

36V General-Purpose Industry Comparators

1 Features

- Wide Supply: 3.0V to 36V
- Faster Response Time: 1.3us (typical)
- Low Offset Voltage: $\pm 2\text{mV}$ (typical)
- Low Input Bias Current: 25nA (typical)
- Large Voltage Gain: 100 dB (typical)
- Open Collector Output
- Input Common-Mode Voltage Range Includes Ground
- Differential Input Voltage Range Equal To Power Supply
- Extended Temperature Range: -40°C to $+125^{\circ}\text{C}$

2 Applications

- Industrial Application
- Solar Inverter
- White Goods
- Battery Management System
- Medical Equipment

3 Description

The GD30CP2903/2901 are dual and quad channel voltage comparators with very low input offset voltage specification. They are designed to operate from a single power supply over a wide range of voltages, however operation from split power supplies is also possible. They offer low power supply current independent of the magnitude of the power supply voltage.

These comparators family are designed to directly interface with TTL and CMOS. When operating from both plus and minus power supplies, the comparators could directly interface with MOS logic where their low power drain is a distinct advantage over standard comparators.

The GD30CP2903(dual) is offered in SOIC-8L and MSOP-8L packages, the quad of GD30CP2901 is offered in SOIC-14L and TSSOP-14L packages.

Device Information¹

PART NUMBER	PACKAGE	BODY SIZE (NOM)
GD30CP2903	SOIC-8L	4.90mm x 3.92mm
	MSOP-8L	3.00mm x 3.00mm
GD30CP2901	SOIC-14L	8.73mm x 3.95mm
	TSSOP-14L	4.96mm x 4.40mm

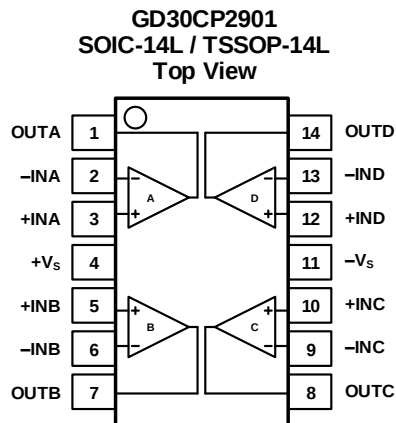
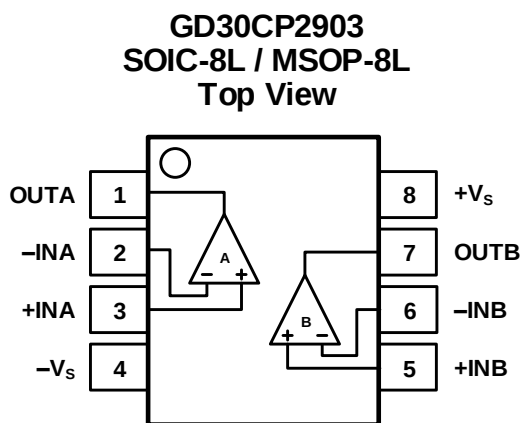
1. For packaging details, see [Package Information](#) section.

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4 Device Overview

4.1 Pinout and Pin Assignment



4.2 Pin Description

NAME	PIN TYPE ¹	FUNCTION
-IN	I	Inverting input of the comparator. The voltage range is from (V _{S-} -V) to (V _{S+} + 20V).
+IN	I	Non-inverting input of the comparator. This pin has the same voltage range as -IN.
+V _S	P	Positive power supply. The voltage is from 3.0V to 36V. Split supplies are possible as long as the voltage between V _{S+} and V _{S-} is from 3.0V to 36V.
-V _S	P	Negative power supply. It is normally tied to ground. It can also be tied to a voltage other than ground as long as the voltage between V _{S+} and V _{S-} is from 3.0V to 36V.
OUT	O	Comparator output.

