

## FEATURES

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

## DESCRIPTION

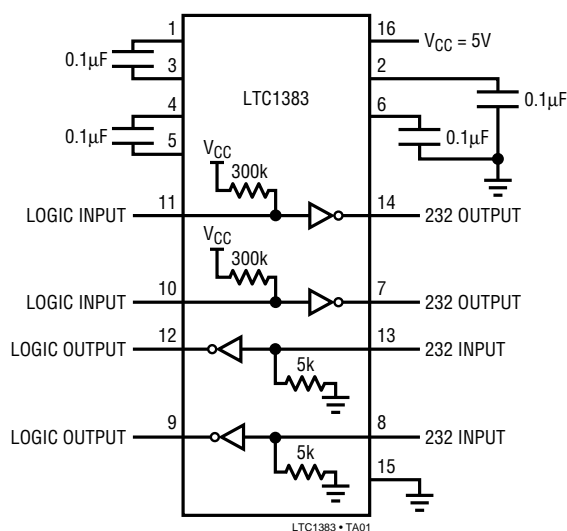
The LTC1383 is an ultra-low power 2-driver/2-receiver RS232 transceiver that operates from a single 5V supply. The charge pump requires only four space-saving  $0.1\mu F$  capacitors. The supply current ( $I_{CC}$ ) of the transceiver is only  $220\mu A$  with driver outputs unloaded.

The LTC1383 is fully compliant with all data rate and overvoltage RS232 specifications. The transceiver can operate up to 120kbaud with a  $2500pF$ ,  $3k\Omega$  load. Both driver outputs and receiver inputs can be forced to  $\pm 25V$  without damage and can survive multiple  $\pm 10kV$  ESD strikes.

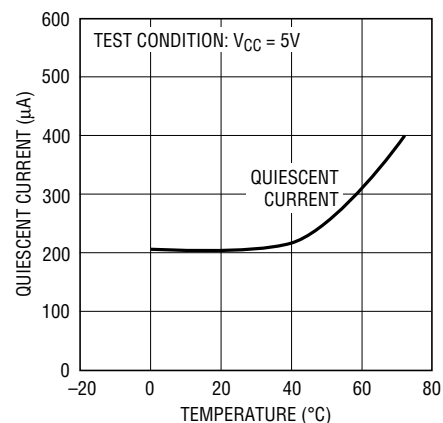
## APPLICATIONS

- Notebook Computers
- Palmtop Computers

## TYPICAL APPLICATION



**Quiescent Supply Current vs Temperature**

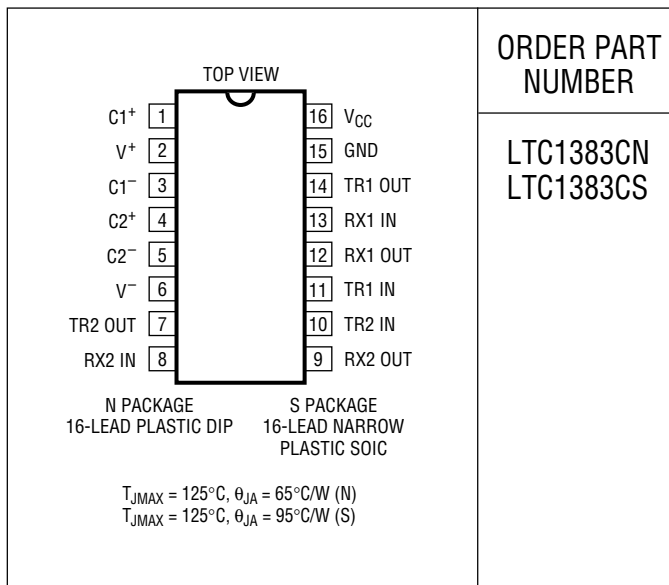


LTC1383 • TA02

## 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 .....	0°C to 70°C
Storage Temperature Range .....	-65°C to 150°C
Lead Temperature (Soldering, 10 sec) .....	300°C

## PACKAGE/ORDER INFORMATION



Consult factory for Industrial and Military grade products.

## DC ELECTRICAL CHARACTERISTICS

$V_{CC} = 5V$ ,  $C1 = C2 = C3 = C4 = 0.1\mu F$ , unless otherwise noted.

