

LM2901x-Q1 四线路汽车比较器

1 特性

- 符合汽车应用要求
- 具有符合 AEC-Q100 标准的下列特性：
 - 器件温度等级 1：-40°C 至 125°C 环境温度范围
 - 器件 HBM ESD 分类等级：
 - H1B (对于“AV”版本)
 - H1C (对于所有其他版本)
 - 器件 CDM ESD 分类等级 C6
- 单电源或双电源
- 独立于电源电压的低电源电流消耗：0.8mA (典型值)
- 低输入偏置电流：25nA (典型值)
- 低输入失调电流：2nA (典型值)
- 低输入失调电压：2mV (典型值)
- 共模输入电压范围包括接地
- 差动输入电压范围等于最大额定电源电压：±36V
- 低输出饱和电压
- 输出与 TTL、MOS 和 CMOS 兼容
- 对于采用 5 引脚 SOT-23 的单通道版本，请参阅 TL331-Q1 (SLVS969)

2 应用

- 汽车
 - HEV/EV 和动力总成
 - 信息娱乐系统与仪表组
 - 车身控制模块
- 工业
- 电器

3 说明

LM2901x-Q1 系列器件包含四个独立的电压比较器，这些比较器可在宽电压范围内由单电源供电。

如果两个电源之间的电压差在 2V 和 36V 之间且 V_{CC} 比输入共模电压的至少高 +1.5V，也可使用双电源供电运行。漏极电流不受电源电压的影响。

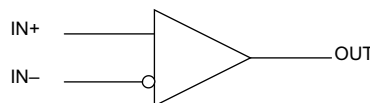
可将输出连接到其它集电极开路输出，以实现有线 AND 关联。

LM2901V-Q1 支持更高的 32V 电源电压，LM2901AV-Q1 支持更高的 32V 电源电压和更低的失调电压。

器件信息

器件型号	封装 ⁽¹⁾	封装尺寸 (标称值)
LM2901-Q1	TSSOP (14)	4.40mm × 5.00mm
LM2901A-Q1	SOIC (14)	3.91mm × 8.65mm
LM2901AV-Q1		

(1) 如需了解所有在售封装，请参阅数据表末尾的可订购产品附录。



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简化版原理图



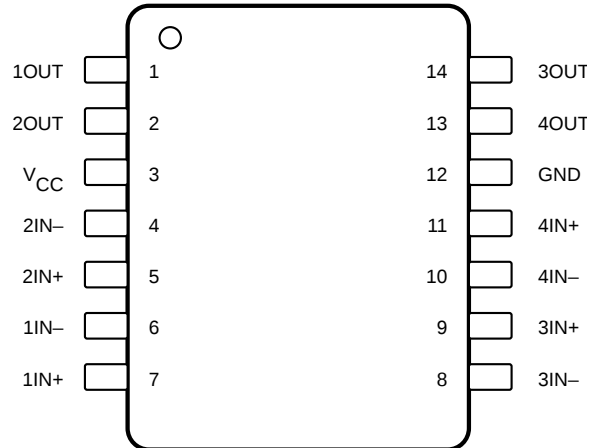
Table of Contents

1 特性.....	1	7.4 Device Functional Modes.....	8
2 应用.....	1	8 Application and Implementation.....	9
3 说明.....	1	8.1 Application Information.....	9
4 Revision History.....	2	8.2 Typical Application.....	9
5 Pin Configuration and Functions.....	3	9 Power Supply Recommendations.....	11
6 Specifications.....	4	10 Layout.....	11
6.1 Absolute Maximum Ratings.....	4	10.1 Layout Guidelines.....	11
6.2 ESD Ratings.....	4	10.2 Layout Example.....	11
6.3 Recommended Operating Conditions.....	4	11 Device and Documentation Support.....	12
6.4 Thermal Information.....	5	11.1 Documentation Support.....	12
6.5 Electrical Characteristics LM2901x-Q1.....	6	11.2 Related Links.....	12
6.6 Switching Characteristics LM2901x-Q1.....	6	11.3 Trademarks.....	12
6.7 Typical Characteristics LM2901x-Q1.....	7	11.4 静电放电警告.....	12
7 Detailed Description.....	8	11.5 术语表.....	12
7.1 Overview.....	8	12 Mechanical, Packaging, and Orderable Information.....	12
7.2 Functional Block Diagram.....	8		
7.3 Feature Description.....	8		