1. I = Input, O = Output, P = Power.

5 Parameter Information

5.1 Absolute Maximum Ratings

Exceeding the operating temperature range (unless otherwise noted)¹

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{S+} to V_{S-}	Supply Voltage		40	V
V_I	Differential Input Voltage	-36	36	V
I_I	Signal Input Voltage Range	-0.3	40	V
	Output Short-Circuit	Continuous		s
T_J	Junction Temperature		150	°C
T_A	Operate Temperature Range	-40	125	°C
T_{stg}	Storage Temperature Range	-65	+150	°C
	Lead Temperature Range (Soldering 10 sec)		260	°C

1. The maximum ratings are the limits to which the device can be subjected without permanently damaging the device. Note that the device is not guaranteed to operate properly at the maximum ratings. Exposure to the absolute maximum rating conditions for extended periods may affect device reliability.

5.2 Recommended Operation Conditions

SYMBOL ^{1,2}	PARAMETER	MIN	TYP	MAX	UNIT
V_S	Input supply voltage range	3.0		36	V
V_{CM}	$V_S = 5.0V$ to $36V$	$-V_S$		$+V_S - 1.5$	V
	$V_S = 5.0V$ to $36V$, $T_A = -40^{\circ}C$ to $125^{\circ}C$	$-V_S$		$+V_S - 2.0$	
T_A	Operating temperature range	-40		125	°C

1. The device is not guaranteed to function outside of its operating conditions.

5.3 Electrical Sensitivity

SYMBOL	CONDITIONS	VALUE	UNIT
$V_{ESD(HBM)}$	Human-body model (HBM), ANSI/ESDA/JEDEC JS-001-2017 ¹	±500	V
$V_{ESD(CDM)}$	Charge-device model (CDM), ANSI/ESDA/JEDEC JS-002-2022 ²	±1000	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.

5.4 Thermal Characteristics

SYMBOL ¹	CONDITIONS	PACKAGE	VALUE	UNIT
Θ_{JA}	Package Thermal Resistance	MSOP-8L	171	°C/W
		SOIC-8L	124.7	
		TSSOP-14L	135.8	
		SOIC-14L	160.9	

1. Thermal characteristics are based on simulation, and meet JEDEC document JESD51-7.

5.5 Electrical Characteristics

$V_S = 5.0\text{ V}$ to 36 V , $T_A = +25^\circ\text{C}$, unless otherwise noted. Boldface limits apply over the specified temperature range.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
V _{OS}	Input offset voltage	V _S = 5.0 V to 30 V, V _{OUT} = 1.4 V	±2		±7	mV
		V _S = 5.0 V to 30 V, V _{OUT} = 1.4 V			±15	
		T _A = -40 to +125°C				
INPUT BIAS CURRENT						
I _B	Input bias current	V _{CM} = 0	-25		-250	nA
		V _{CM} = 0, T _A = -40 to +125°C			-400	
I _{OS}	Input offset current	V _{CM} = 0	5		50	nA
		V _{CM} = 0, T _A = -40 to +125°C			200	
INPUT VOLTAGE						
V _{CM}	Common-mode voltage range	V _S = 5.0 V to 36 V,	-V _S		+V _S - 1.5	V
		V _S = 5.0 V to 36 V			+V _S - 2.0	
		T _A = -40 to +125°C	-V _S			
VOLTAGE GAIN						
A _{VD}	Large-signal differential-voltage amplification	V _{CC} = 15 V, V _{OUT} = 1 V to 11 V R _L ≥ 15KΩ	50	200		V/mV
PROPAGATION DELAY TIME						
T _{PD}	Propagation delay time	R _L = 5.1KΩ, V _{RL} = 5 V, C _L = 15 pF TTL-Level Input Step	0.3			μs
		R _L = 5.1KΩ, V _{RL} = 5 V, C _L = 15 pF 100mV Input Step With 5mV Overdrive	1.3			
OUTPUT						
V _{OL}	Low output voltage swing	I _{OL} = 4mA, V _{ID} = -1V	200		400	mV
		I _{OL} = 4mA, V _{ID} = -1V			700	
		T _A = -40 to +125°C				
I _{OL}	Low-level output current	V _{OL} = 1.5V, V _{ID} = 1V	6		16	mA
I _{OH}	High-level output current	V _{OL} = 5 V, V _{ID} = 1V	0.1	50		nA
		V _{OL} = 30 V, V _{ID} = 1V			1	μA
		T _A = -40 to +125°C				
POWER SUPPLY						
V _S	Operating supply voltage	T _A = -40°C to +125°C	3.0		36	V
I _Q	Quiescent current of GD30CP2903	V _S = 5 V	400		1000	μA
		V _S = 30 V	650		1750	
I _Q	Quiescent current of GD30CP2901	V _S = 5 V	850		1990	μA
		V _S = 30 V	1150		2490	

