PART NUMBER

LTC1383CN
LTC1383CS
LTC1383IN
LTC1383IS

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

DC ELECTRICAL CHARACTERISTICS

The ● denotes specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. V_{CC} = 5V, C1 = C2 = C3 = C4 = 0.1μF, unless noted.

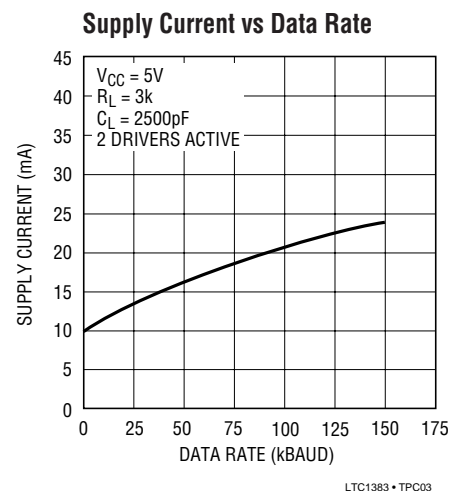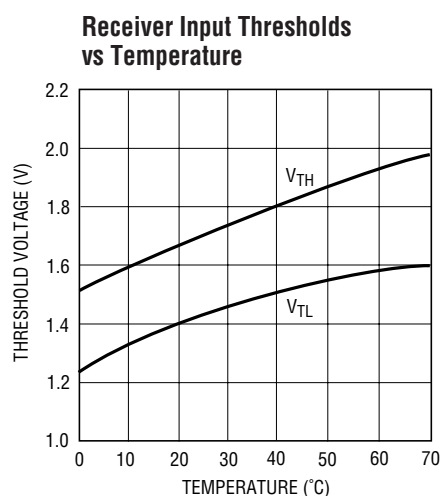| PARAMETER	CONDITIONS			MIN	TYP	MAX	UNITS
Any Driver							
Output Voltage Swing	3k to GND	Positive	●	5.0	7.0		V
		Negative	●	−5.0	−6.5		V
Logic Input Voltage Level	Input Low Level (V_{OUT} = High)		●		1.4	0.8	V
	Input High Level (V_{OUT} = Low)		●	2.0	1.4		V
Logic Input Current	$V_{IN} = V_{CC}$		●			5	μA
	V_{IN} = 0V		●		−20	−40	μA
Output Short-Circuit Current	V_{OUT} = 0V			±9	±12		mA
Any Receiver							
Input Voltage Thresholds	Input Low Threshold		●	0.8	1.3		V
	Input High Threshold		●		1.7	2.4	V
Hysteresis			●	0.1	0.4	1	V
Input Resistance	−10V ≤ V_{IN} ≤ 10V			3	5	7	kΩ
Output Voltage	Output Low, I_{OUT} = −1.6mA (V_{CC} = 5V)		●		0.2	0.4	V
	Output High, I_{OUT} = 160μA (V_{CC} = 5V)		●	3.0	3.2		V
Output Short-Circuit Current	Sinking Current, $V_{OUT} = V_{CC}$			−15	−40		mA
	Sourcing Current V_{OUT} = 0V			10	20		mA
Power Supply Generator							
V^+ Output Voltage	I_{OUT} = 0mA				8.0		V
	I_{OUT} = 8mA				7.5		V
V^- Output Voltage	I_{OUT} = 0mA				−8.0		V
	I_{OUT} = −8mA				−7.0		V

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LINEAR TECHNOLOGY

DC ELECTRICAL CHARACTERISTICS

The ● denotes specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. V_{CC} = 5V, C1 = C2 = C3 = C4 = 0.1μF, unless noted.

