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APX393/APX339

LOW VOLTAGE RAIL-TO-RAIL INPUT DUAL/QUAD COMPARATORS

Features

- Guaranteed 2.7V and 5V performance
- Industrial temperature range (-40°C to +85°C)
- Low supply current: 60 µA per Channel
- Input Common Mode Voltage (V-+0.2V to V+ -0.2V)
- Low output saturation voltage @ 200 mV
- Manufactured in standard CMOS process
- MSOP-8L, SOP-8L, and TSSOP-14L available in "Green" Molding Compound (No Br, Sb)
- Lead-free Finish / RoHS Compliant (Note 3)

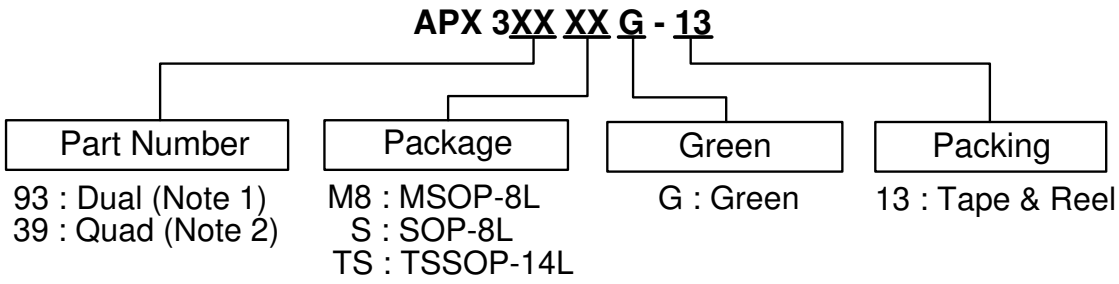
General Description

The APX393/339 are low voltage (2.5V to 5.5V) dual and quad comparators. The APX393 is the dual version available in the 8-pin SOP and MSOP packages. The APX339 is the quad version available in 14-pin TSSOP package. The APX393/339 are designed to efficiently minimize cost, space, and power consumption for portable consumer products. They have open drain output to connect to the logic supply through a pull-up resistor and allow interfacing to a variety of logic families.

Applications

- Mobile communications
- Notebooks and PDA's
- Battery powered electronics
- General purpose portable device
- General purpose low voltage applications

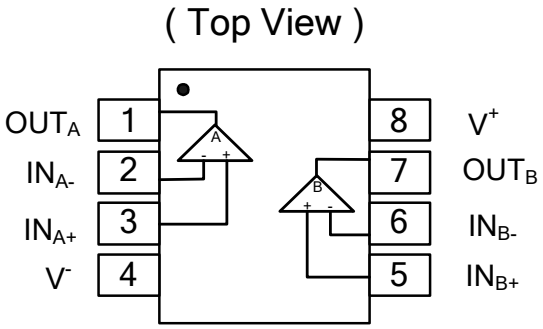
Ordering Information



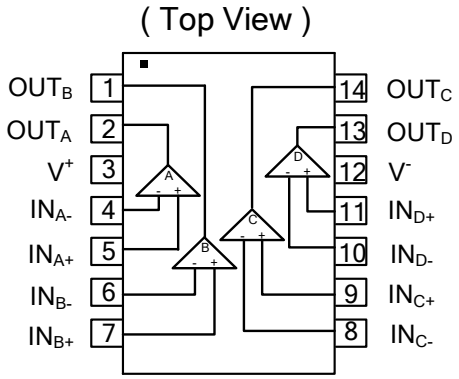
Device	Package Code	Packaging (Note 4)	13" Tape and Reel	
			Quantity	Part Number Suffix
APX393M8G-13	M8	MSOP-8L	2500/Tape & Reel	-13
APX393SG-13	S	SOP-8L	2500/Tape & Reel	-13
APX339TSG-13	TS	TSSOP-14L	2500/Tape & Reel	-13

Notes:
1. APX393 is only available for MSOP-8L and SOP-8L.
2. APX339 is only available for TSSOP-14L.
3. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html
4. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.

Pin Assignments



MSOP-8L / SOP-8L



TSSOP-14L

Absolute Maximum Ratings (Note 5)

Symbol	Description		Rating	Unit
ESD HBM	Human Body Model	APX393	4000	V
		APX339	3500	
ESD MM	Machine Model	APX393	400	V
		APX339	400	
	Differential Input Voltage		±Supply Voltage	V
	Voltage On Any Pin (Referred to V^- Pin)		5.5	V
T_{ST}	Storage Temperature		-65 to 150	°C
T_J	Maximum Junction Temperature		150	°C

Operating Ratings (Note 5)

Symbol	Description	Rating	Unit
$V^+ - V^-$	Supply Voltage	2.5 to 5.5	V
T_A	Operating Temperature Range	-40 to +85	°C

Notes: 5. Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not guaranteed. For guaranteed specifications and the test conditions, see the Electrical Characteristics.

