

- **2.7-V and 5-V Performance**
- **Low Supply Current:**
 LMV331 . . . 60 μA Typ
 LMV393 . . . 100 μA Typ
 LMV339 . . . 170 μA Typ
- **Input Common-Mode Voltage Range Includes Ground**
- **Low Output Saturation Voltage . . . 200 mV Typ**
- **Package Options Include Plastic Small-Outline (D), Small-Outline Transistor (SOT-23 DBV, DCK), and Thin Shrink Small-Outline (PW) Packages**

description

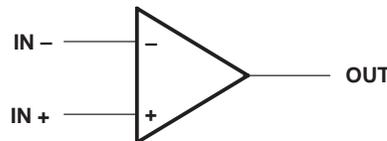
The LMV393 and LMV339 are low-voltage (2.7 V to 5.5 V) versions of the dual and quad comparators, LM393 and LM339, which operate from 5 V to 30 V. The LMV331 is the single-comparator version.

The LMV331, LMV339, and LMV393 are the most cost-effective solutions for applications where low-voltage operation, low power, space saving, and price are the primary specifications in circuit design for portable consumer products. These devices offer specifications that meet or exceed the familiar LM339 and LM393 devices at a fraction of the supply current.

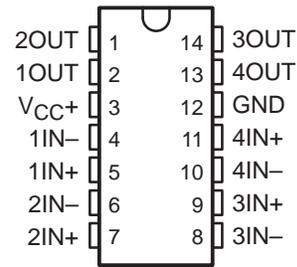
The LMV331 is available in the ultra-small DCK package, which is approximately half the size of the five-pin SOT-23. The small package saves space on printer circuit boards and enables the design of small portable electronic devices. It also allows the designer to place the device closer to the signal source to reduce noise pickup and increase signal integrity.

The LMV331, LMV339, and LMV393 devices are characterized for operation from -40°C to 85°C .

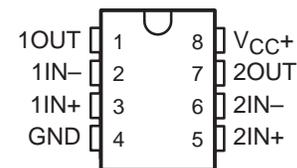
symbol (each comparator)



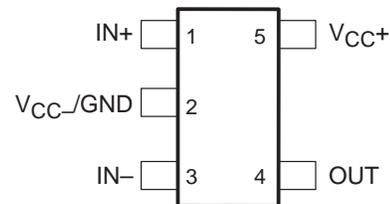
LMV339 . . . D OR PW PACKAGE (TOP VIEW)



LMV393 . . . D OR PW PACKAGE (TOP VIEW)



LMV331 . . . DBV OR DCK PACKAGE (TOP VIEW)



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

LMV331 SINGLE, LMV393 DUAL, LMV339 QUAD COMPARATORS

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AVAILABLE OPTIONS

T _A	PACKAGE TYPE	PACKAGED DEVICES		
		SINGLE	DUAL	QUADRUPLE
-40°C to 85°C	5-pin DCK	LMV331DCKR	—	—
	5-pin DBV	LMV331DBVR	—	—
	8-pin SOIC	—	LMV393D	—
	8-pin TSSOP	—	LMV393PW	—
	14-pin SOIC	—	—	LMV339D
	14-pin TSSOP	—	—	LMV339PWR

The D package is available taped and reeled. Add the suffix R to the device type (e.g., LMV393DR). The DCK, DBV, and PW packages are only available left-end taped and reeled.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, V _{CC} (see Note 1)	5.5 V
Differential input voltage, V _{ID} (see Note 2)	±5.5 V
Input voltage, V _I (either input)	0 to 5.5°C
Operating virtual junction temperature temperature range	0 to 150°C
Package thermal impedance, θ _{JA} (see Notes 3 and 4): D (8-pin) package	197°C/W
D (14-pin) package	127°C/W
DBV package	347°C/W
DCK package	389°C/W
PW (8-pin) package	243°C/W
PW (14-pin) package	170°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D or PW package	260°C
DBV or DCK package	TBD
Storage temperature range, T _{stg}	-65 to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES:
1. All voltage values (except differential voltages and V_{CC} specified for the measurement of I_{OS}) are with respect to the network GND.
 2. Differential voltages are at IN+ with respect to IN-.
 3. Maximum power dissipation is a function of T_{J(max)}, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is P_D = (T_{J(max)} - T_A)/θ_{JA}. Selecting the maximum of 150 °C can impact reliability.
 4. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions