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

## DC ELECTRICAL CHARACTERISTICS $V_{CC} = 5V, C1 = C2 = C3 = C4 = 0.1\mu F$ , unless otherwise noted.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
<b>Power Supply</b>					
$V_{CC}$ Supply Current	No Load (Note 2)	●	0.22	0.5	mA
Digital Input Threshold Low		●	1.4	0.8	V
Digital Input Threshold High		●	2.0	1.4	V

## AC CHARACTERISTICS $V_{CC} = 5V, C1 = C2 = C3 = C4 = 0.1\mu F$ , unless otherwise noted.

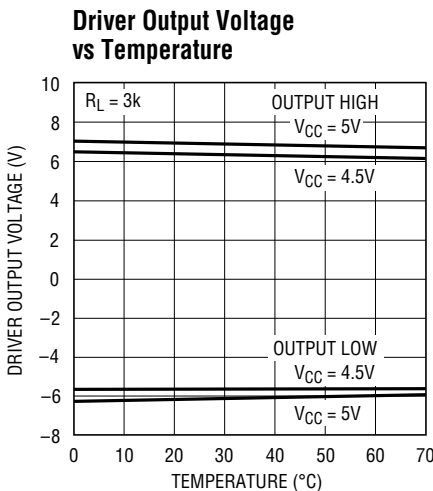
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Slew Rate	$R_L = 3k, C_L = 51pF$		8	30	$V/\mu s$
	$R_L = 3k, C_L = 2500pF$	3	5		$V/\mu s$
Driver Propagation Delay (TTL to RS232)	$t_{HLD}$ (Figure 1)	●	2	3.5	$\mu s$
	$t_{LHD}$ (Figure 1)	●	2	3.5	$\mu s$
Receiver Propagation Delay (RS232 to TTL)	$t_{HLR}$ (Figure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

The ● denotes specifications which apply over the operating temperature range of  $0^\circ C \leq T_A \leq 70^\circ C$ .

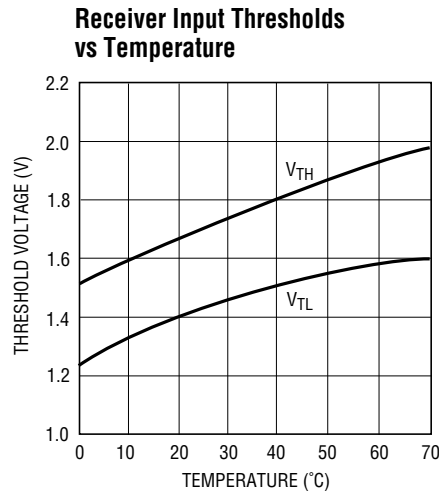
**Note 1:** Absolute maximum ratings are those values beyond which the life of the device may be impaired.