4 Revision History

Changes from Revision E (January 2015) to Revision F (May 2021)	Page
• 更新了首页 HBM ESD 分级.....	1
• 更新了整个文档中的表格、图和交叉参考的编号格式.....	1
• Added separate line for 1kV LM2901AV-Q1 HBM in ESD Ratings table.....	4
• Changed incorrect text in Apps Section Feature Description.....	8
• Changed incorrect Layout Example pinout.....	11
Changes from Revision D (April 2008) to Revision E (January 2015)	Page
• 向特性部分添加了 AEC-Q100 结果.....	1
• 添加了 ESD 等级表、特性说明部分、器件功能模式、应用和实施部分、电源相关建议部分、布局部分、器件和文档支持部分以及机械、封装和可订购信息部分。.....	1
• Added the common-mode voltage note to the V_{ICR} parameter in the <i>Electrical Characteristics</i> table.....	6

5 Pin Configuration and Functions



**图 5-1. D and PW Packages
14-Pin SOIC and TSSOP
Top View**

表 5-1. Pin Functions

PIN		I/O	DESCRIPTION
NO.	NAME		
1	1OUT	O	Output of comparator 1
2	2OUT	O	Output of comparator 2
3	V _{CC}	—	Supply Pin
4	2IN -	I	Negative input of comparator 2
5	2IN+	I	Positive input of comparator 2
6	1IN -	I	Negative input of comparator 1
7	1IN+	I	Positive input of comparator 1
8	3IN -	I	Negative input of comparator 3
9	3IN+	I	Positive input of comparator 3
10	4IN -	I	Negative input of comparator 4
11	4IN+	I	Positive input of comparator 4
12	GND	—	Ground
13	4OUT	O	Output of comparator 4
14	3OUT	O	Output of comparator 3

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

	MIN	MAX	UNIT
Supply voltage, V_{CC} ⁽²⁾		36	V
Differential input voltage, V_{ID} ⁽³⁾		±36	
Input voltage range, V_I (either input)	- 0.3	36	
Output voltage, V_O		36	
Output current, I_O		20	mA
Duration of output short circuit to ground ⁽⁴⁾		Unlimited	
Operating virtual junction temperature, T_J		150	°C
Storage temperature, T_{stg}	- 65	150	°C

- (1) Operation outside the Absolute Maximum Ratings may cause permanent device damage. Absolute Maximum Ratings do not imply functional operation of the device at these or any other conditions beyond those listed under Recommended Operating Conditions. If used outside the Recommended Operating Conditions but within the Absolute Maximum Ratings, the device may not be fully functional, and this may affect device reliability, functionality, performance, and shorten the device lifetime.
- (2) All voltage values, except differential voltages, are with respect to network ground.
- (3) Differential voltages are at IN+ with respect to IN-.
- (4) Short circuits from outputs to V_{CC} can cause excessive heating and eventual destruction.

6.2 ESD Ratings

		MIN	MAX	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM), per AEC Q100-002 ⁽¹⁾ , (LM2901-Q1, LM2901V-Q1)		V
		Human-body model (HBM), per AEC Q100-002 ⁽¹⁾ , (LM2901AV-Q1 Only)		
		Charged-device model (CDM), per AEC Q100-011		

- (1) AEC Q100-002 indicates that HBM stressing shall be in accordance with the ANSI/ESDA/JEDEC JS-001 specification.

6.3 Recommended Operating Conditions

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

		MIN	MAX	UNIT	
V_{CC}	Supply voltage	LM2901-Q1	2	30	V
		LM2901V-Q1, LM2901AV-Q1	2	32	
T_A	Ambient temperature	- 40	125	°C	
I_O	Output current (per comparator)	0	4	mA	

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾		LM2901x-Q1		UNIT
		D (SOIC)	PW (TSSOP)	
		14 PINS	14 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance ⁽²⁾	88.6	119.1	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	49.1	47.9	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	43.0	60.9	°C/W
ψ_{JT}	Junction-to-top characterization parameter	13.6	5.4	°C/W
ψ_{JB}	Junction-to-board characterization parameter	42.7	60.3	°C/W

- (1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report, [SPRA953](#).
- (2) Maximum power dissipation is a function of $T_{J(max)}$, $R_{\theta JA}$, and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_{J(max)} - T_A) / R_{\theta JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.