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Power Supply						
V_{CC} Supply Current	No Load (Note 2), 0°C to 70°C	●		0.22	0.5	mA
	No Load (Note 2), −40°C to 85°C	●		0.35	1.0	mA
Digital Input Threshold Low		●		1.4	0.8	V
Digital Input Threshold High		●	2.0	1.4		V

AC CHARACTERISTICS

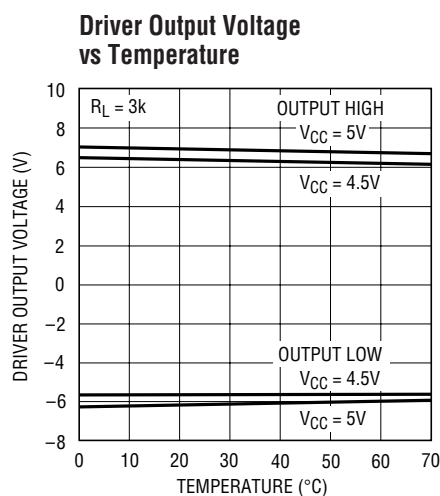The ● denotes specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. V_{CC} = 5V, C1 = C2 = C3 = C4 = 0.1μF, unless noted.

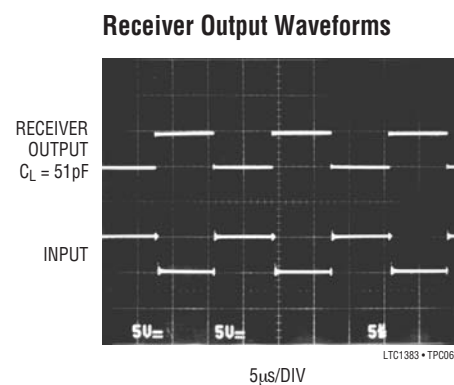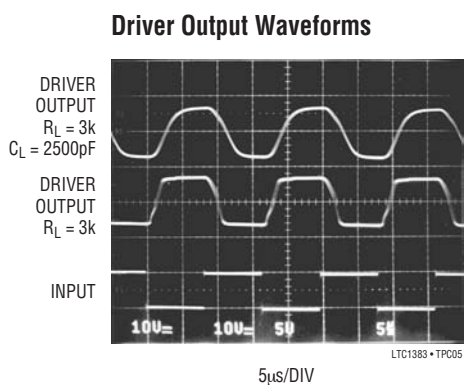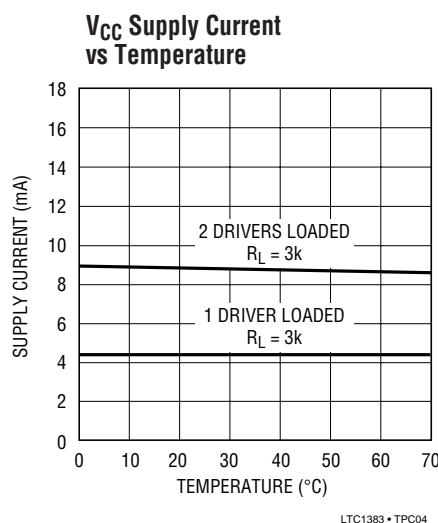| PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Slew Rate	R_L = 3k, C_L = 51pF			8	30	V/μs
	R_L = 3k, C_L = 2500pF		3	5		V/μs
Driver Propagation Delay	t_{HLD} (Figure 1)	●		2	3.5	μs
(TTL to RS232)	t_{LHD} (Figure 1)	●		2	3.5	μs
Receiver Propagation Delay	t_{HLR} (Figure 2)	●		0.3	0.8	μs
(RS232 to TTL)	t_{LHR} (Figure 2)	●		0.3	0.8	μs

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

Note 2: Supply current is measured with driver and receiver outputs unloaded.