		MIN	MAX	UNIT
V _{CC}	Supply voltage (single-supply operation)	2.7	5.5	V
T _A	Operating free-air temperature	-40	85	°C

PRODUCT PREVIEW



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LMV331 SINGLE, LMV393 DUAL, LMV339 QUAD COMPARATORS

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electrical characteristics at specified free-air temperature, $V_{CC} = 2.7\text{ V}$, $V-/GND = 0\text{ V}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage		25°C		1.7	7	mV
$\alpha_{V_{IO}}$	Average temperature coefficient of input offset voltage		25°C		5		$\mu\text{V}/^\circ\text{C}$
I_{IB}	Input bias current		25°C		10	250	nA
			-40°C to 85°C			400	
I_{IO}	Input offset current		25°C		5	50	nA
			-40°C to 85°C			150	
I_O	Output current	$V_O \leq 1.5\text{ V}$	25°C	5	23		mA
	Output leakage current		25°C		0.003		μA
			-40°C to 85°C			1	
V_{ICR}	Common-mode input voltage range		25°C	-0.1 to 2			V
V_{SAT}	Saturation voltage	$I_O \leq 1\text{ mA}$	25°C		200		mV
I_{CC}	Supply current	LMV331	25°C		40	100	μA
		LMV393 (both comparators)	25°C		70	140	
		LMV339 (all four comparators)	25°C		140	200	

switching characteristics $T_A = 25^\circ\text{C}$, $V_{CC} = 2.7\text{ V}$, $R_L = 5.1\text{ k}\Omega$, $V-/GND = 0\text{ V}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	Propagation delay, high- to low-level output switching	Input overdrive = 10 mV		1000		ns
		Input overdrive = 100 mV		350		
t_{PLH}	Propagation delay, low- to high-level output switching	Input overdrive = 10 mV		500		ns
		Input overdrive = 100 mV		400		

PRODUCT PREVIEW



LMV331 SINGLE, LMV393 DUAL, LMV339 QUAD COMPARATORS

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electrical characteristics at specified free-air temperature, $V_{CC} = 5\text{ V}$, $V-/GND = 0\text{ V}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage		25°C		1.7	7	mV
			-40°C to 85°C			9	
$\alpha_{V_{IO}}$	Average temperature coefficient of input offset voltage		25°C		5		$\mu\text{V}/^\circ\text{C}$
I_{IB}	Input bias current		25°C		25	250	nA
			-40°C to 85°C			400	
I_{IO}	Input offset current		25°C		2	50	nA
			-40°C to 85°C			150	
I_O	Output current	$V_O \leq 1.5\text{ V}$	25°C	10	84		mA
	Output leakage current		25°C		0.003		μA
			-40°C to 85°C			1	
V_{ICR}	Common-mode input voltage range		25°C	-0.1 to 4.2			V
V_{SAT}	Saturation voltage	$I_O \leq 4\text{ mA}$	25°C		200	400	mV
			-40°C to 85°C			700	
I_{CC}	Supply current	LMV331	25°C		60	120	μA
			-40°C to 85°C			150	
		LMV393 (both comparators)	25°C		100	200	
			-40°C to 85°C			250	
		LMV339 (all four comparators)	25°C		170	300	
			-40°C to 85°C			350	

switching characteristics at specified free-air temperature, $T_A = 25^\circ\text{C}$, $V_{CC} = 5\text{ V}$, $R_L = 5.1\text{ k}\Omega$, $V-/GND = 0\text{ V}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	Propagation delay, high- to low-level output switching	Input overdrive = 10 mV		600		ns
		Input overdrive = 100 mV		200		
t_{PLH}	Propagation delay, low- to high-level output switching	Input overdrive = 10 mV		450		ns
		Input overdrive = 100 mV		300		

PRODUCT PREVIEW



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