DESCRIPTION

The AO393 consist of two independent precision voltage comparators with a typical offset voltage of 1.0mV and high gain. They are specifically designed to operate from a single power supply over wide range of voltages.

Operation from split power supply is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

The AO393 is available in SOP8 and DIP8 packages.

ORDERING INFORMATION

Package Type	Part Number	
SOP8 SPQ: 4,000pcs/Reel	M8	AO393M8R
		AO393M8VR
DIP8 SPQ: 20pcs/Tube	P8	AO393P8U
		AO393P8VU
Note	V: Halogen free Package R: Tape & Reel U: Tube	
AiT provides all RoHS products		

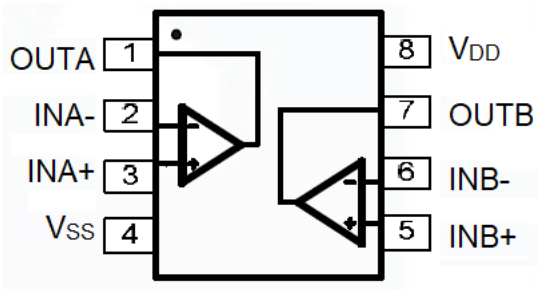
FEATURES

- Wide Supply Voltage Range
- Single Supply: 2.0V to 36V
- Dual Supplies: ±1.0V to ±18V
- Low Supply Current Drain: 0.6mA
- Low Input Bias Current: 25nA (Typical)
- Low Input Offset Current: ±5.0nA (Typical)
- Low Input Offset Voltage: 1.0mV (Typical)
- Input Common Mode Voltage Range Includes Ground
- Differential Input Voltage Range Equals to the Power Supply Voltage
- Low Output Saturation Voltage: 200mV at 4mA
- Open Collector Output
- Available in SOP8 and DIP8 packages

APPLICATION

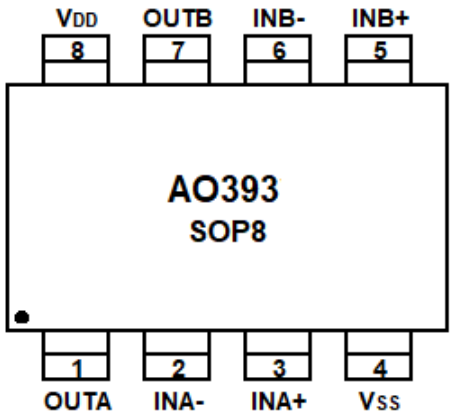
- Vacuum Robot
- Single Phase UPS
- Server PSU
- Cordless Power Tool
- Wireless Infrastructure
- Building Automation
- Factory Automation & Control
- Motor Dives
- Infotainment & Cluster
- Battery Charger
- DC-DC Module
- PC Motherboard
- Communication Equipment

TYPICAL APPLICATION

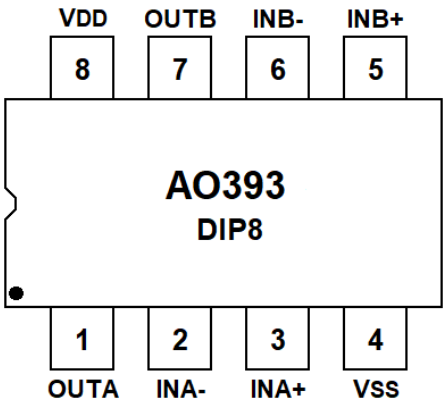


SOP8/DIP8

PIN DESCRIPTION



Top View



Top View

SOP8	DIP8	Symbol	Function
1	1	OUTA	Output A
2	2	INA-	Analog Inverting Input A
3	3	INA+	Analog Positive Input A
4	4	V_{SS}	Ground or Negative Power Supply Input
5	5	INB+	Analog Positive Input B
6	6	INB-	Analog Inverting Input B
7	7	OUTB	Output B
8	8	V_{DD}	Positive Power Supply Input

ABSOLUTE MAXIMUM RATINGS

V_{CC}, Power Supply Voltage	±20V or 40V
$V_{I(DIFF)}$, Differential input voltage	40V
V_I, Input Voltage	-0.3V ~ 40V
T_{opr}, Operating Temperature Range	-25°C ~ 125°C
T_{STG}, Storage Temperature Range	-65°C ~ 150°C

Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

NOTE1: This input current will only exist when the voltage at any of the input leads is driven negative. It is due to the collector-base junction of the input PNP transistors becoming forward biased and thereby acting as input diode clamps. In addition to this diode action, there is also lateral NPN parasitic transistor action on the IC chip. This transistor action can cause the output voltages of the comparators to go to the V+ voltage level (or to ground for a large overdrive) for the time duration that an input is driven negative. This is not destructive and normal output states will re-establish when the input voltage, which was negative, again returns to a value greater than -0.3 V_{DC} at 25°C).

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	V_{CC}		2	-	36	V
Operating Temperature Range	T_A		-40	-	85	°C

ELECTRICAL CHARACTERISTICS

Limits in standard typeface are for T_A=25℃, bold typeface applies over T_A=-40℃ to 85℃[NOTE2], V_{CC}=5V, GND=0V, unless otherwise specified.

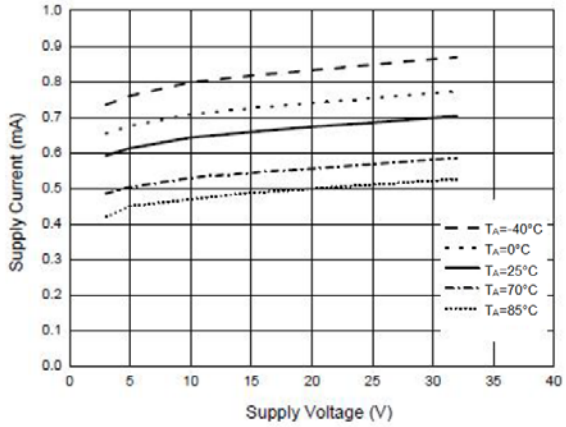
Parameter	Conditions		Min	Typ	Max	Unit
Input Offset Voltage	V_O=1.4V, R_S=0Ω, V_{CC}=5V to 30V		-	1.0	3.0	mV
			-	-	5	
Input Bias Current	I_{IN}+ or I_{IN}- with output in Linear Range, V_{CM}=0V		-	25	250	nA
			-	-	400	
Input Offset Current	I_{IN}+ - I_{IN}-, V_{CM}=0V		-	5.0	50	nA
			-	-	200	
Input Common-Mode Voltage Range[NOTE3]	V_{CC} = 30V		0	-	V_{CC}-1.5	V
Supply Current	R_L=∞	V_{CC} = 5V	-	0.6	1.0	mA
			-	-	2	
		V_{CC} = 30V	-	0.7	1.7	
			-	-	3	
Voltage Gain	V_{CC}=15V, R_L≥15kΩ, V_O=1V to 11V		50	200	-	V/mV
Large Signal Response Time	V_{IN}=TTL Logic Swing, V_{REF}=1.4V, V_{RL}=5V, R_L=5.1k		-	200	-	ns
Response Time	V_{RL}=5V, R_L=5.1k		-	1.3	-	μs
Output Sink Current	V_{IN}=1V, V_{IN}+=0, V_O=1.5V		6.0	16	-	mA
Output Leakage Current	V_{IN}=0V, V_{IN}+=0, V_O=1.5V		-	0.1	-	nA
	V_{IN}=0V, V_{IN}+=0, V_O=30V		-	-	1	μA
Saturation Voltage	V_{IN}=1V, V_{IN}+=0, I_{SINK}≤4mA		-	200	400	mV
			-	-	500	
Thermal Resistance (Junction to Case)	DIP8		-	93	-	°C/W
	SOP8		-	138	-	

NOTE2: These specifications are limited to -40°C ≤ T_A ≤85°C. Limits over temperature are guaranteed by design, but not tested in production.