TYPICAL PERFORMANCE CHARACTERISTICS

Driver Output Voltage vs Temperature

LTC1383 • TPC01

Receiver Input Thresholds vs Temperature

LTC1383 • TPC02

Supply Current vs Data Rate

LTC1383 • TPC03

TYPICAL PERFORMANCE CHARACTERISTICS

V_CC Supply Current vs Temperature

LTC1383 • TPC04

Driver Output Waveforms

LTC1383 • TPC05

5µs/DIV

Receiver Output Waveforms

LTC1383 • TPC06

5µs/DIV

PIN FUNCTIONS

V_CC: 5V Input Supply Pin. This pin should be decoupled with a 0.1µF ceramic capacitor.

GND: Ground Pin.

V⁺: Positive Supply Output (RS232 Drivers). $V^+ \cong 2V_{CC} - 2V$. This pin requires an external capacitor C = 0.1µF for charge storage. The capacitor may be tied to ground or V_{CC}. With multiple devices, the V^+ and V^- pins may share a common capacitor. For large numbers of devices, increasing the size of the shared common storage capacitors is recommended to reduce ripple.

V⁻: Negative Supply Output (RS232 Drivers). $V^- \cong -(2V_{CC} - 2V)$. This pin requires an external capacitor C = 0.1µF for charge storage.

C1⁺, C1⁻, C2⁺, C2⁻: Commutating Capacitor Inputs. These pins require two external capacitors C = 0.1µF: one from C1⁺ to C1⁻ and another from C2⁺ to C2⁻. To maintain charge pump efficiency, the capacitor's effective series resistance should be less than 2Ω.

TR IN: RS232 Driver Input Pins. Inputs are TTL/CMOS compatible. The inputs of unused drivers can be left unconnected since 300k input pull-up resistors to V_{CC} are included on chip.

TR OUT: Driver Outputs at RS232 Voltage Levels. The driver outputs are protected against ESD to ±10kV for human body model discharges.

RX IN: Receiver Inputs. These pins can be forced to ±25V without damage. The receiver inputs are protected against ESD to ±10kV for human body model discharges. Each receiver provides 0.4V of hysteresis for noise immunity.

RX OUT: Receiver Outputs with TTL/CMOS Voltage Levels.
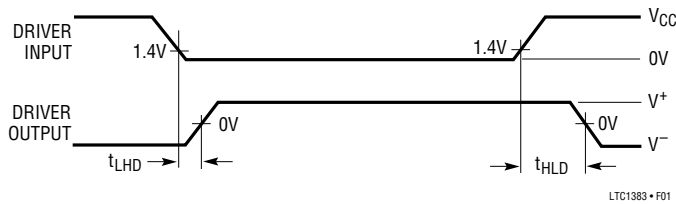
SWITCHING TIME WAVEFORMS
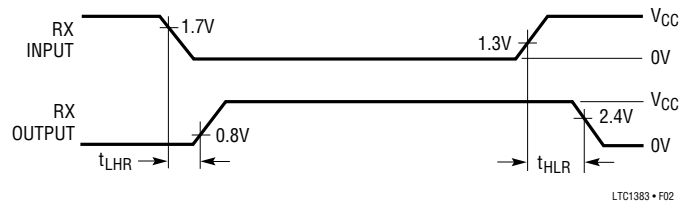

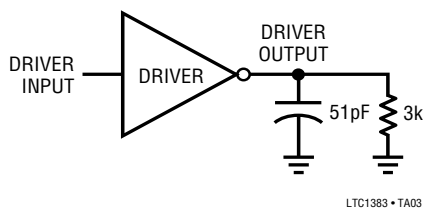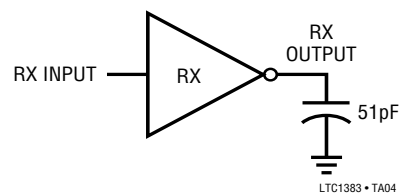Figure 1. Driver Propagation Delay Timing