Electrical Characteristics

2.7V DC Electrical Characteristics

Unless otherwise specified, all limits guaranteed for T_A = 25°C, V^+ = 2.7V, V^- = 0V. Boldface limits apply at the temperature extremes.

Symbol	Parameter	Test Conditions	Min (Note 7)	Typ. (Note 6)	Max (Note 7)	Unit
V_{OS}	Input Offset Voltage			1.7	7	mV
TCV_{OS}	Input Offset Voltage Average Drift			5		µV/°C
I_B	Input Bias Current			10	250 **400**	nA
I_{OS}	Input Offset Current			5	50 **150**	nA
V_{CM}	Input Voltage Range			0.2		V
				2.5		V
V_{SAT}	Saturation Voltage	I_{SINK} ≤ 1mA		200		mV
I_O	Output Sink Current	V_O ≤ 1.5V	5	20		mA
I_S	Supply Current	APX393 Both Comparators		150	180	µA
		APX339 All four Comparators		240	300	µA
	Output Leakage Current			0.003	**1**	µA

2.7V AC Electrical Characteristics

T_A = 25°C, V^+ = 2.7V, R_L = 5.1 kΩ, V^- = 0V.

Symbol	Parameter	Test Conditions	Min (Note 7)	Typ. (Note 6)	Max (Note 7)	Unit
T_{PHL}	Propagation Delay (High to Low)	Input Overdrive = 10mV		700		ns
		Input Overdrive = 100mV		150		ns
T_{PLH}	Propagation Delay (Low to High)	Input Overdrive = 10mV		500		ns
		Input Overdrive = 100mV		200		ns

Electrical Characteristics (Continued)

5V DC Electrical Characteristics

Unless otherwise specified, all limits guaranteed for T_A = 25°C, V^+ = 5V, V^- = 0V. **Boldface** limits apply at the temperature extremes.

Symbol	Parameter	Test Conditions	Min (Note 7)	Typ. (Note 6)	Max (Note 7)	Unit
V_{OS}	Input Offset Voltage			1.7	7 **9**	mV
TCV_{OS}	Input Offset Voltage Average Drift			5		µV/°C
I_B	Input Bias Current			25	250 **400**	nA
I_{OS}	Input Offset Current			2	50 **150**	nA
V_{CM}	Input Voltage Range			0.2		V
				4.8		V
A_V	Voltage Gain	R_L = 5.1 kΩ	20	50		V/mV
V_{SAT}	Saturation Voltage	$I_{SINK} \leq$ 4mA		200	400 **700**	mV
I_O (Sink)	Output Sink Current	$V_O \leq$ 1.5V	10	60		mA
I_S	Supply Current	APX393 Both Comparators		150	180 **250**	µA
		APX339 All four Comparators		240	300 **350**	µA
	Output Leakage Current			.003	**1**	µA
θ_{JA}	Thermal Resistance Junction-to -Ambient	MSOP-8L (Note 8)		203		°C/W
		SOP-8L (Note 8)		150		°C/W
		TSSOP-14L (Note 8)		100		°C/W

5V AC Electrical Characteristics

T_A = 25°C, V^+ = 5V, R_L = 5.1 kΩ, V^- = 0V.

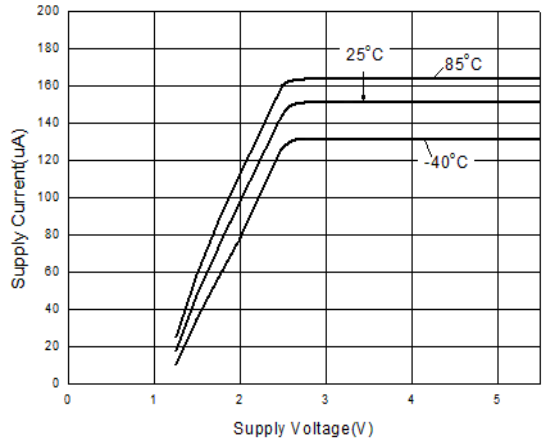
Symbol	Parameter	Test Conditions	Min (Note 7)	Typ. (Note 6)	Max (Note 7)	Unit
T_{PHL}	Propagation Delay (High to Low)	Input Overdrive = 10mV		600		ns
		Input Overdrive = 100mV		200		ns
T_{PLH}	Propagation Delay (Low to High)	Input Overdrive = 10mV		450		ns
		Input Overdrive = 100mV		300		ns

Notes: 6. Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration. The typical values are not tested and are not guaranteed on shipped production material.
7. All limits are guaranteed by testing or statistical analysis.
8. All numbers are typical, and apply for packages soldered directly onto a PC board in still air.