1. Guaranteed by design and engineering sample characterization.

5.6 Typical Characteristics

$V_S = 5V$, $R_L = 5.1k\Omega$, $T_A = +25^\circ C$, unless otherwise noted.

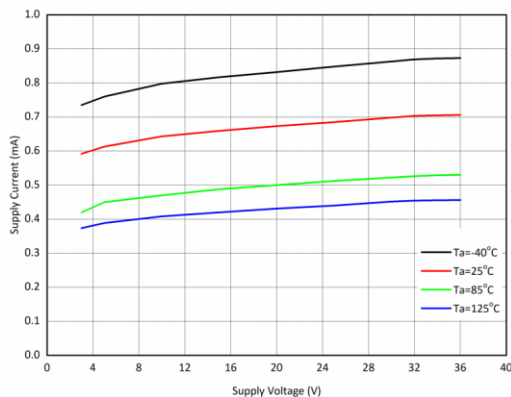


Figure 1. LTA903L Quiescent Current vs. Supply Voltage

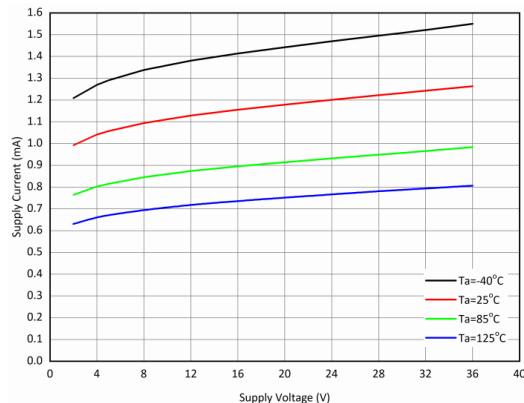


Figure 2. LTA901L Quiescent Current vs. Supply Voltage

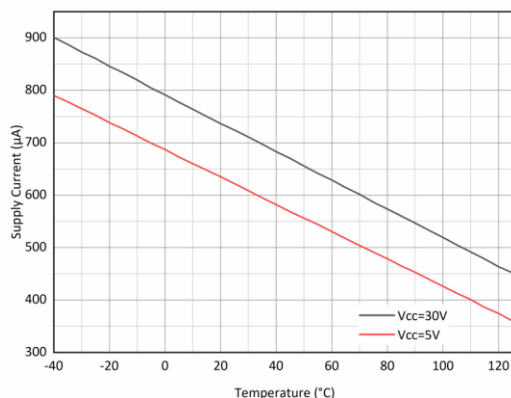


Figure 3. LTA903L Quiescent Current vs. Temperature

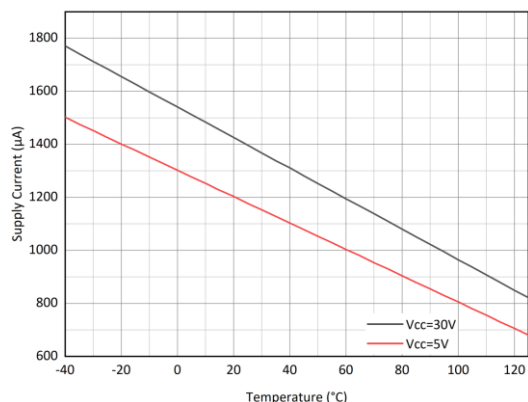


Figure 4. LTA901L Quiescent Current vs. Temperature

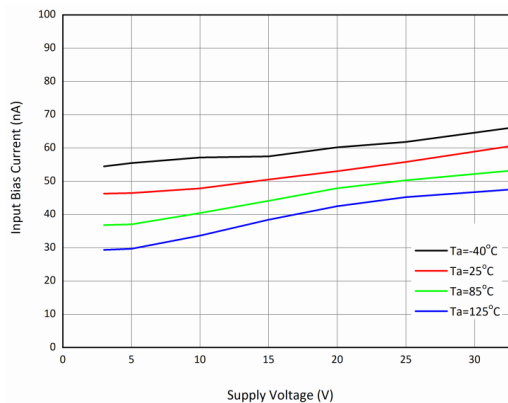


Figure 5. Input Bias Current vs. Supply Voltage

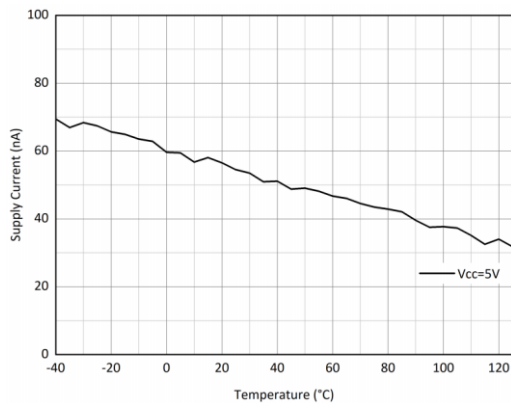


Figure 6. Input Bias Current vs. Supply Temperature

Typical Characteristics (continued)

$V_{IN} = 5V$, $V_{OUT} = 3.3V$, $L = 2.2\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