6.5 Electrical Characteristics LM2901x-Q1

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

PARAMETER	TEST CONDITIONS ⁽¹⁾		T_A ⁽²⁾	MIN	TYP	MAX	UNIT	
V_{IO} Input offset voltage	$V_{IC} = V_{ICR(min)}$, $V_O = 1.4\text{ V}$, $V_{CC} = 5\text{ V}$ to MAX ⁽³⁾	Non A devices	25°C		2	7	mV	
			Full range			15		
		A suffix devices	25°C		1	2		
			Full range			4		
I_{IO} Input offset current	$V_O = 1.4\text{ V}$		25°C		5	50	nA	
			Full range			200		
I_{IB} Input bias current	$V_O = 1.4\text{ V}$		25°C		- 25	- 250	nA	
			Full range			- 500		
V_{ICR} Common-mode input-voltage range ⁽⁴⁾			25°C	0		$V_{CC} - 1.5$	V	
			Full range	0		$V_{CC} - 2$		
A_{VD} Large-signal differential-voltage amplification	$V_{CC} = 15\text{ V}$, $V_O = 1.4\text{ V}$ to 11.4 V, $R_L \geq 15\text{ k}\Omega$ to V_{CC}		25°C	25	100		V/mV	
I_{OH} High-level output current	$V_{ID} = 1\text{ V}$		$V_{OH} = 5\text{ V}$	25°C		0.1	50	nA
			$V_{OH} = V_{CC}\text{ MAX}^{(3)}$	Full range				1
V_{OL} Low-level output voltage	$V_{ID} = - 1\text{ V}$	$I_{OL} = 4\text{ mA}$	25°C		150	400	mV	
			Full range			700		
I_{OL} Low-level output current	$V_{ID} = - 1\text{ V}$	$V_{OL} = 1.5\text{ V}$	25°C	6	16		mA	
I_{CC} Supply current (four comparators)	$V_O = 2.5\text{ V}$, No load		25°C	$V_{CC} = 5\text{ V}$		0.8	2	mA
				$V_{CC} = \text{MAX}^{(3)}$		1	2.5	

- (1) All characteristics are measured with zero common-mode input voltage, unless otherwise specified.
- (2) Full range (MIN to MAX) is -40°C to 125°C . All characteristics are measured with zero common-mode input voltage, unless otherwise specified.
- (3) $V_{CC}\text{ MAX} = 30\text{ V}$ for non-V devices and 32 V for V-suffix devices.
- (4) The voltage at either the input or common mode should not be allowed to negative by more than 0.3 V . The upper end of the common-mode voltage range is $V_{CC+} - 1.5\text{ V}$; however, one input can exceed V_{CC} , and the comparator will provide a proper output state as long as the other input remains in the common-mode range. Either or both inputs can go to 30 V without damage.

6.6 Switching Characteristics LM2901x-Q1

$V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Response time ⁽²⁾	R_L connected to 5 V through $5.1\text{ k}\Omega$, $C_L = 15\text{ pF}^{(1)}$	100-mV input step with 5-mV overdrive		1.3		$\mu\text{ s}$
		TTL-level input step		0.3		

- (1) C_L includes probe and jig capacitance.
- (2) The response time specified is the interval between the input step function and the instant when the output crosses 1.4 V .

