

Features

- Fully specified rail to rail at $V_{CC} = 2.5\text{ V to }5.5\text{ V}$
- Input common-mode voltage from $-0.2\text{ V to }V_{CC} - 1.5\text{ V}$
- Low glitch CMOS-/TTL-compatible output stage
- 3.5 ns propagation delay
- Support 100pF capacitance loading
- 13.5 mW at 3.3 V
- Shutdown pin
- Replacement for ADCMP601/MAX999
- $-40^{\circ}\text{C to }+125^{\circ}\text{C}$ operation

Application

- High speed instrumentation
- Clock and data signal restoration
- Logic level shifting or translation
- Pulse spectroscopy
- High speed line receivers
- Threshold detection
- Peak and zero-crossing detectors
- High speed trigger circuitry
- Pulse-width modulators
- Current/voltage-controlled oscillators
- Automatic test equipment (ATE)

Description

The TP1981 is a very fast comparator. These comparators are exceptionally versatile and easy to use. Features include an input common mode range from $-0.2\text{ V to }V_{CC}-1.5\text{ V}$, low noise, TTL-/CMOS-compatible output drivers, and shutdown inputs.

The device offers 3.5 ns propagation delay with 100 mV overdrive with 4 mA typical quiescent current. The maximum detectable signal frequency exceeds 250MHz.

The TTL-/CMOS-compatible output stage is designed to drive up to 10 pF with full timing specs and to degrade in a graceful and linear fashion as additional capacitance is added. The comparator input stage offers robust protection against large input overdrive, and the output does not phase-reverse when the valid input signal range is exceeded.

The TP1981 is available in a 6-lead SC70 package.

Product family table

Table 1.

P/N	CH	Tpd	Icc	Vcc	Output stype	Hyst	package
TP1981	1	3.5 ns	4.1 mA	2.5V – 5.5V	Push-pull	5 mV	SC70-6

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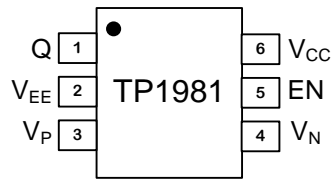
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Revision History

Table 2.

Date	Revision	Notes
2017.03.21	Rev.A.0	Pre-release version
2017.05.21	Rev.A.1	Add test figure in Typical Performance Characteristics

Pin Configuration and Functions



Pin Functions

Table 3.

Pin	I/O	Description
1	Q	O The output of comparator
2	V _{EE}	I The negative power supply
3	V _P	I The positive input to comparator
4	V _N	I The negative input of comparator
5	EN	I Enable pin, Active high
6	V _{CC}	I The positive power supply.

Order Information

Table 4.

Order Number	Operating Temperature Range	Package	Marking Information	MSL	Transport Media, Quantity
TP1981-CR	-40 to 85°C	6-Pin SC70	H81	3	Tape and Reel, 3000

Absolute Maximum Ratings*

Table 5.

Parameters	Value	Unit
Power Supply, V _{CC} to GND	6.0	V
V _{IN}	Input Voltage	V _{CC} + 0.3V to GND - 0.3V
I _O	Output Current	50 mA
T _J	Maximum Junction Temperature	150 °C
T _A	Operating Temperature Range	-45 to 85 °C
T _{STG}	Storage Temperature Range	-65 to 150 °C
TL	Lead Temperature (Soldering 10 sec)	260 °C

* **Note:** 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.

ESD, Electrostatic Discharge Protection

Table 6.

Symbol	Parameter	Condition	Minimum Level	Unit
HBM	Human Body Model ESD	MIL-STD-883H Method 3015.8	2	kV
CDM	Charged Device Model ESD	JEDEC-EIA/JESD22-C101E	1	kV

Thermal Information

Table 7.

Package Type	θ_{JA}	Unit
TP1981-CR SC70 6-Lead	400	°C/W

Electrical Characteristics

All test condition is $V_{CC} = 3.3V$, $V_{CM} = 1.65V$, $T_A = +25^{\circ}C$, $R_L = 100\Omega$ to V_{CM} , unless otherwise noted.