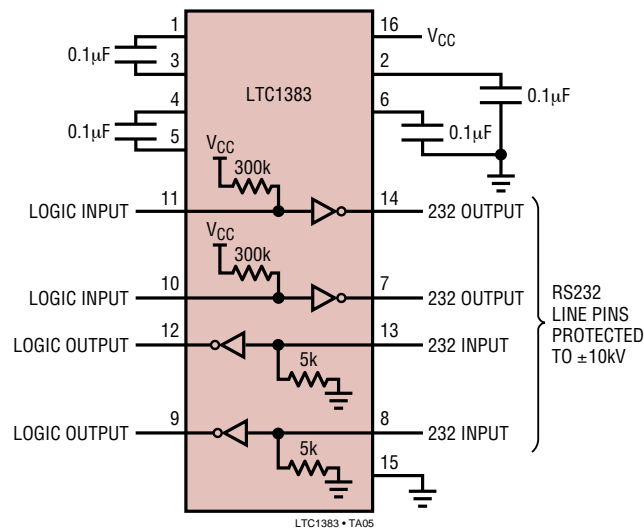
Figure 2. Receiver Propagation Delay Timing

TEST CIRCUITS

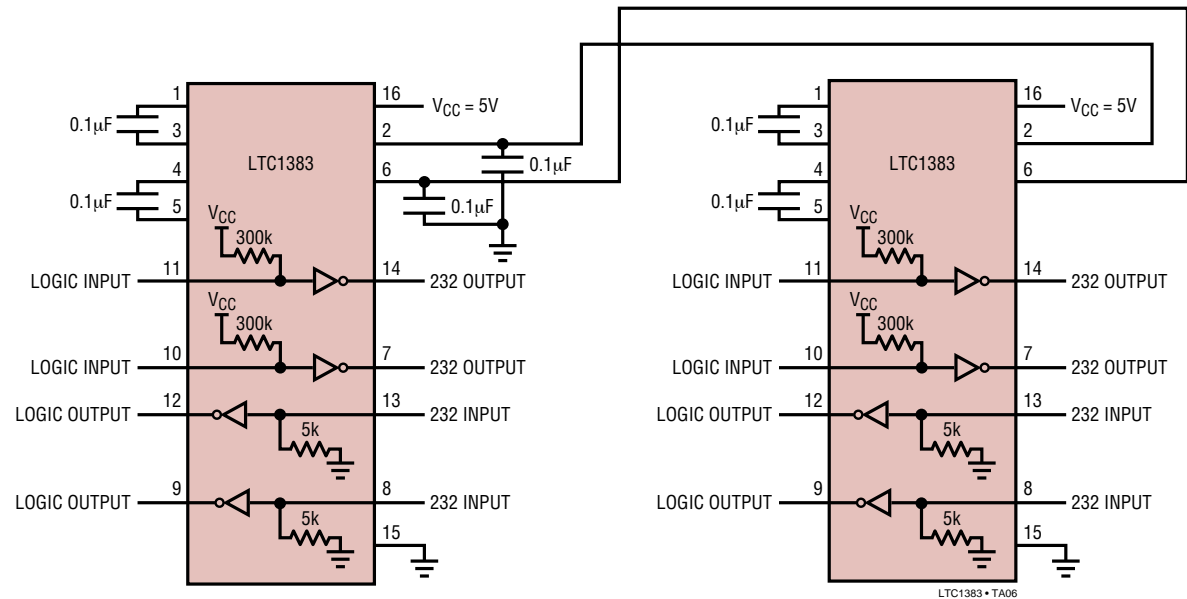**Driver Timing Test Load**

Receiver Timing Test Load

ESD Test Circuit

TYPICAL APPLICATIONS

**Paralleling Power Supply Generator
with Common Storage Capacitors**

LTC1383 • TA06

1383fa

PACKAGE DESCRIPTION

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

.770*
(19.558)
MAX

16 15 14 13 12 11 10 9

.255 ± .015*
(6.477 ± 0.381)

1 2 3 4 5 6 7 8

.300 – .325
(7.620 – 8.255)

.130 ± .005
(3.302 ± 0.127)