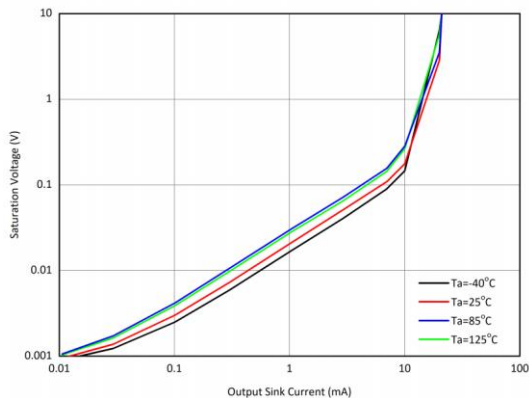


Figure 7. Output Sink Current vs. Saturation Voltage

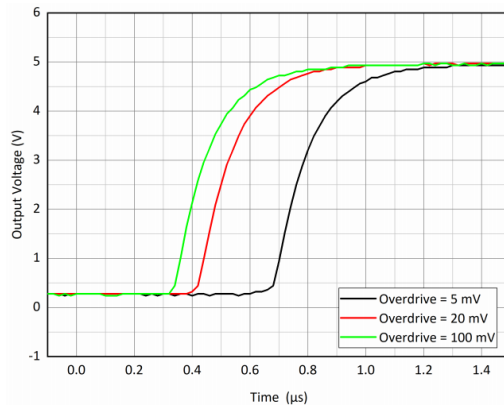


Figure 8. Response Time for Various Over Drives Positive Transition

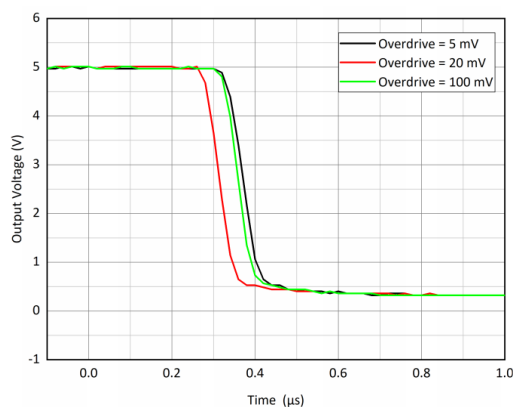
