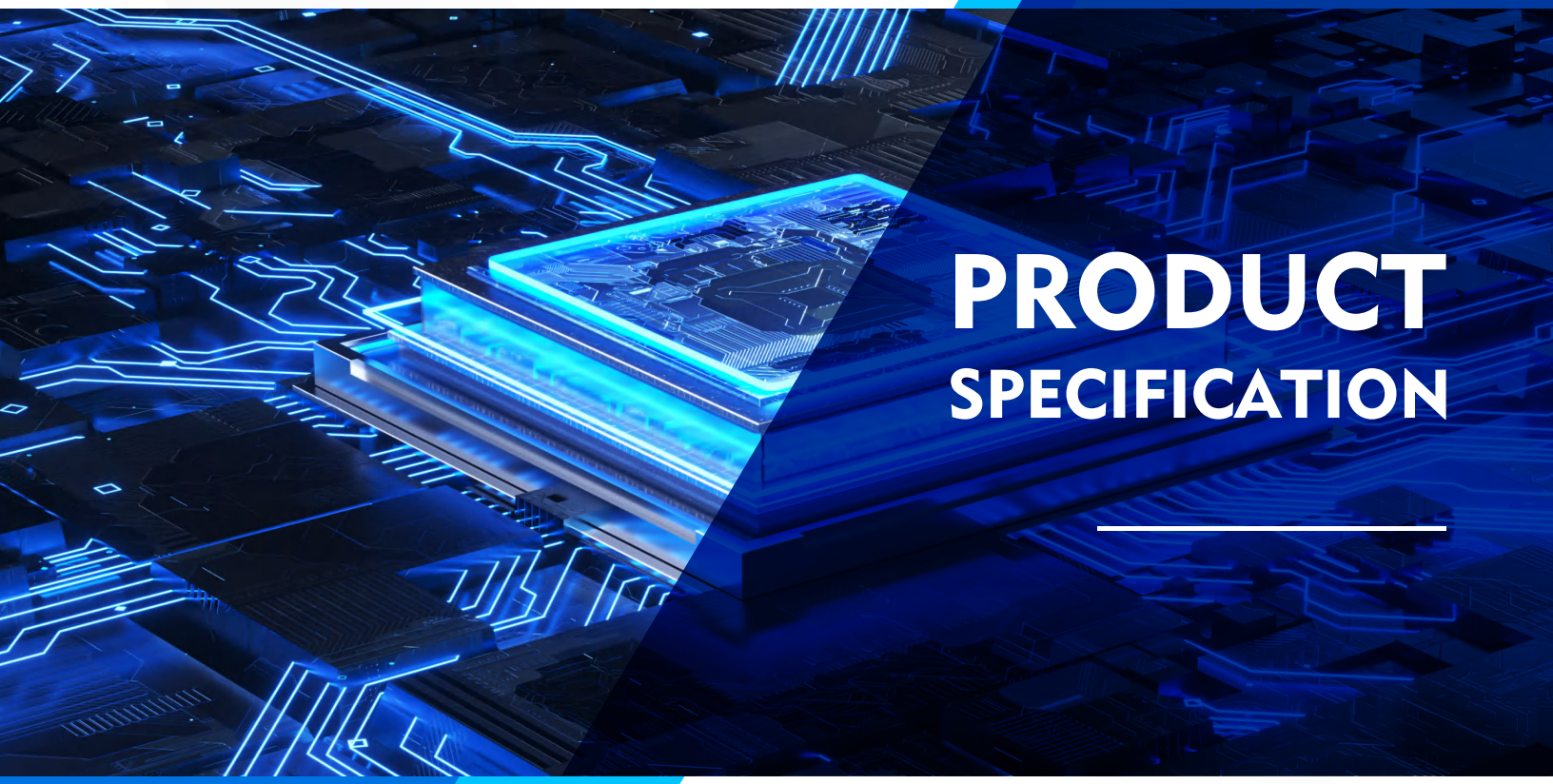
HJKE

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PRODUCT SPECIFICATION

MAIN PRODUCTS

1 Features

- Ultra-High speed: 5.7 ns propagation delay
- Low offset voltage: 10mV (max)
- Rail to Rail input and output
- 6mV internal hysteresis for clean switching
- Support CMOS or TTL logic
- Supply range: +2.5 V to +5.5 V
- Quiescent current: 2 mA per comparator