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

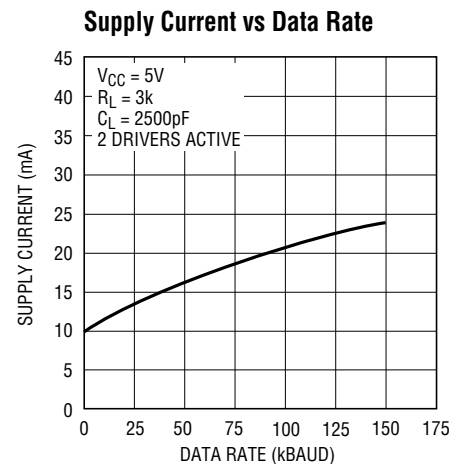
## TYPICAL PERFORMANCE CHARACTERISTICS



LTC1383 • TPC01

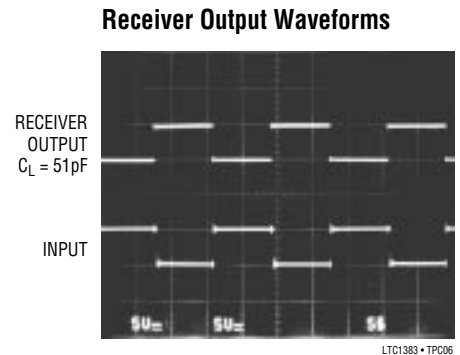
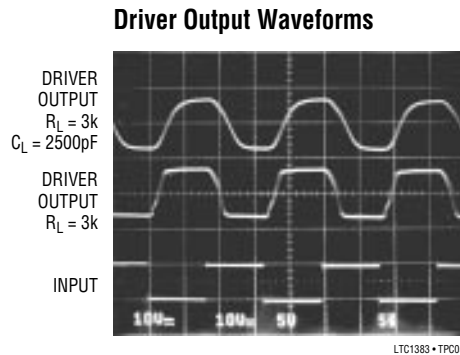
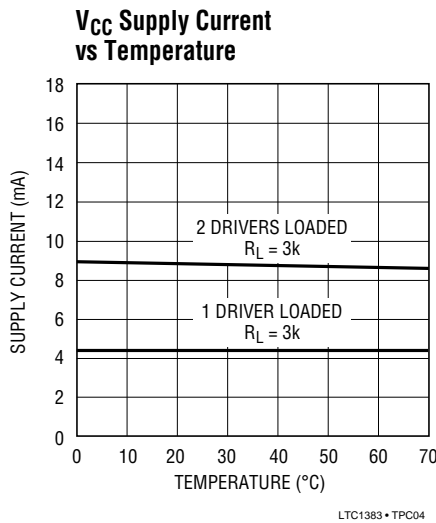


LTC1383 • TPC02



LTC1383 • TPC03

## TYPICAL PERFORMANCE CHARACTERISTICS



## PIN FUNCTIONS

**V<sub>CC</sub>**: 5V Input Supply Pin. This pin should be decoupled with a 0.1μF ceramic capacitor.

**GND**: Ground Pin.

**V<sup>+</sup>**: Positive Supply Output (RS232 Drivers).  $V^+ \cong 2V_{CC} - 2V$ . This pin requires an external capacitor  $C = 0.1\mu F$  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<sup>-</sup>**: Negative Supply Output (RS232 Drivers).  $V^- \cong -(2V_{CC} - 2V)$ . This pin requires an external capacitor  $C = 0.1\mu F$  for charge storage.

**C1<sup>+</sup>, C1<sup>-</sup>, C2<sup>+</sup>, C2<sup>-</sup>**: Commutating Capacitor Inputs. These pins require two external capacitors  $C = 0.1\mu F$ : one from C1<sup>+</sup> to C1<sup>-</sup> and another from C2<sup>+</sup> to C2<sup>-</sup>. 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

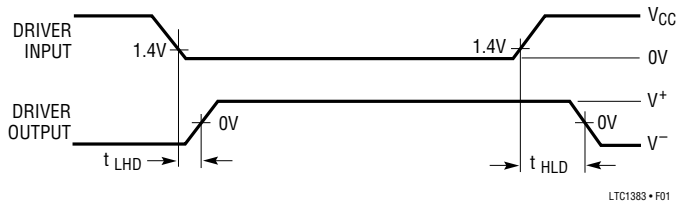


Figure 1. Driver Propagation Delay Timing

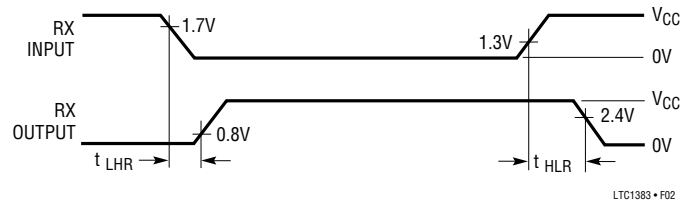
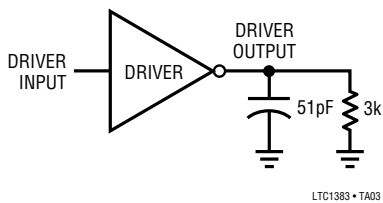


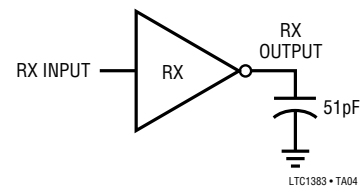
Figure 2. Receiver Propagation Delay Timing