Table 8.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
DC INPUT CHARACTERISTICS						
V_P, V_N	Voltage Range	$V_{CC} = 2.5 V$ to $5.5 V$	-0.3		$V_{CC} + 0.2$	V
	Common-Mode Range	$V_{CC} = 2.5 V$ to $5.5 V$	-0.2		$V_{CC} - 1.5$	V
	Differential Voltage	$V_{CC} = 2.5 V$ to $5.5 V$			$V_{CC} + 0.5$	V
V_{OS}	Offset Voltage		10	15	20	mV
C_P, C_N	Capacitance			1.5		pF
CMRR	Common-Mode Rejection Ratio			50		dB
		$V_{CC} = 5.5 V$		50		dB
	Hysteresis			5		mV
ENABLE PIN CHARACTERISTICS						
V_{IH}	High-level input voltage		1.2			V
V_{IL}	Low-level input voltage				0.6	V
I_{IN}	Input Current		-1		1	μA
	Sleep Time			70		ns
	Wake-Up Time			300		ns
DC OUTPUT CHARACTERISTICS						
V_{OH}	Output Voltage High Level	$I_{OH} = -4 mA$		3.25		V
V_{OL}	Output Voltage Low Level	$I_{OL} = 4 mA$		0.05		V
AC PERFORMANCE						
T_{RISE}	Rise Time	10% to 90% V_{CC}		0.6		ns
T_{FALL}	Fall Time	90% to 10% V_{CC}		0.6		ns
T_{PD}	Propagation Delay	$V_{OVERDRIVE} = 100 mV$		3.5		ns
PW_{MIN}	Minimum Pulse Width			2		ns
POWER SUPPLY						
V_{CC}	Supply Voltage Range		2.5		5.5	V
I_{CC}	Supply Current			4.1		mA
P_D	Power Dissipation			13.5		mW
I_{DIS}	Shut down mode current			300		μA

Typical Performance Characteristics

All test condition is $V_{CC} = 3.3V$, $T_A = +25^{\circ}C$, $R_L = 50\Omega + 10pF$ to GND, unless otherwise noted.