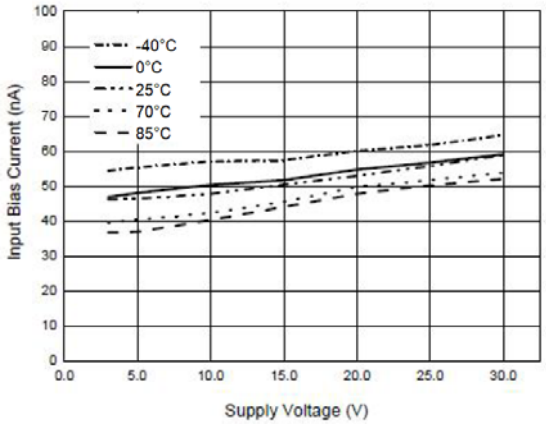
NOTE3: The input common-mode voltage of either input signal voltage should not be allowed to go negatively by more than 0.3V (at 25°C). The upper end of the common-mode voltage range is V_{CC}-1.5V (at 25°C), but either or both inputs can go to +36V without damages, independent of the magnitude of the V_{CC}.

TYPICAL PERFORMANCE CHARACTERISTICS

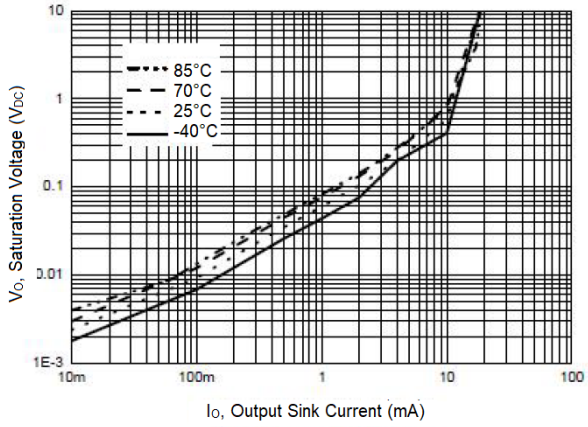
1. Supply Voltage vs. Supply Current



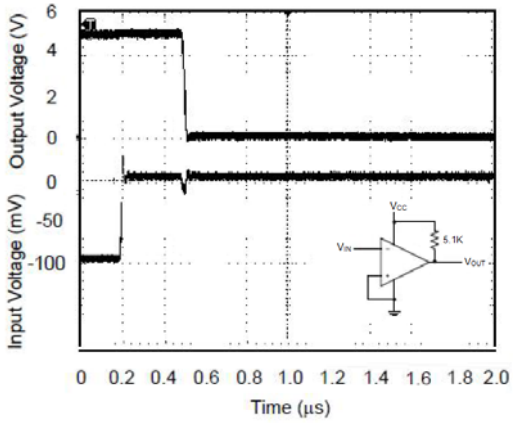
2. Supply Voltage vs. Input Bias Current



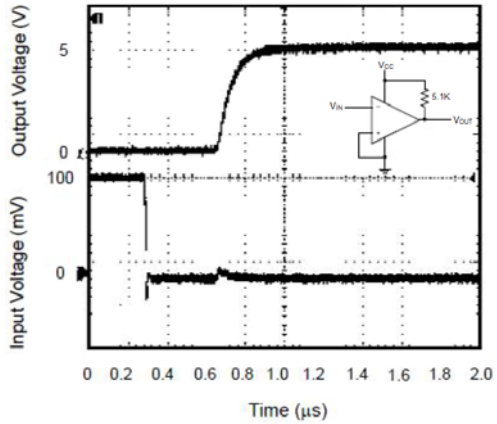
3. Output Sink Current vs. Saturation Voltage