.045 – .065
(1.143 – 1.651)

.008 – .015
(0.203 – 0.381)

.020
(0.508)
MIN

.065
(1.651)
TYP

$.325 \, {}^{+.035}_{-.015}$

$\left(8.255 \, {}^{+0.889}_{-0.381}\right)$

.120
(3.048)
MIN

.100
(2.54)
BSC

.018 ± .003
(0.457 ± 0.076)
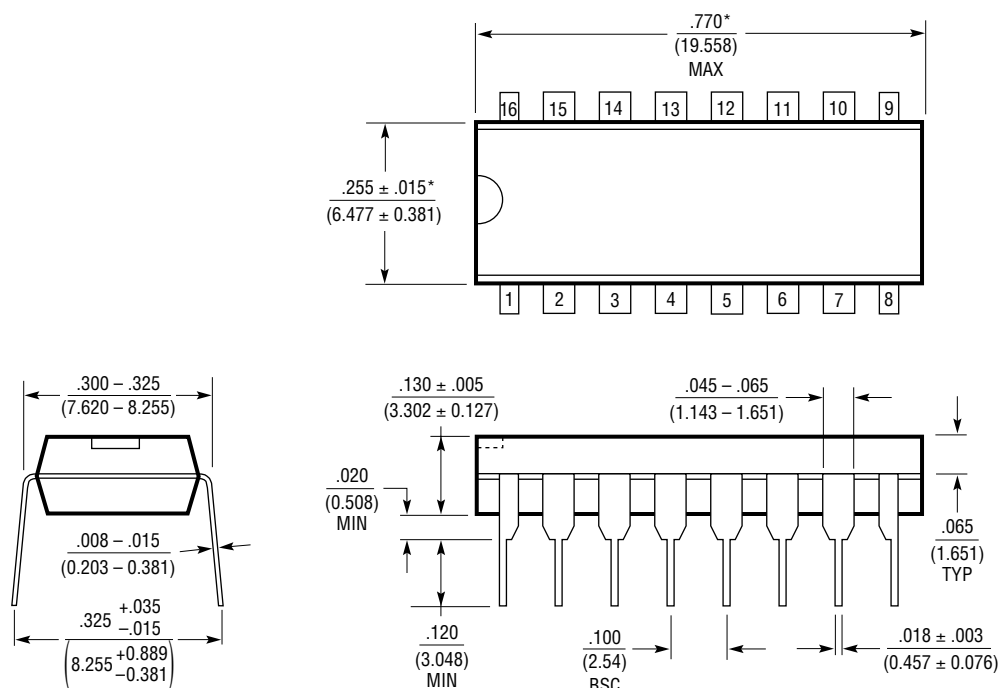
NOTE:
1. DIMENSIONS ARE $\frac{\text{INCHES}}{\text{MILLIMETERS}}$