2 Application

- High-speed line or digital line receivers
- High speed sampling circuits
- High-density systems
- Threshold detectors
- Portable equipment

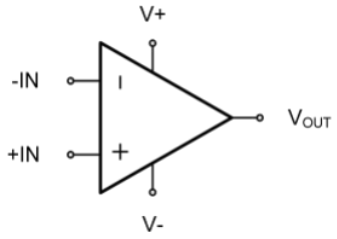
3 Description

The LMV7219 series are low-power, ultra-high-speed comparators with internal hysteresis, which feature a fast 6ns propagation delay. These devices are optimized for single +3V or +5V operation, and consume only 2mA supply current.

The LMV7219 series support rail-to-rail input and output operation.
The input common mode voltage range is from -0.1V to (V+) +0.1V. The LMV7219 series have an internal hysteresis for reducing comparator sensitivity to noise, even when the input signals move slowly.

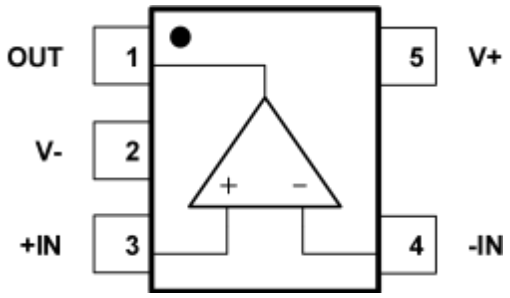
All features are specified over the extended -40°C to +125°C temperature range.

Circuit Diagram



5 Device Summary, Pin and Packages(Continued)

Top View



LMV7219M7X**(SC70-5) Package**

LMV7219M5X**(SOT23-5) Package**

Table 5-1 Pin Definition

Name	Pin		I/O	Description
-IN		4	I	Negative (inverting) input
+IN		3	I	Positive(noninverting) input
OUT		1	O	Output
V-		2	-	Negative (lowest) power supply
V+		5	-	Positive (highest) power supply

6 Voltage, Temperature, ESD and Thermal Ratings

6.1 Absolute Maximum Ratings(1) (2)

Parameters	Min.	Max.	Unit
Supply Voltage, V_S=(V+) - (V-)		6.5	V
Input Voltage	(V-)-0.3	(V+)+0.3	V
Maximum Junction Temperature	-55	150	°C
Storage Temperature Range	-55	150	°C

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

(2) Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.3V beyond the supply rails should be current- limited to 10mA or less.

6.2 ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic Discharge	Human-Body Model (HBM)(1)	6.5 K	V
		Charged-Device Model (CDM)(2)	2 K	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameters	Min	Max	Unit
V_S	Single-Supply, V_S=(V+) - (V-)	2.5	5.5	V
	Dual-Supply,V_S=(V+) - (V-)	±1.25	±2.75	V
TA	Operating Temperature	-40	125	°C

6.4 Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
SC70-5	400	150	°C/W
SOT23-5	250	81	°C/W

7 Electrical Specifications

V_S= +2.5V to +5.5V, V_{IN+} = V_S, V_{IN-} =0V, R_{PU}=10kΩ, and C_L=15pF. Typical values are at TA=+25°C. FULL=–40°C to +125°C (unless otherwise noted)