6.7 Typical Characteristics LM2901x-Q1

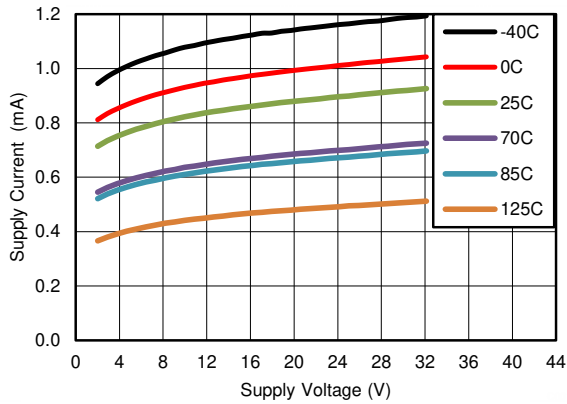


图 6-1. Supply Current vs Supply Voltage

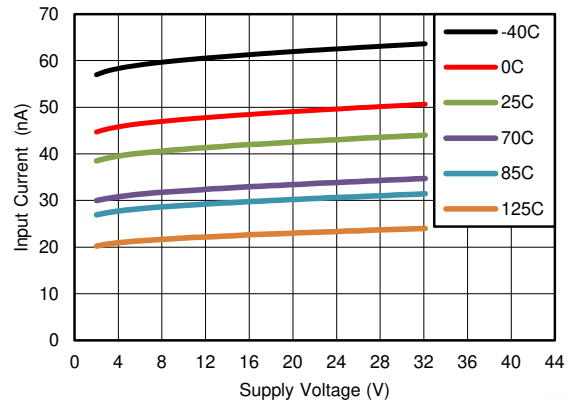


图 6-2. Input Bias Current vs Supply Voltage

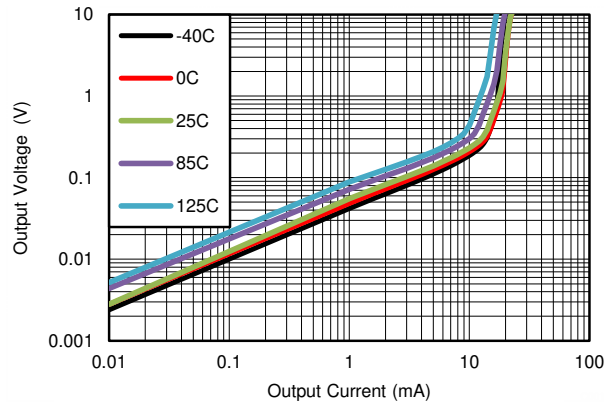


图 6-3. Output Saturation Voltage

7 Detailed Description

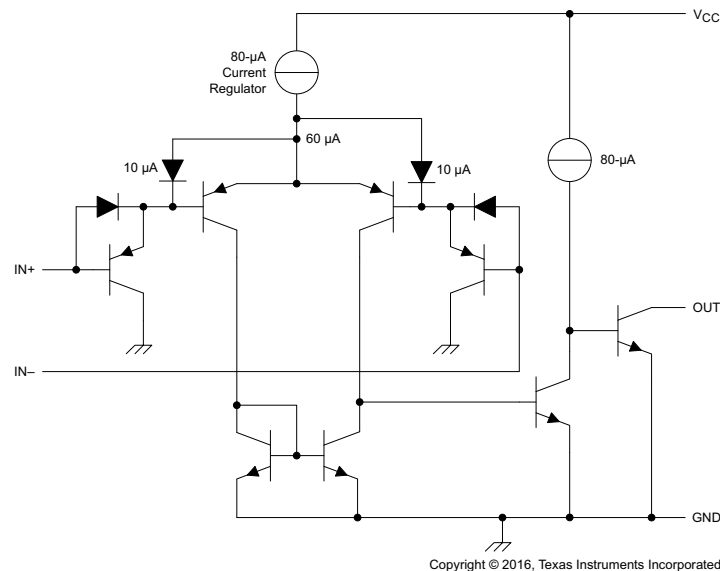
7.1 Overview

The LM2901x-Q1 family of devices is a quad comparator with the ability to operate up to an absolute maximum of 36 V on the supply pin. This standard device has proven ubiquity and versatility across a wide range of applications because of the very wide supply voltage range (2 V to 30 V or 32 V), low I_Q , and fast response of the device.

This device is AEC-Q100 qualified and can operate over a wide temperature range (- 40°C to 125°C).

The open-collector output allows the user to configure the logic-high voltage of the output (V_{OH}) independent of V_{CC} and can be used with multiple comparators in wired AND functionality.