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

N16 1002

PACKAGE DESCRIPTION

S Package
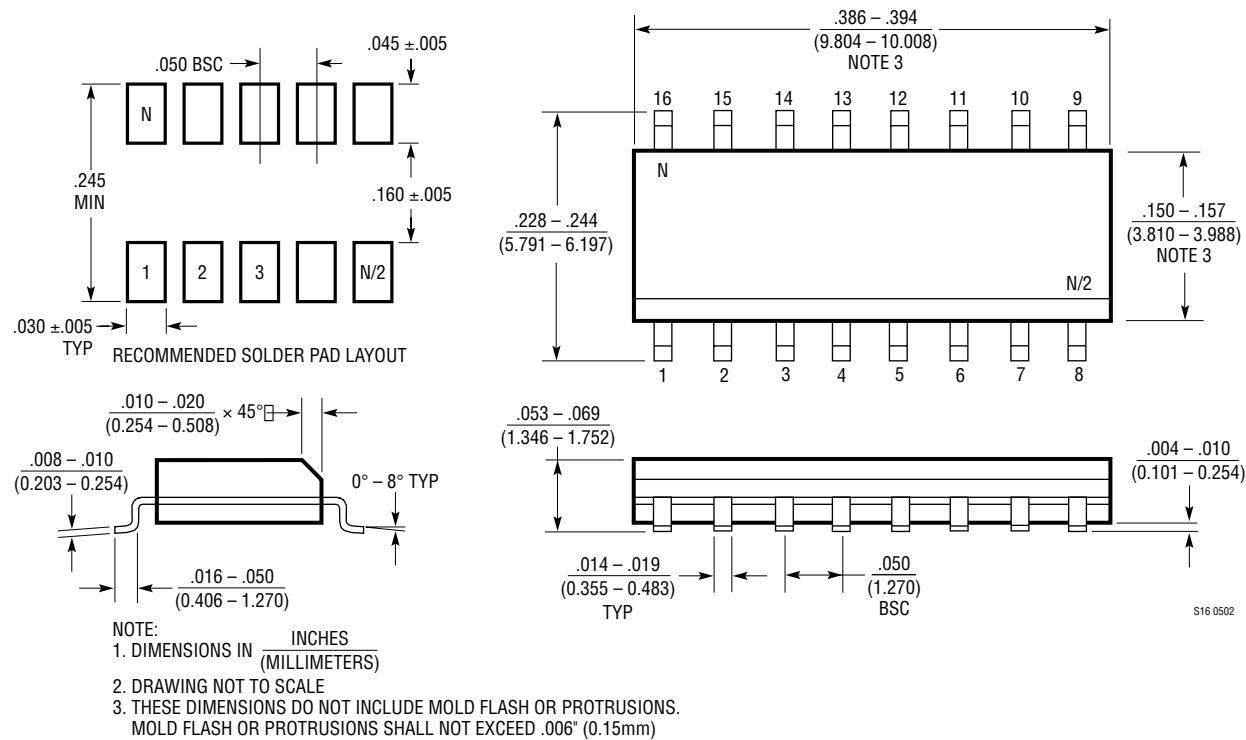**16-Lead Plastic Small Outline (Narrow .150 Inch)**
(Reference LTC DWG # 05-08-1610)

.050 BSC   .045 ±.005

.245 MIN

.160 ±.005

.030 ±.005 TYP   RECOMMENDED SOLDER PAD LAYOUT

.386 – .394
(9.804 – 10.008)
NOTE 3

16 15 14 13 12 11 10 9

.228 – .244
(5.791 – 6.197)

.150 – .157
(3.810 – 3.988)
NOTE 3

1 2 3 4 5 6 7 8

.010 – .020
(0.254 – 0.508) × 45°

.008 – .010
(0.203 – 0.254)

0° – 8° TYP

.016 – .050
(0.406 – 1.270)

.053 – .069
(1.346 – 1.752)

.004 – .010
(0.101 – 0.254)

.014 – .019
(0.355 – 0.483)
TYP

.050
(1.270)
BSC

S16 0502

NOTE:
1. DIMENSIONS IN $\frac{INCHES}{(MILLIMETERS)}$
2. DRAWING NOT TO SCALE
3. THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
   MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .006" (0.15mm)

RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LT1780/LT1781	5V, 2 Driver, 2 Receiver RS232 Transeivers	±15kV ESD per IEC 1000-4
LTC1382	5V, 2 Driver, 2 Receiver RS232 Transceiver	220µA Supply Current, 0.2µA in Shutdown
LTC1384	5V, 2 Driver, 2 Receiver RS232 Transceiver	220µA Supply Current, 2 Receivers Active in Shutdown
LTC1385	3.3V, 2 Driver, 2 Receiver RS562 Transceiver	220µA Supply Current, 2 Receivers Active in Shutdown
LTC1386	3.3V, 2 Driver, 2 Receiver RS562 Transceiver	220µA Supply Current, Narrow 16-pin SO

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