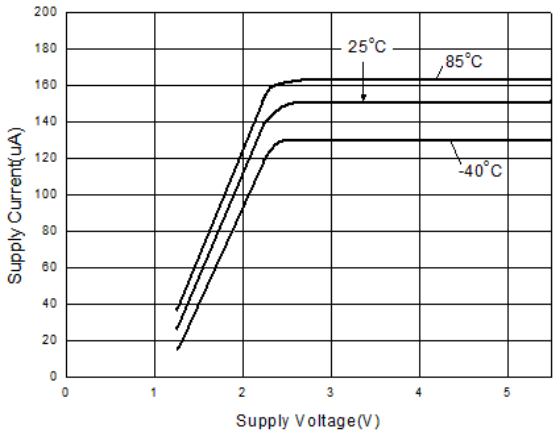
Typical Performance Characteristics

Unless otherwise specified, Vs=+5V, single supply, T_A=25°C

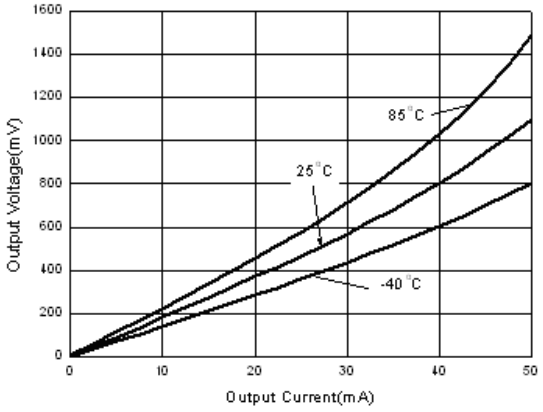
Supply Current vs. Supply Voltage Output High



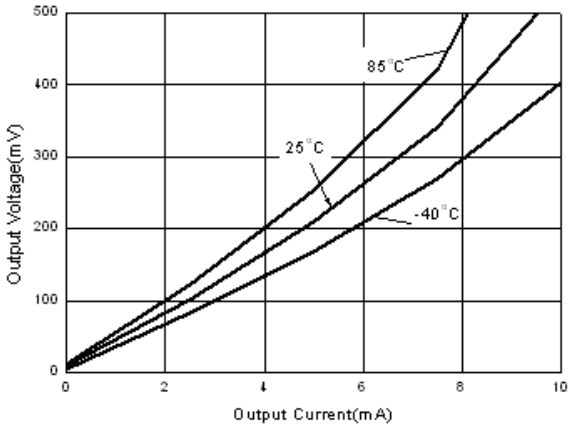
Supply Current vs. Supply Voltage Output Low



Output Voltage vs. Output Current (5V)



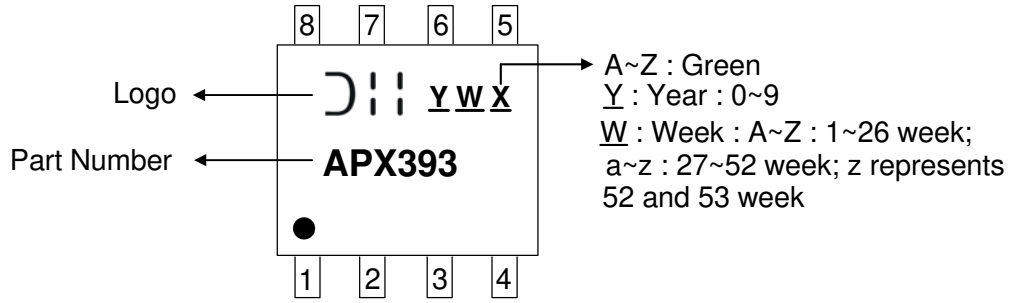
Output Voltage vs. Output Current (2.7V)