7.2 Functional Block Diagram



7.3 Feature Description

The LM2901x-Q1 family of devices consists of a PNP Darlington pair input, allowing the device to operate with very high gain and fast response with minimal input bias current. The input Darlington pair creates a limit on the input common-mode voltage ability, allowing the LM2901x-Q1 family of devices to accurately function from ground to $V_{CC} - 2$ V for the lower voltage input. The higher voltage input may go up to the maximum V_{CC} . This ability enables a wide input range even when using modern-day supplies of 3.3 V and 5 V.

The output consists of an open collector bipolar transistor. The transistor sinks current when the negative input voltage is higher than the positive input voltage and the offset voltage. The V_{OL} is resistive and scales with the output current. See [Figure 6-3](#) in [Section 6.7](#) for the V_{OL} values with respect to the output current.

The special pinout of this device separates input pins from the output pins to reduce parasitic coupling between input and output.

7.4 Device Functional Modes

7.4.1 Voltage Comparison

The LM2901x-Q1 family of devices operates solely as a voltage comparator, comparing the differential voltage between the positive and negative pins and outputs a logic low or high impedance (logic high with pullup) based on the input differential polarity.

8 Application and Implementation

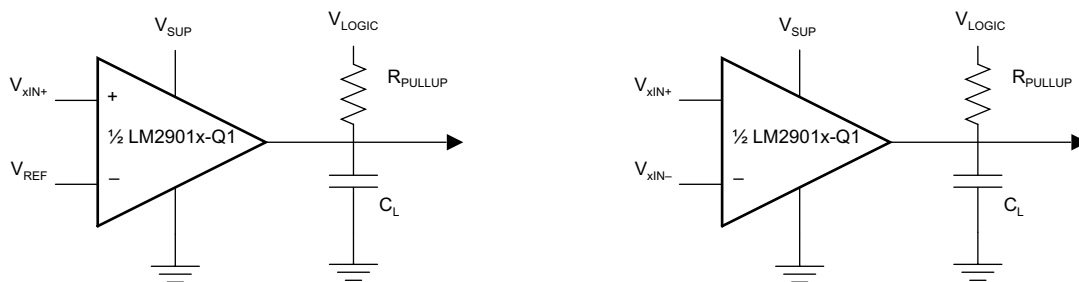
备注

以下应用部分的信息不属于 TI 组件规范，TI 不担保其准确性和完整性。客户应负责确定 TI 组件是否适用于其应用。客户应验证并测试其设计，以确保系统功能。

8.1 Application Information

The LM2901x-Q1 family of devices is typically used to compare a single signal to a reference or two signals against each other. Many users take advantage of the open-drain output to drive the comparison logic output to a logic voltage level to an MCU or logic device. The wide supply range and high voltage capability makes the LM2901x-Q1 family of devices optimal for level shifting to a higher or lower voltage.

8.2 Typical Application



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图 8-1. Single-Ended and Differential Comparator Configurations

8.2.1 Design Requirements

For this design example, use the parameters listed in 表 8-1 as the input parameters.

表 8-1. Design Parameters

PARAMETER	EXAMPLE VALUE
Input voltage range	0 V to $V_{SUP} - 1.5$ V
Supply voltage	2 V to 36 V
Logic supply voltage	2 V to 36 V
Output current (R_{PULLUP})	1 μ A to 20 mA
Input overdrive voltage	100 mV
Reference voltage	2.5 V
Load capacitance (C_L)	15 pF

8.2.2 Detailed Design Procedure

8.2.2.1 Input Voltage Range

When selecting the input voltage range, the input common-mode voltage range (V_{ICR}) must be considered. If temperature operation is above or below 25°C the V_{ICR} can range from 0 V to $V_{CC} - 2$ V. The V_{ICR} range limits the input voltage range to as high as $V_{CC} - 2$ V and as low as 0 V. Operation outside of this range can yield incorrect comparisons.

The following lists some input voltage scenarios and the resulting outcomes:

- When both IN⁻ and IN⁺ are both within the common-mode range:
 - If IN⁻ is higher than IN⁺ and the offset voltage, then the output is low and the output transistor is sinking current.