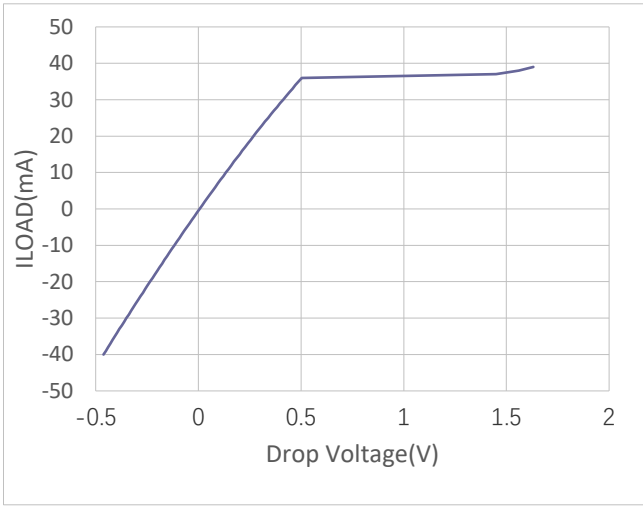


Figure 1. V_{OH} vs. Current Load

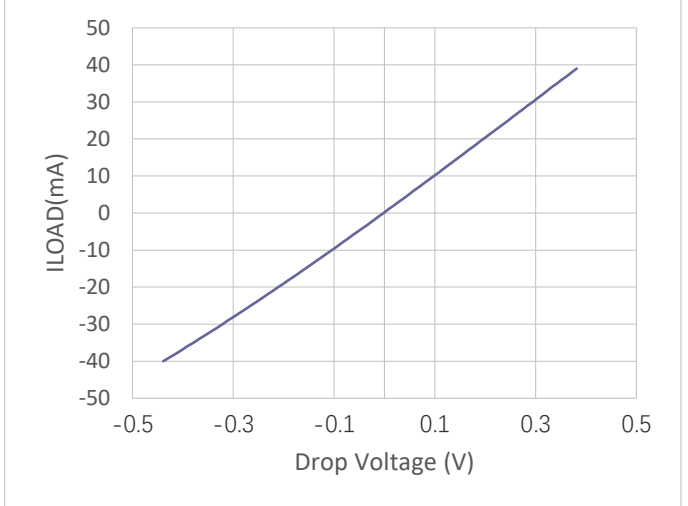


Figure 2. V_{OL} vs. Current Load

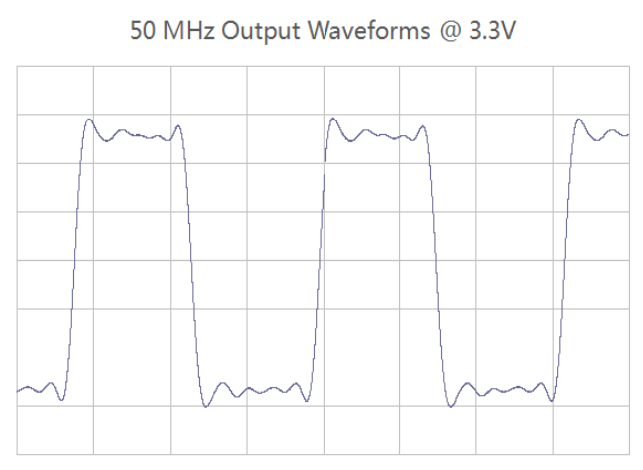


Figure 3. 50MHz Output waveforms @ 3.3V

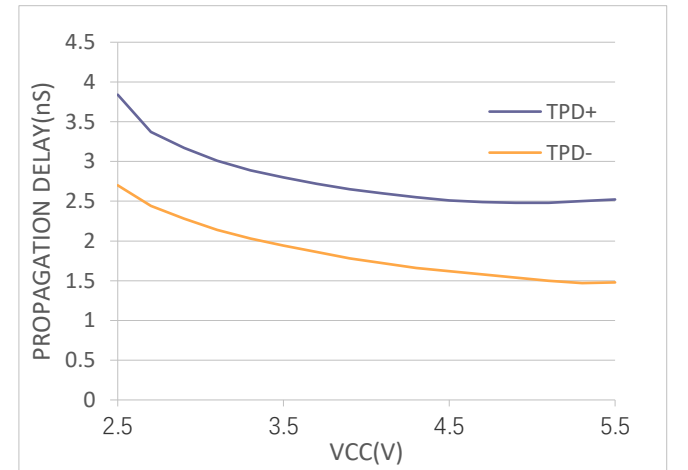