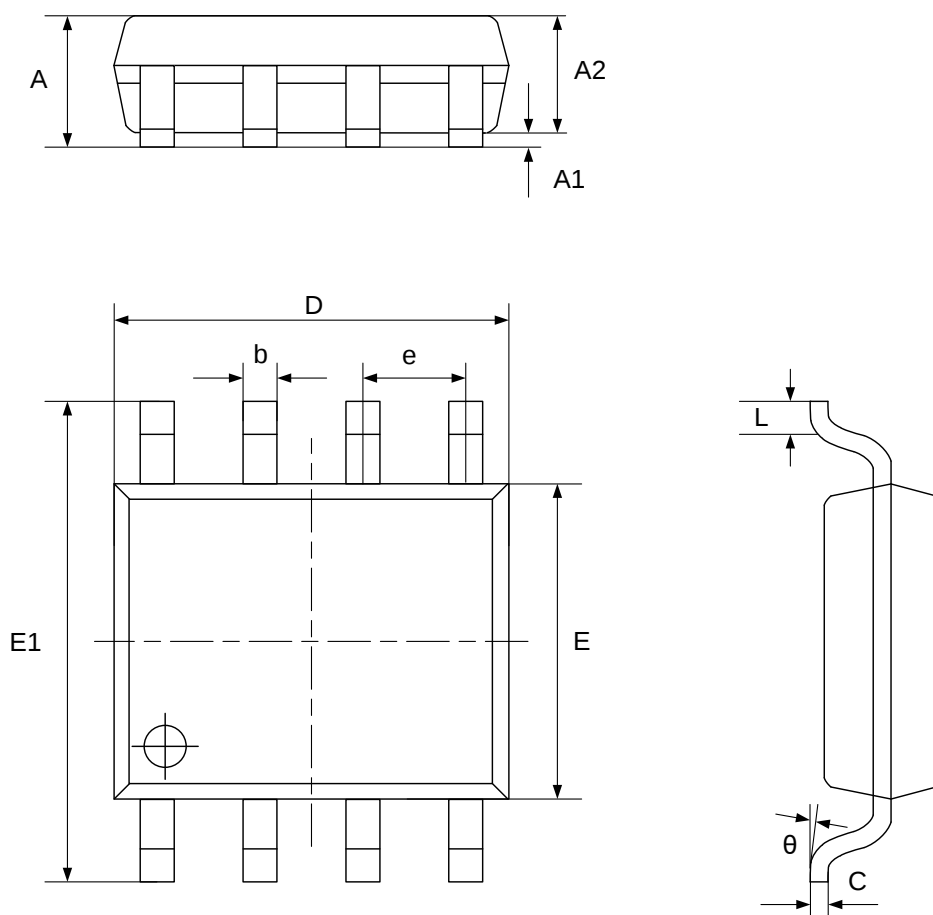


Figure 9. Response Time for Various Over Drives Negative Transition

6 Package Information

6.1 Outline Dimensions

SOIC-8L Package Outline



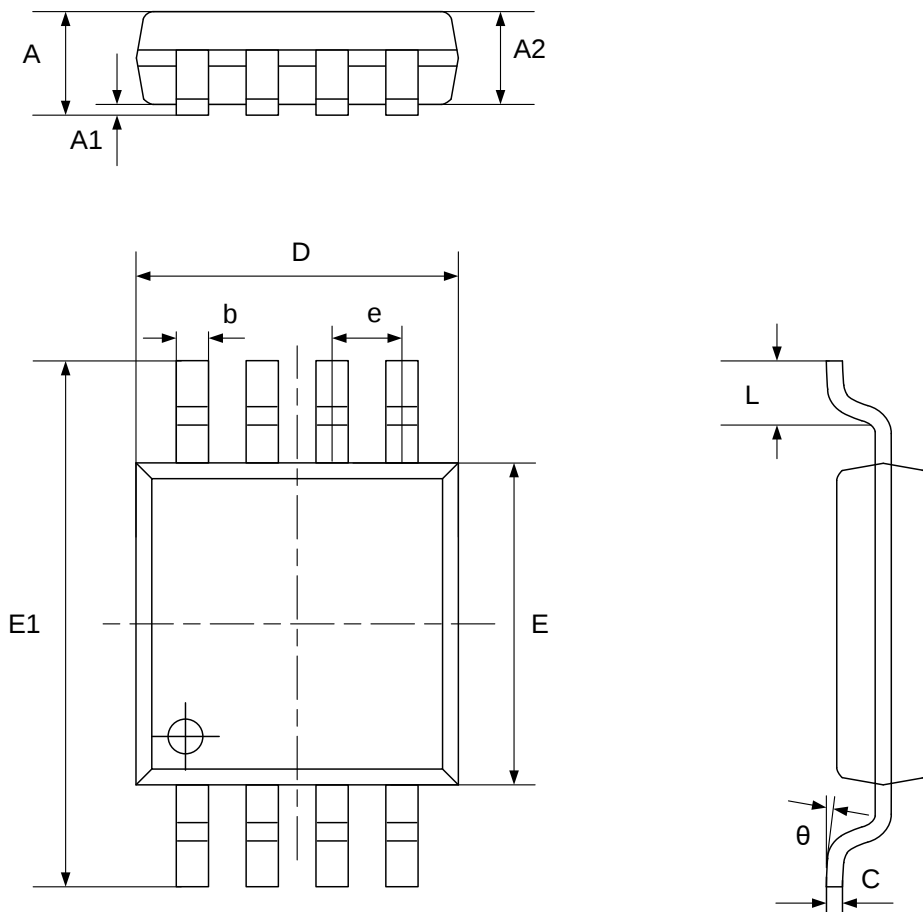
NOTES: (continued)