Parameter	Symbol	Test Conditions	Vs	TA	Min	Typ	Max	Units
Operating Voltage	V_S		2.5V to 5.5V	FULL	2.5		5.5	V
Input Common Mode Voltage Range	V_{CM}		2.5V to 5.5V	FULL	(V-)-0.1		(V-)+0.1	V
Input Offset Voltage	V_{OS}	V_{CM}=1.2V	5V	+25°C		0.5		mV
				FULL	-10		10	
Quiescent Current (per Comparator)	IQ		5V	+25°C		2		mA
				FULL			3.4	
Input Hysteresis Voltage	V_{HYST}	V_{CM}=1.2V		FULL		4.5		mV
Input Bias Current	I_B		5V	+25°C		20		pA
Input Offset Current	I_{OS}		5V	+25°C		20		pA
Common Mode Rejection Range	CMRR	V_{CM}= V- to V+	5V	+25°C		72		dB
Power Supply Rejection Ration	PSRR		5V	+25°C		73		dB
High-Level Output Voltage	V_{OH}	I_{OUT}=-4mA, V_{ID}=500mV	2.5V to 5.5V	FULL	(V+)-0.2	(V+)-0.1		V
		I_{OUT}=-0.4mA, V_{ID}=500mV			(V+)-0.03	(V+)-0.01		
Low-Level Output Voltage	V_{OL}	I_{OUT}=-4mA, V_{ID}=500mV	2.5V to 5.5V	FULL		100	130	mV
		I_{OUT}=-0.4mA, V_{ID}=500mV				20	25	
Output Short-Circuit Current	$I_{SOURCING}$		5V	FULL		90		mA
	$I_{SINKING}$					100		
Propagation Delay (Low-to-High)	T_{PLH}	V_{CM}=0V, Overdrive = 100mV	5V	FULL		5.7		ns
Propagation Delay (High-to-Low)	T_{PHL}	V_{CM}=0V, Overdrive = 100mV	5V	FULL		5.3		ns
Propagation Delay Skew	T_{PDSKEW}	V_{CM}=0V, Overdrive = 100mV	5V	FULL		0.4		ns
Rising Time	T_R		5V	FULL		7.5		ns
Falling Time	T_F		5V	FULL		8		ns

8 Typical Characteristics

V_S=5V , C_L= 10 pF, and V_{CM} = 0 , TA=+25 °C. (unless otherwise noted)

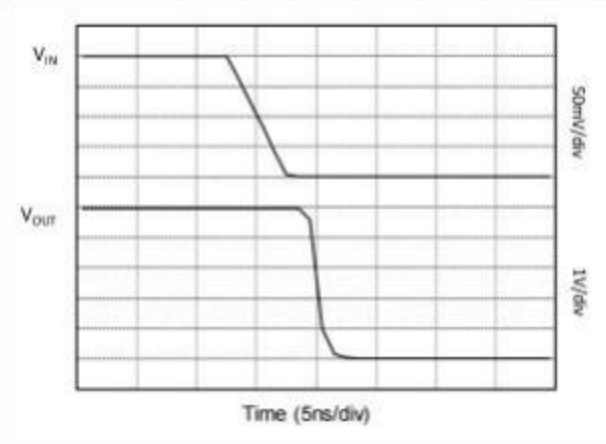


Fig.8-1 . Propagation Delay (High to Low)

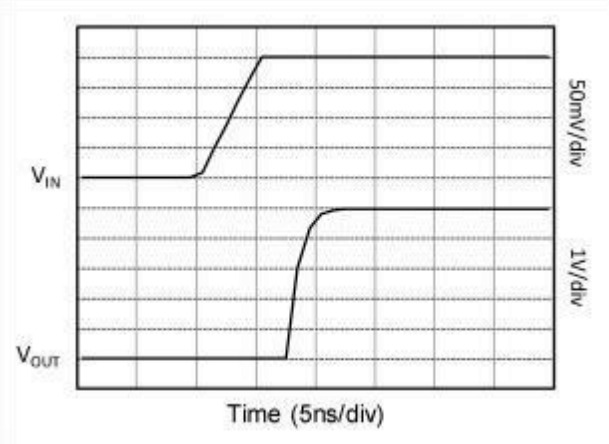


Fig.8-2 . Propagation Delay (Low to High)