- If IN^- is lower than IN^+ and the offset voltage, then the output is in high impedance and the output transistor is not conducting.
- When IN^- is higher than common-mode and IN^+ is within common-mode, the output is low and the output transistor is sinking current.
- When IN^+ is higher than common-mode and IN^- is within common-mode, then the output is in high impedance and the output transistor is not conducting.
- When IN^- and IN^+ are both higher than common-mode, then the output is low and the output transistor is sinking current.

8.2.2.2 Minimum Overdrive Voltage

The overdrive voltage is the differential voltage produced between the positive and negative inputs of the comparator over the offset voltage (V_{IO}). To make an accurate comparison the overdrive voltage (V_{OD}) must be higher than the input offset voltage (V_{IO}). The overdrive voltage can also determine the response time of the comparator, with the response time decreasing as the overdrive increases. 图 8-2 and 图 8-3 show positive and negative response times with respect to overdrive voltage.

8.2.2.3 Output and Drive Current

Output current is determined by the load or pullup resistance and logic or pullup voltage. The output current produces an output low voltage (V_{OL}) from the comparator. In which V_{OL} is proportional to the output current. Use 图 6-3 to determine V_{OL} based on the output current.

The output current can also effect the transient response. See 节 8.2.2.4 for more information.

8.2.2.4 Response Time

The transient response can be determined by the load capacitance (C_L), load or pullup resistance (R_{PULLUP}), and equivalent collector-emitter resistance (R_{CE}).

Use 方程式 1 and 方程式 2 to calculate the approximate values of the rise time (t_r) and fall time (t_f).

$$t_P \approx R_{PULLUP} \times C_L \quad (1)$$

$$t_N \approx R_{CE} \times C_L \quad (2)$$

To find the value of R_{CE} , use the slope of 图 6-3 in the linear region at the desired temperature, or divide V_{OL} by I_O .

8.2.3 Application Curves

The following curves were generated with 5 V on V_{CC} and V_{LOGIC} , $R_{PULLUP} = 5.1 \text{ k}\Omega$, and 50-pF scope probe.

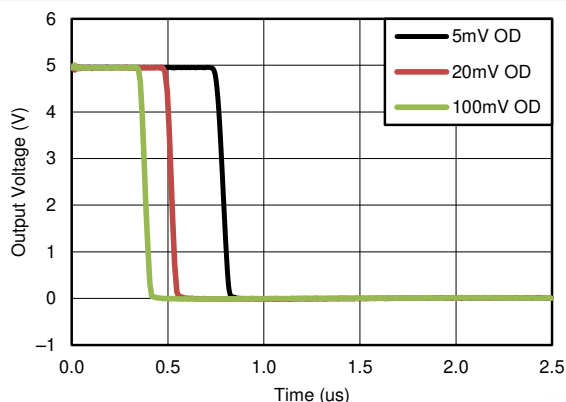


图 8-2. Response Time for Various Overdrives Negative Transition

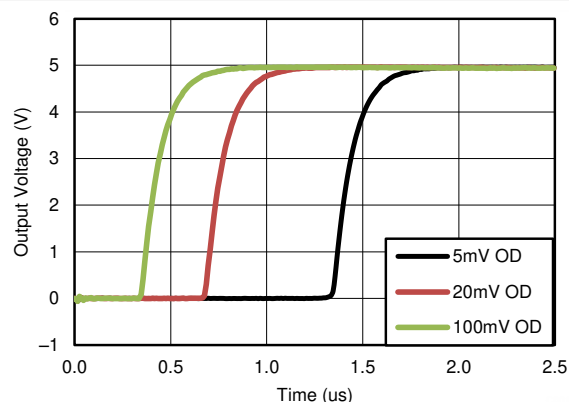


图 8-3. Response Time for Various Overdrives Positive Transition

9 Power Supply Recommendations

For fast response and comparison applications with noisy or AC inputs, TI recommends using a bypass capacitor on the supply pin to reject any variation on the supply voltage. This variation can take away from some of the input common mode range of the comparator and create an inaccurate comparison.

10 Layout

10.1 Layout Guidelines

For accurate comparator applications without hysteresis, maintaining a stable power supply with minimized noise and glitches, which can affect the high-level input common-mode voltage range, is important. To achieve a stable power supply, place a bypass capacitor between the positive and negative (if available) supply voltage and ground. If a negative supply is not being used, do not put a capacitor between the GND pin of the IC and system ground.