Marking Information

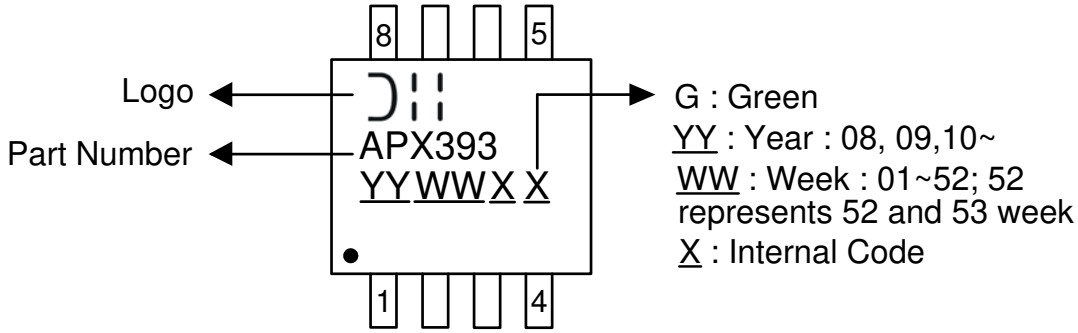
(1) MSOP-8L

(Top View)



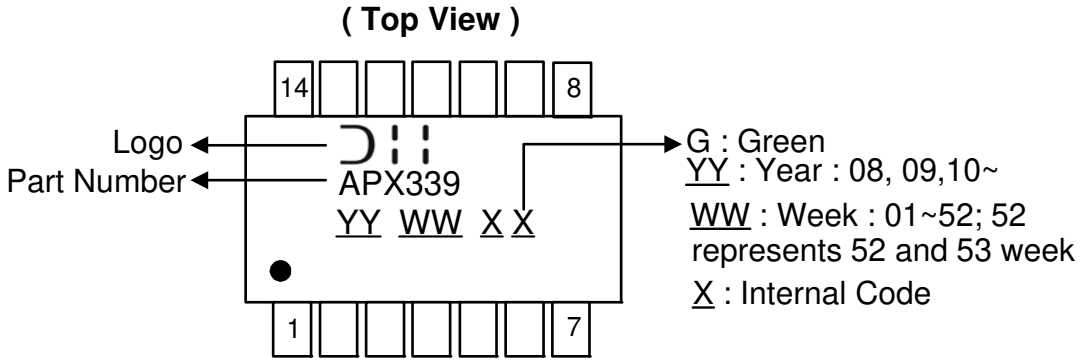
(2) SOP-8L

(Top View)



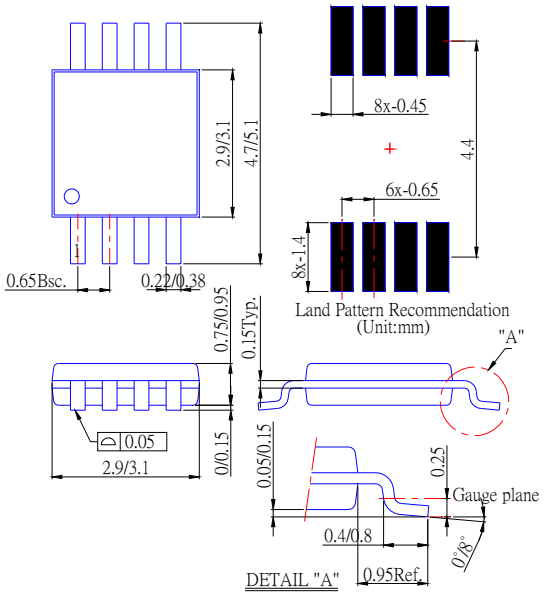
(3) TSSOP-14L

(Top View)

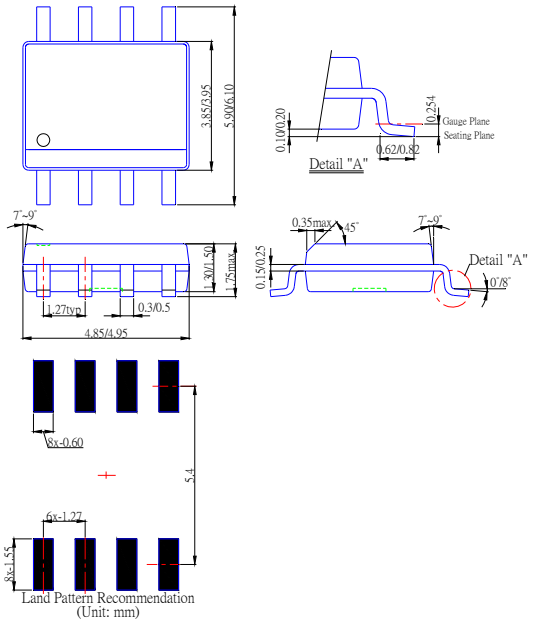


Package Information (All Dimensions in mm)

(1) Package type: MSOP-8L



(2) Package type: SOP-8L



Package Information (Continued)

(3) Package type: TSSOP-14L