# TEST CIRCUITS

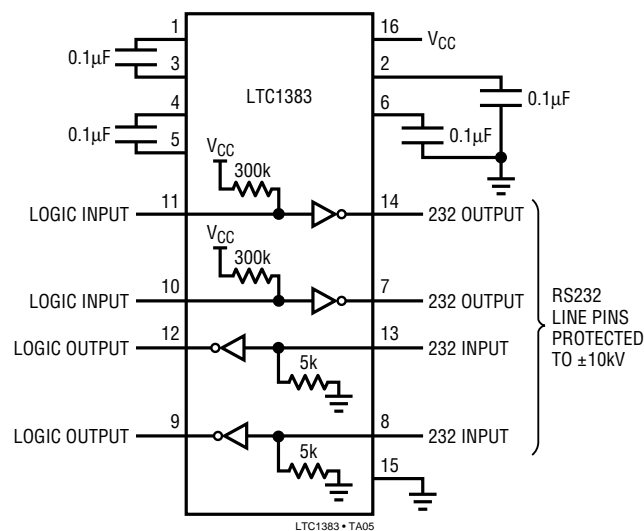
## Driver Timing Test Load



## Receiver Timing Test Load

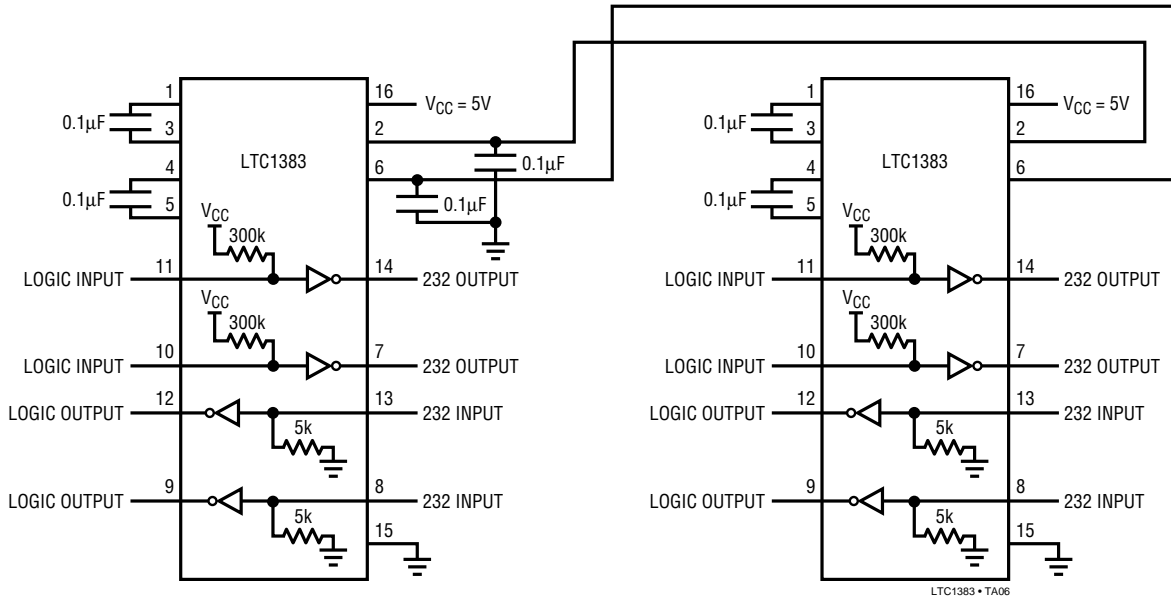


## ESD Test Circuit



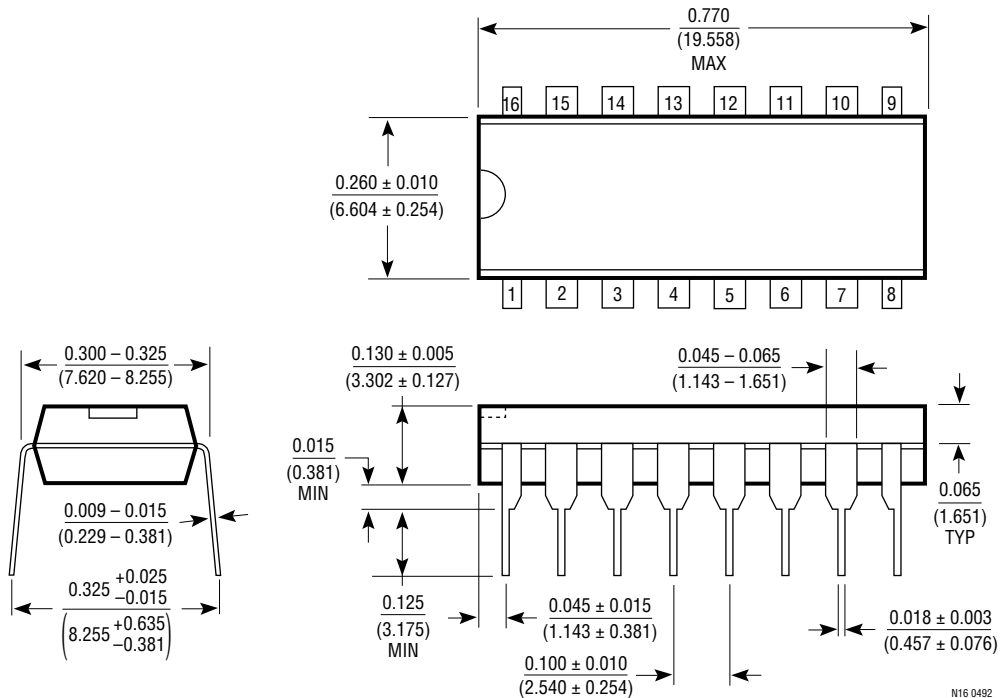
# TYPICAL APPLICATIONS

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



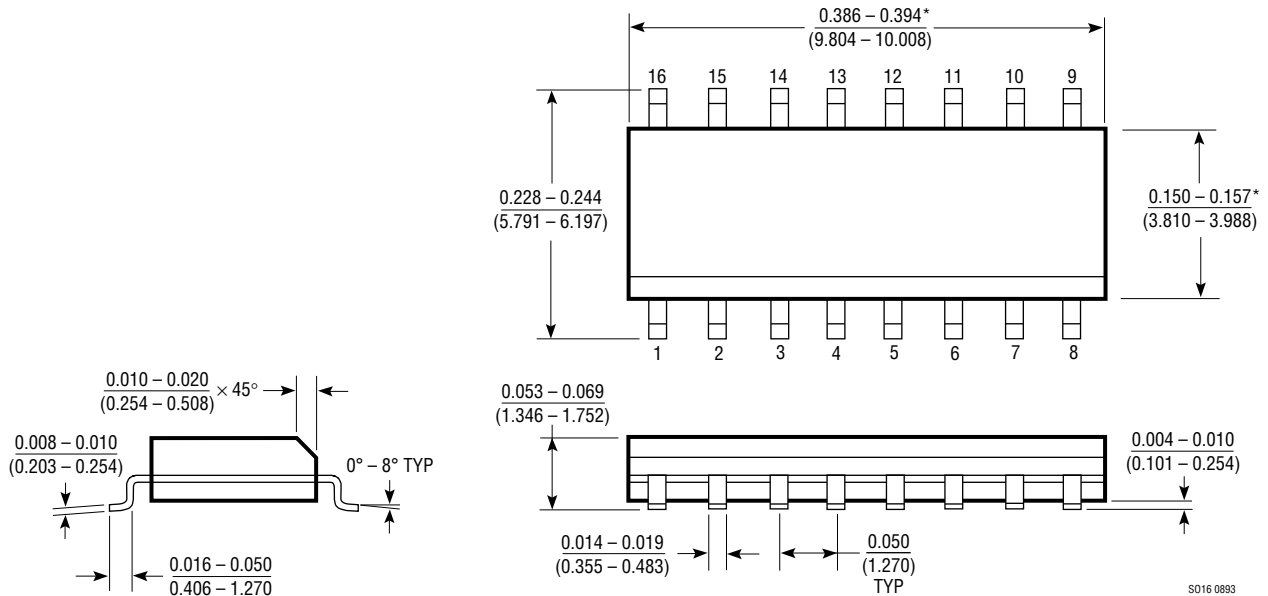
# PACKAGE DESCRIPTION Dimensions in inches (millimeters) unless otherwise noted.

**N Package  
16-Lead Plastic DIP**



**PACKAGE DESCRIPTION** Dimensions in inches (millimeters) unless otherwise noted.

**S Package  
16-Lead Plastic SOIC**



\*THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.  
MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.006 INCH (0.15mm).

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