1. Refer to the [Table 1. SOIC-8L dimensions\(mm\)](#).

Table 1. SOIC-8L dimensions(mm)

SYMBOL	MIN	NOM	MAX
A	1.370		1.670
A1	0.070		0.170
A2	1.300		1.500
b	0.306		0.506
C		0.203	
D	4.700		5.100
E	3.820		4.020
E1	5.800		6.200
e		1.270	
L	0.450		0.750
θ	0°		8°

MSOP-8L Package Outline



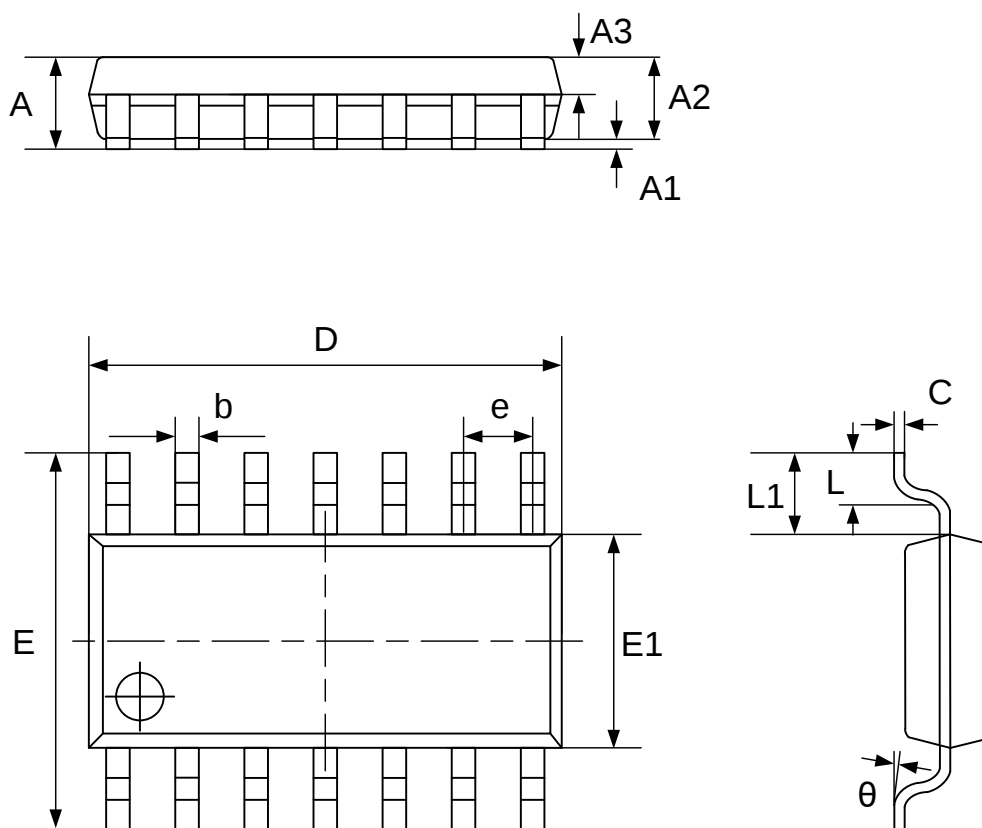
NOTES: (continued)