4. Response Time for 5mV Input Overdrive Negative Transition

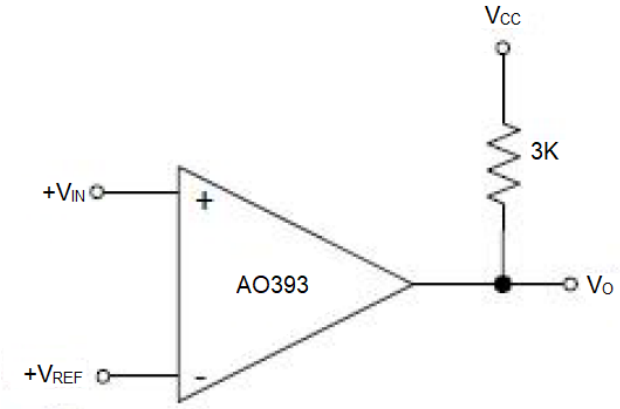


5. Response Time for 5mV Input Overdrive Positive Transition

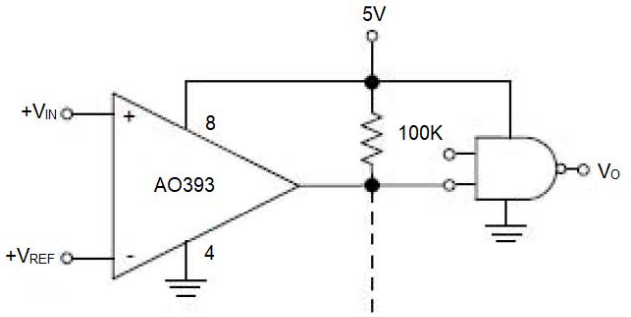


TYPICAL APPLICATIONS

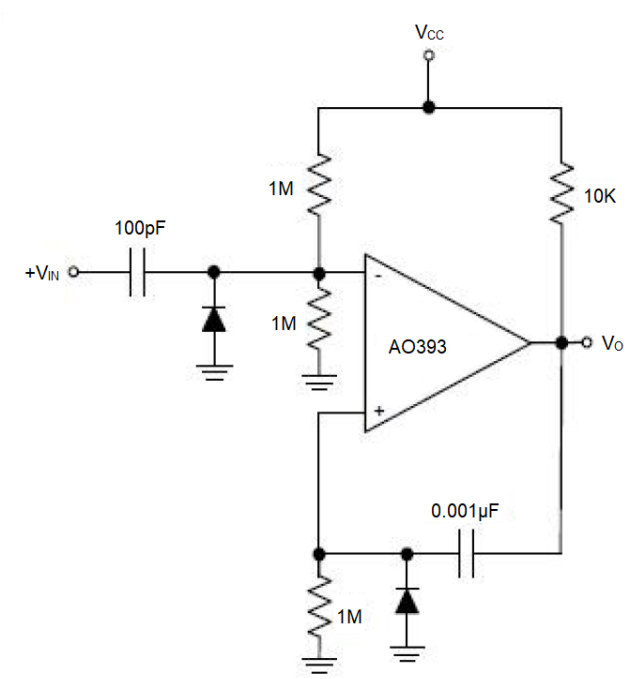
1. Basic Comparator



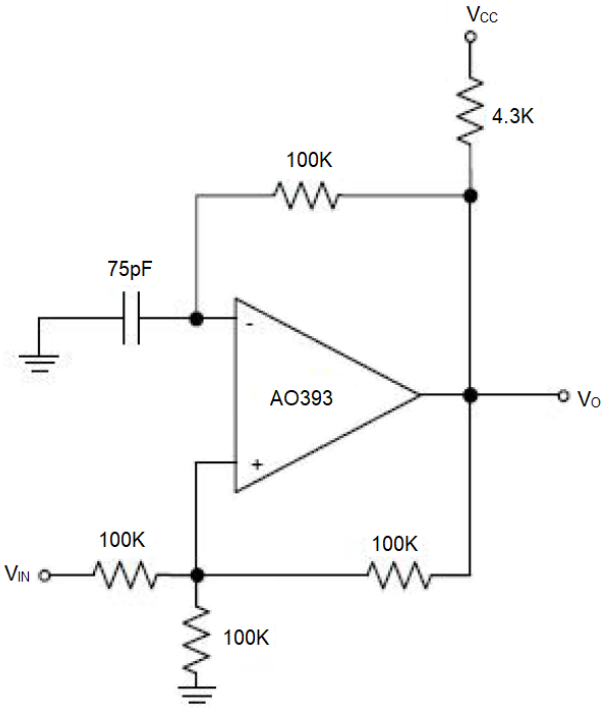
2. Driving CMOS



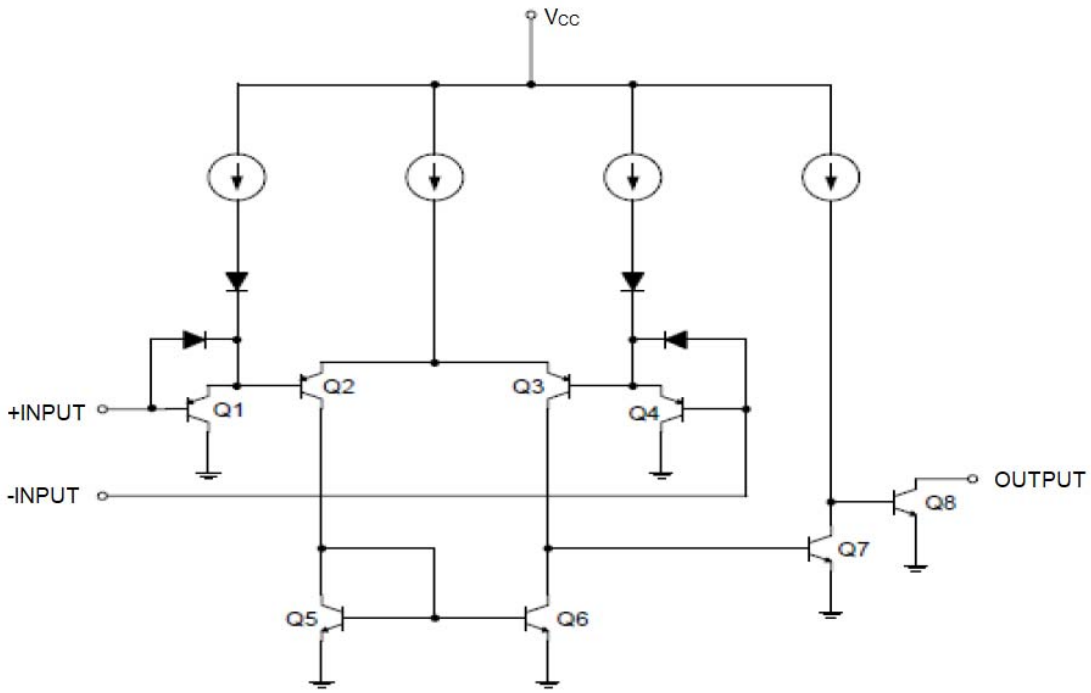
