LMV331 SINGLE, LMV393 DUAL, LMV339 QUAD GENERAL-PURPOSE LOW-VOLTAGE COMPARATORS

SLCS136D - AUGUST 1999 - REVISED JUNE 2000

- 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, SC-70 DCK), and Thin Shrink Small-Outline (PW) Packages

description

The LMV393 and LMV339 devices 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.

LMV339 D C	R PW PACKAGE
(TOP	VIEW)
2OUT [1	14 3OUT
1OUT [2	13 4OUT
V _{CC+} [3	12 GND
1IN- [4	11 4IN+
1IN+ [5	10 4IN-
2IN- [6	9 3IN+
2IN+ [7	8 3IN-
LMV393 D C	8 PW PACKAGE
(TOP	VIEW)
1OUT [1	8 V _{CC+}
1IN- [2	7 20UT
1IN+ [3	6 21N-
GND [4	5 121N+
LMV331 DBV (TOP (TOP IN+ [1] GND [2] IN- [3]	DR DCK PACKAGE VIEW) 5 V _{CC+} 4 OUT

The LMV331 is available in the ultra-small DCK package, which is approximately one-half the size of the five-pin DBV package. The DCK 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 LMV331I, LMV339I, and LMV393I devices are characterized for operation from -40°C to 85°C.

logic symbol (each comparator)





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AVAILABLE OPTIONS							
т.	PACKAGE	PACKAGE PACKAGED DEVICE		S			
'A	TYPE	SINGLE	DUAL	QUADRUPLE			
	5-pin SOT	LMV331IDCKR LMV331IDBVR	—	—			
–40°C to 85°C	8-pin SOIC 8-pin TSSOP	—	LMV393ID LMV393IPWR	—			
	14-pin SOIC 14-pin TSSOP	_	—	LMV339ID LMV339IPWR			

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)		0 V to 5 5 V
Operating virtual junction temperature range		0° C to 150°C
Package thermal impedance, θ_{JA} (see Notes 3 and 4):	D (8-pin) package	
	D (14-pin) package	86°C/W
	DBV package	206°C/W
	DCK package	252°C/W
	PW (8-pin) package	149°C/W
	PW (14-pin) package	113°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 10	seconds: D or PW package	260°C
Storage temperature range, T _{sta}		–65°C 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 affect 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
TA	Operating free-air temperature	-40	85	°C



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

	PARAMETER	TEST CONDITIONS	TA	MIN	TYP	MAX	UNIT
VIO	Input offset voltage		25°C		1.7	7	mV
α _V IO	Average temperature coefficient of input offset voltage		-40°C to 85°C		5		μV/°C
		25°C		10	250	nA	
	input bias current		–40°C to 85°C			400	IIA
10	logut offsat surrant		25°C		5	50	24
IIO Input onset current	input onset current		-40°C to 85°C			150	ПА
10	Output current	$V_{O} \le 1.5 V$	25°C	5	23		mA
			25°C		0.003		
	Output leakage current		-40°C to 85°C			1	μΑ
VICR	Common-mode input voltage range		25°C	-0	.1 to 2		V
VSAT	Saturation voltage	$I_{O} \leq 1 \text{ mA}$	25°C		200		mV
		LMV331	25°C		40	100	
Icc	Supply current	LMV393 (both comparators)	25°C		70	140	μA
		LMV339 (all four comparators)	25°C		140	200	

switching characteristics, T_A = 25°C, V_{CC+} = 2.7 V, R_L = 5.1 k Ω , GND = 0 V (unless otherwise noted)

	PARAMETER	TEST CONDITIONS	MIN TYP	MAX	UNIT
Ir		Input overdrive = 10 mV	1000		
tPHL Propagation delay, high- to low-level output switching	Input overdrive = 100 mV	350		115	
tPLH Propagation delay, low- to high-level output switching	Input overdrive = 10 mV	500			
	Propagation delay, low- to high-level output switching	Input overdrive = 100 mV	400		



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	PARAMETER	TEST CONDITIONS	TA	MIN	TYP	MAX	UNIT
Mar			25°C		1.7	7	
VIO	input offset voltage		-40°C to 85°C			9	mv
α _{VIO}	Average temperature coefficient of input offset voltage		25°C		5		μV/°C
1	logut biog gurrant		25°C		25	250	~^
ЧВ	input bias current		–40°C to 85°C			400	ΠA
1	Input offect ourrent		25°C		2	50	~^
١O	input onset current		-40°C to 85°C			150	
IO	Output current	$V_{O} \le 1.5 V$	25°C	10	84		mA
			25°C -40°C to 85°C		0.003		
	Output leakage current					1	μΑ
VICR	Common-mode input voltage range		25°C		-0.1 to 4.2		V
AVD	Large-signal differential voltage gain		25°C	20	50		V/mV
	Soturation voltage	la < 4 mA	25°C		200	400	m\/
V SAT	Saturation voltage	$10 \ge 4 \text{ IIIA}$	–40°C to 85°C			700	mv
			25°C		60	120	
ICC		LMV331	–40°C to 85°C			150	
		LMV/202 (both componetors)	25°C		100	200	
	Supply current	Liviv 393 (both comparators)	–40°C to 85°C			250	μΑ
			25°C		170	300	
		LIVIV 339 (all four comparators)	-40°C to 85°C			350	

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

switching characteristics, T_A = 25°C, V_{CC+} = 5 V, R_L = 5.1 k Ω , GND = 0 V (unless otherwise noted)

	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
to u		Input overdrive = 10 mV		600		20
tPHL Propagation delay, high- to low-level output switching	Input overdrive = 100 mV		200		115	
to Dropogation delay, law, to high layel output output		Input overdrive = 10 mV		450		20
TPLH	Fropagation delay, low- to high-level output switching	Input overdrive = 100 mV	600 200 450 300	ns		



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