Figure 4. Propagation Delay vs. V_{CC}

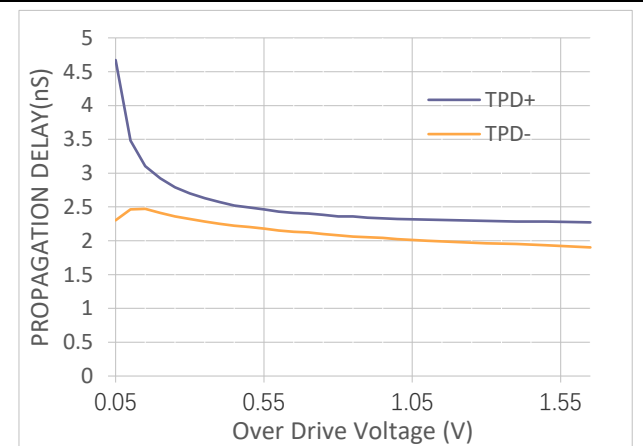
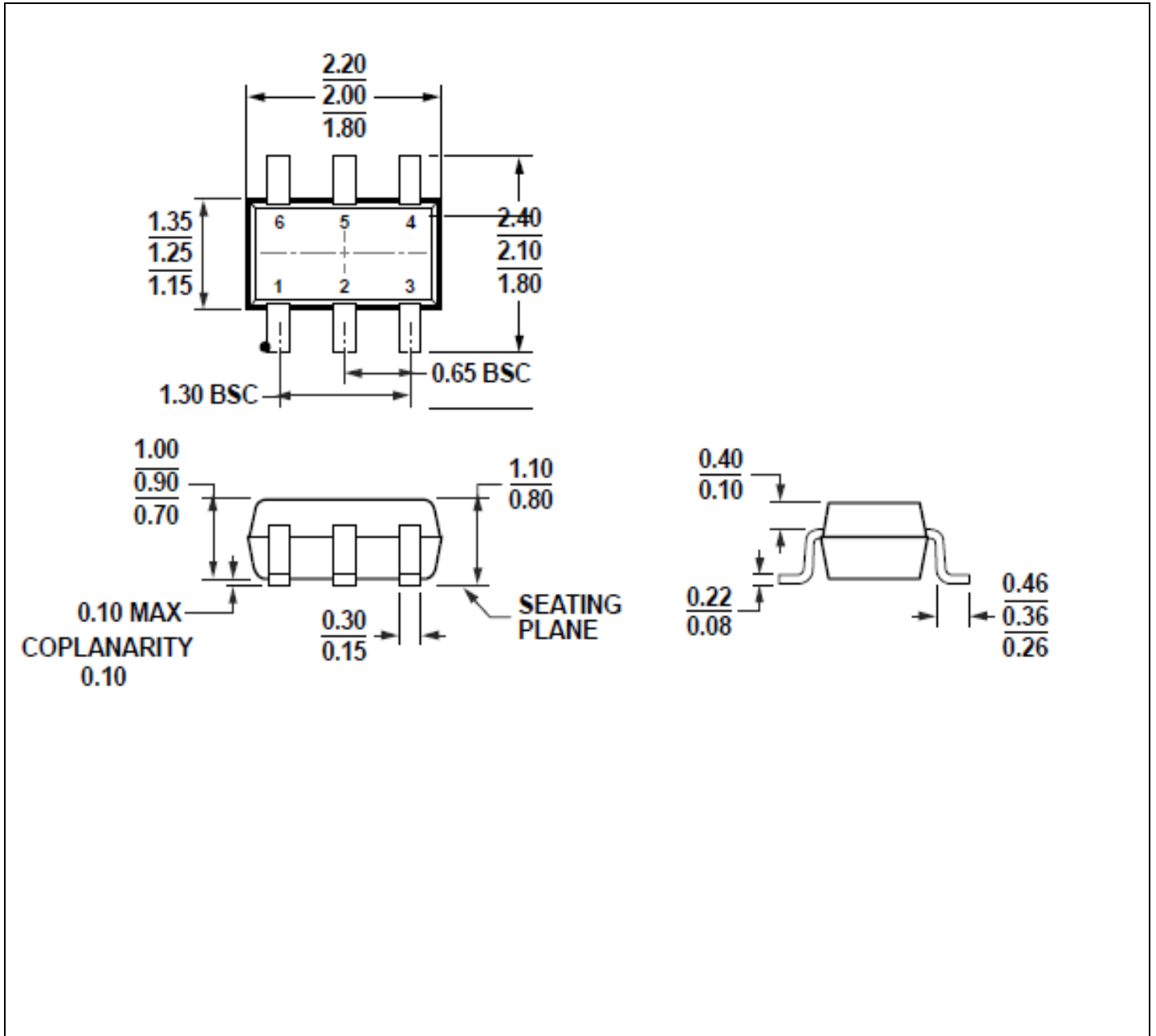


Figure 5. Propagation Delay vs. Overdrive Voltage

Package Outline Dimensions

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