3. One Shot Multi-vibrator



4. Square wave Oscillator

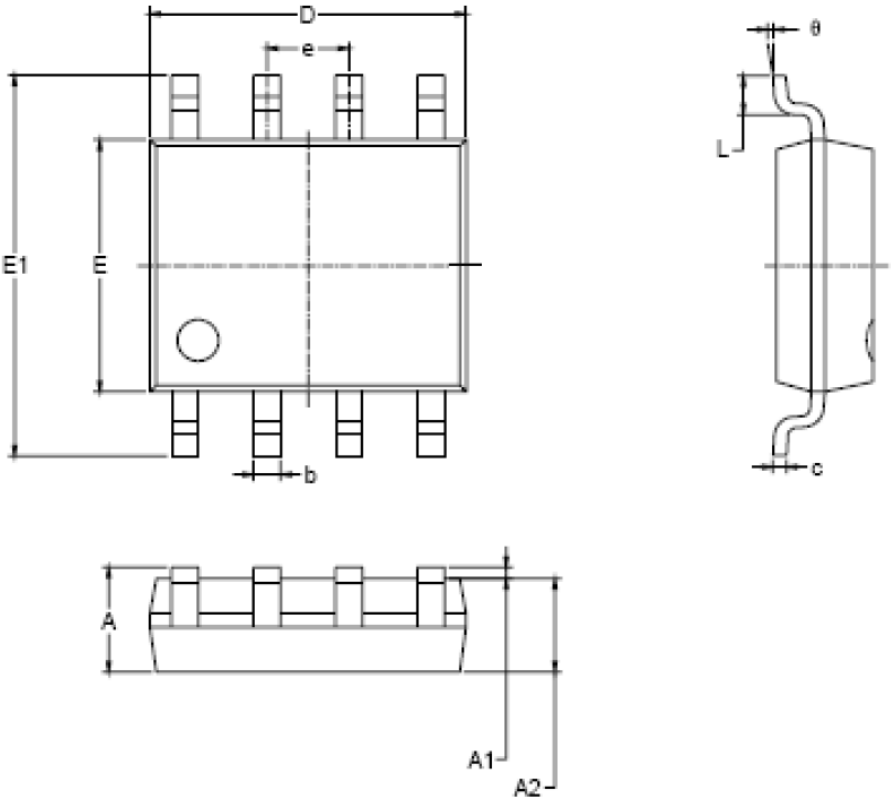


BLOCK DIAGRAM



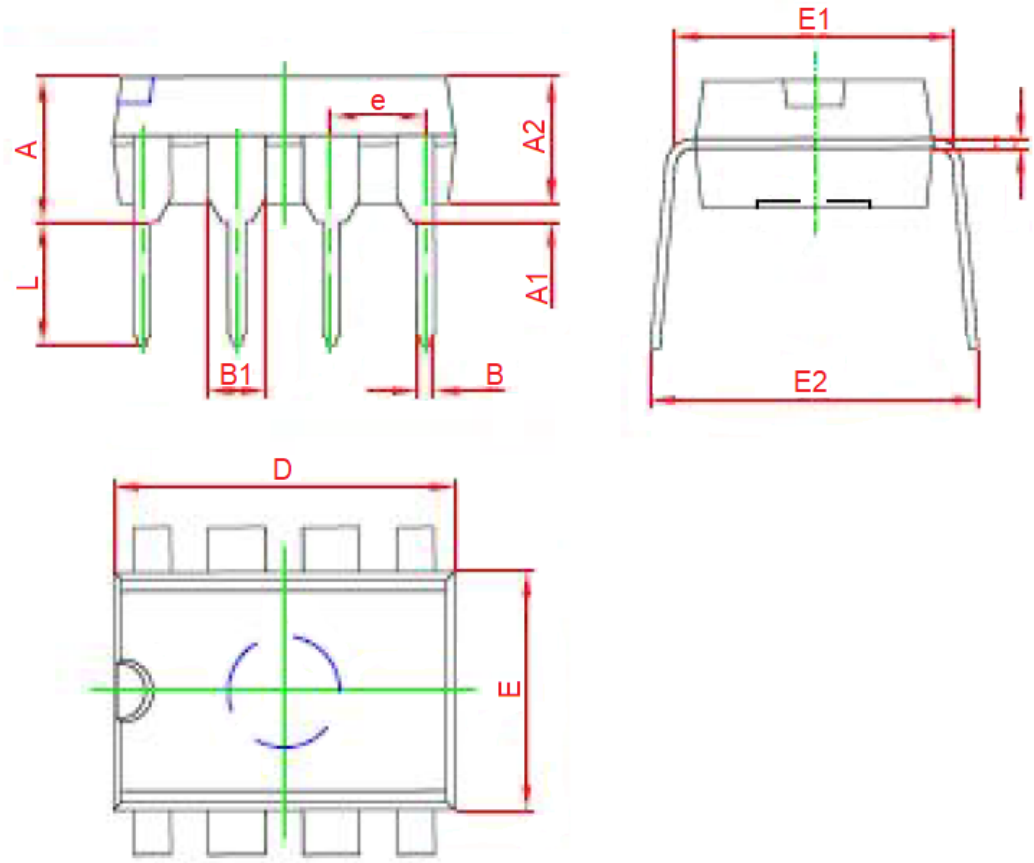
PACKAGE INFORMATION

Dimension in SOP8 (Unit: mm)



Symbol	Millimeters	
	Min.	Max.
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
E	3.800	4.000
E1	5.800	6.200
e	1.270 BSC	
L	0.400	1.270
θ	0°	8°

Dimension in DIP8 (Unit: mm)



Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	3.710	4.310	0.146	0.170
A1	0.510	-	0.020	-
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524 BSC		0.060 BSC	
C	0.204	0.360	0.008	0.014
D	9.000	9.400	0.354	0.370
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540 BSC		0.100 BSC	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354

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