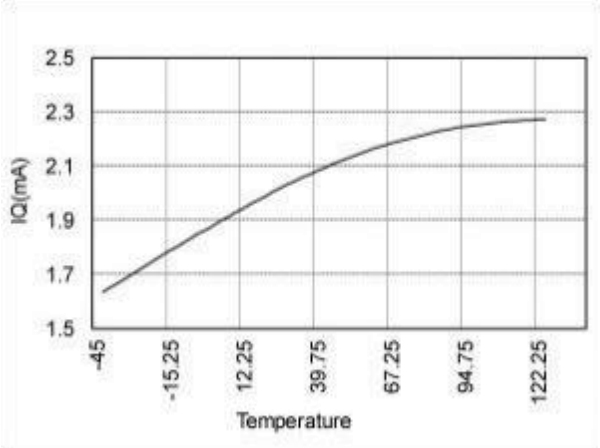


Fig.8-3 . IQ vs Temperature

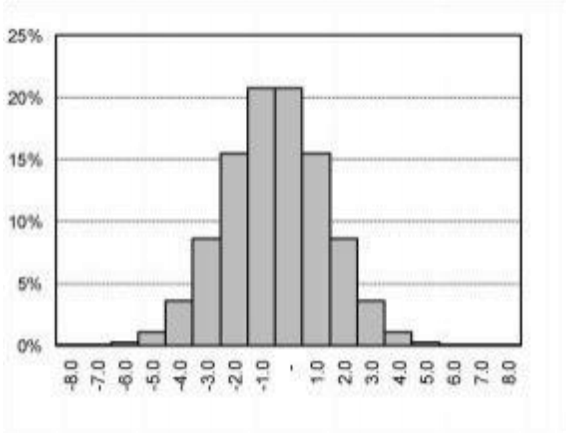


Fig.8-4 . Offset Voltage

9 Detailed Description

The LMV7219 series are low-power, ultra-high-speed comparators with internal hysteresis.
The devices are optimized for low voltage operation from 2.5V to 5.5V supply. The LMV7219 series are suitable for portable equipment. They can be compatible with CMOS and TTL logics.

There are a lot of comparators switched frequently for the linear region as the effect of noise and parasitic parameters, and the condition of this negative situation is when the one input of the comparator tends to reach the other input voltage. In order to ease the effect of noise and parasitic parameter, there is a 4.5mV internal hysteresis inside these comparators.

There are two trip points which are made by the comparator: the trip points when rising edge occurs and the trip points when falling edge occurs. And the gap between two trip points is the hysteresis of the comparator. The offset voltage Vos is defined as the average value of the two trip points. For the condition which two inputs of the comparator are nearly equal, the internal hysteresis will launch to avoid the frequently switching at this case.

10 Application Note

The LMV7219 family's power supply pin should have a local bypass capacitor (i.e., 0.01μF to 0.1μF) within 2mm forgood high frequency performance. It can also use a bulk capacitor (i.e., 1μF or larger) within 100mm to provide large,slow currents. This bulk capacitor can be shared with other analog parts.

Good ground layout improves performance by decreasing the amount of stray capacitance and noise at the comparator's inputs and outputs. To decrease stray capacitance, minimize PCB lengths and resistor leads, and place external components as close to the comparator' pins as possible.

The LMV7219 family is a series of fast-switching, high-speed comparator and requires high-speed layout considerations. For best results, the following layout guidelines should be followed:

1. Use a printed circuit board (PCB) with a good, unbroken low-inductance ground plane.

2. Place a decoupling capacitor (0.1μF ceramic, surface-mount capacitor) as close as possible to supply.

3. On the inputs and the output, keep lead lengths as short as possible to avoid unwanted parasitic feedback around the comparator. Keep inputs away from the output.

