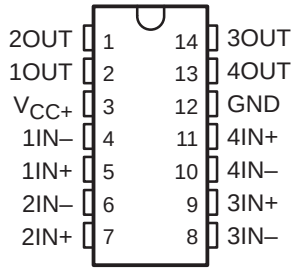
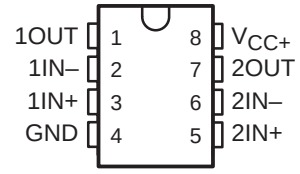
- **2.7-V and 5-V Performance**
- **Low Supply Current:**
  LMV331 . . . 60 μA Typ
  LMV393 . . . 100 μA Typ
  LMV339 . . . 170 μA Typ
- **Input Common-Mode Voltage Range Includes Ground**
- **Low Output Saturation Voltage . . . 200 mV Typ**
- **Package Options Include Plastic Small-Outline (D), Small-Outline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

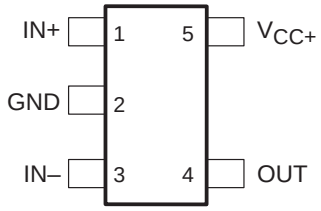
LMV339 . . . D OR PW PACKAGE
(TOP VIEW)



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



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



description

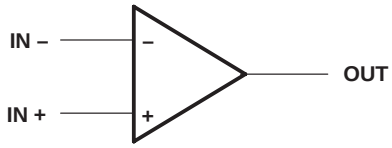
The LMV393 and LMV339 are low-voltage (2.7 V to 5.5 V) versions of the dual and quad comparators, LM393 and LM339, which operate from 5 V to 30 V. The LMV331 is the single-comparator version.

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 printed 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)



PRODUCT PREVIEW

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.

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	—	LMV393PWR	—
	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 range, 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 $P_D = (T_J(max) – T_A)/\theta_{JA}$. Selecting the maximum of 150 °C can impact reliability.
4. The package thermal impedance is calculated in accordance with JESD 51.

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

electrical characteristics at specified free-air temperature, V_{CC+} = 2.7 V, GND = 0 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		–40°C to 85°C		5		μV/°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 curent	$V_O \leq$ 1.5 V	25°C	5	23		mA
	Output leakage curent		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 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°C, V_{CC+} = 2.7 V, R_L = 5.1 kΩ, GND = 0 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

electrical characteristics at specified free-air temperature, V_{CC+} = 5 V, GND = 0 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		μV/°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 curent	$V_O \leq$ 1.5 V	25°C	10	84		mA
	Output leakage curent		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
A_{VD}	Large-signal differential voltage gain		25°C	20	50		V/mV
V_{SAT}	Saturation voltage	$I_O \leq$ 4 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°C, V_{CC+} = 5 V, R_L = 5.1 kΩ, GND = 0V (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		

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.