10.2 Layout Example

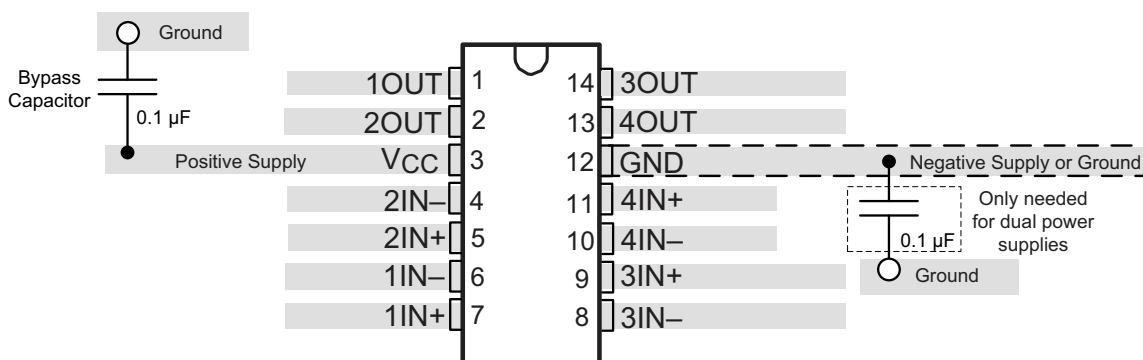


图 10-1. LM2901x-Q1 Layout Example

11 Device and Documentation Support

11.1 Documentation Support

11.1.1 Related Documentation

For related documentation, see the following:

TL331-Q1 *Single Differential Comparator*, [SLVS969](#)

11.2 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

表 11-1. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
LM2901-Q1	Click here	Click here	Click here	Click here	Click here
LM2901V-Q1	Click here	Click here	Click here	Click here	Click here
LM2901AV-Q1	Click here	Click here	Click here	Click here	Click here
LM2901B-Q1	Click here	Click here	Click here	Click here	Click here

11.3 Trademarks

所有商标均为其各自所有者的财产。

11.4 静电放电警告



静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

11.5 术语表

TI 术语表

本术语表列出并解释了术语、首字母缩略词和定义。

12 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LM2901AVQDRG4Q1	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901AVQ	Samples
LM2901AVQDRQ1	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901AVQ	Samples
LM2901AVQPWRG4Q1	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901AVQ	Samples
LM2901AVQPWRQ1	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901AVQ	Samples
LM2901QDRG4Q1	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901Q1	Samples
LM2901QDRQ1	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901Q1	Samples
LM2901QPWRG4Q1	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901Q1	Samples
LM2901QPWRQ1	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901Q1	Samples
LM2901VQDRG4Q1	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901VQ1	Samples
LM2901VQDRQ1	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901VQ1	Samples
LM2901VQPWRG4Q1	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901VQ	Samples
LM2901VQPWRQ1	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	2901VQ	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

- (3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.
- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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OTHER QUALIFIED VERSIONS OF LM2901-Q1, LM2901AV-Q1, LM2901V-Q1 :

- Catalog : [LM2901](#), [LM2901AV](#), [LM2901V](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LM2901AVQPWRG4Q1	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM2901AVQPWRQ1	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM2901QPWRG4Q1	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM2901QPWRQ1	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM2901VQPWRG4Q1	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM2901VQPWRQ1	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM2901AVQPWRG4Q1	TSSOP	PW	14	2000	367.0	367.0	35.0
LM2901AVQPWRQ1	TSSOP	PW	14	2000	356.0	356.0	35.0
LM2901QPWRG4Q1	TSSOP	PW	14	2000	367.0	367.0	35.0
LM2901QPWRQ1	TSSOP	PW	14	2000	356.0	356.0	35.0
LM2901VQPWRG4Q1	TSSOP	PW	14	2000	367.0	367.0	35.0
LM2901VQPWRQ1	TSSOP	PW	14	2000	356.0	356.0	35.0

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
 -  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
 - E. Reference JEDEC MS-012 variation AB.

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4211284-2/G 08/15

- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Publication IPC-7351 is recommended for alternate designs.
 - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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