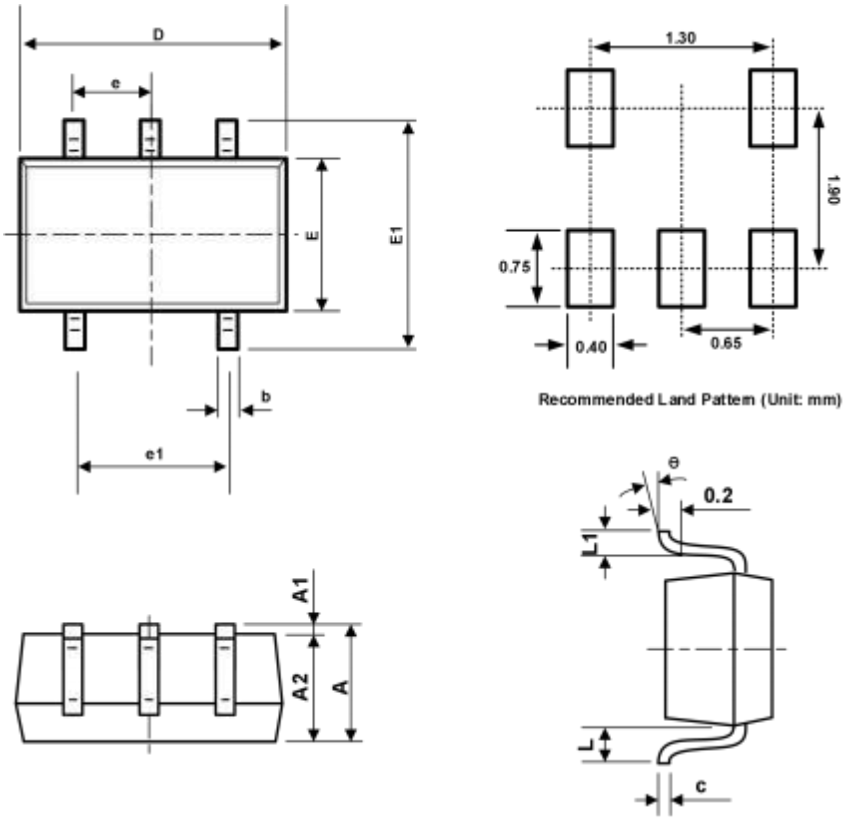
4. Solder the device directly to the PCB rather than using a socket.

5. For slow-moving input signals, take care to prevent parasitic feedback. A small capacitor (1000 pF or less) placed between the inputs can help eliminate oscillations in the transition region. This capacitor causes some degradation to propagation delay when the impedance is low. The topside ground plane should be placed between the output and inputs.

6. The ground pin ground trace should run under the device up to the bypass capacitor, thus shielding the inputs from the outputs.

11 Package Outline Dimension

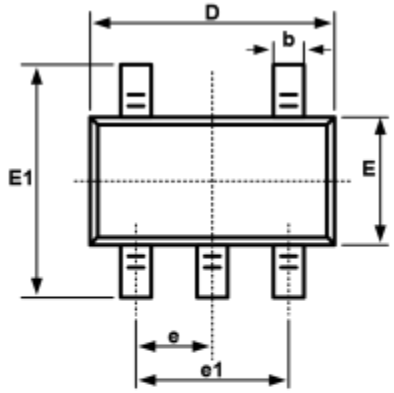
SC70-5

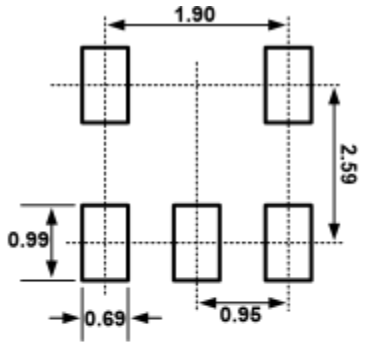


Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.110	0.175	0.004	0.007
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

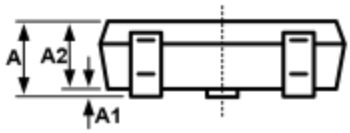
11 Package Outline Dimension(Continued)

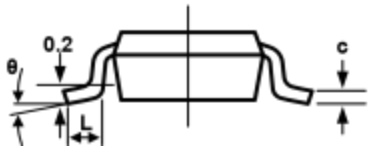
SOT23-5





Recommended Land Pattern (Unit: mm)





Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°