1. Refer to the [Table 2. MSOP-8L dimensions\(mm\)](#).

Table 2. MSOP-8L dimensions(mm)

SYMBOL	MIN	NOM	MAX
A	0.800		1.100
A1	0.050		0.150
A2	0.750		0.950
b	0.290		0.380
C	0.150		0.200
D	2.900		3.100
E	2.900		3.100
E1	4.700		5.100
e		0.650	
L	0.400		0.700
θ	0°		8°

SOIC-14L Package Outline



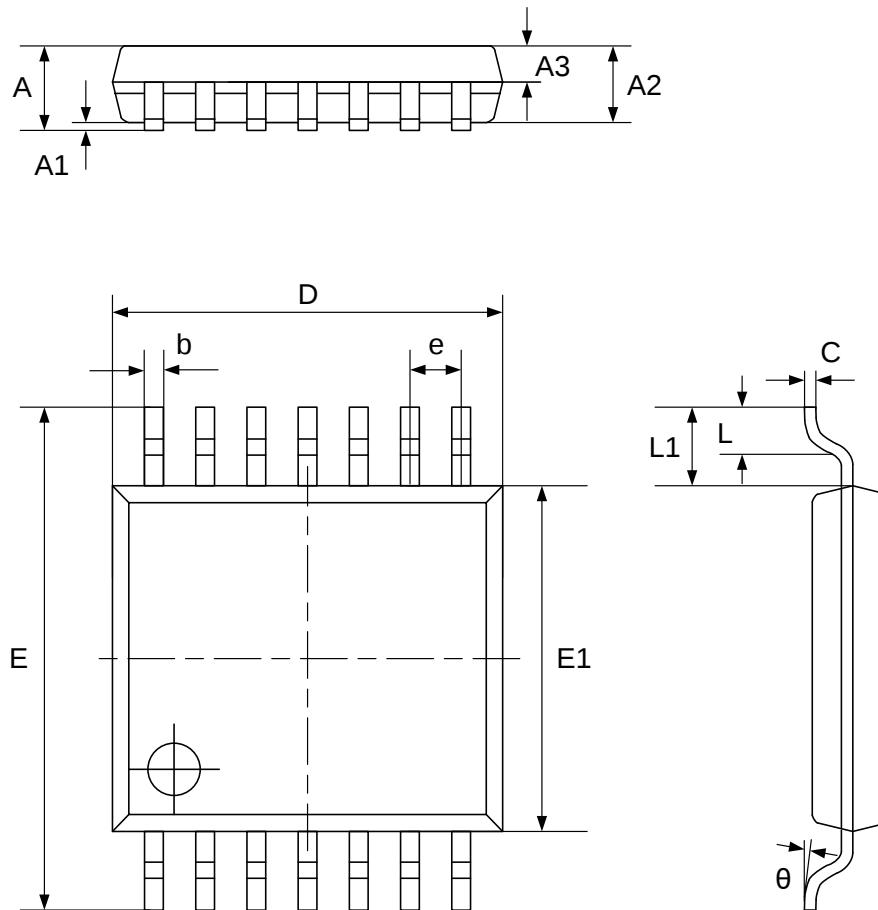
NOTES: (continued)

1. Refer to the [Table 3. SOIC-14L dimensions](#).

Table 3. SOIC-14L dimensions

SYMBOL	MIN	TYP	MAX
A	1.450		1.850
A1	0.100		0.300
A2	1.350		1.550
A3	0.550		0.750
b		0.406	
C		0.203	
D	8.630		8.830
E	5.840		6.240
E1	3.850		4.050
e		1.270	
L1	1.040 REF		
L	0.350		0.750
θ	2°		8°

TSSOP-14L Package Outline



NOTES: (continued)

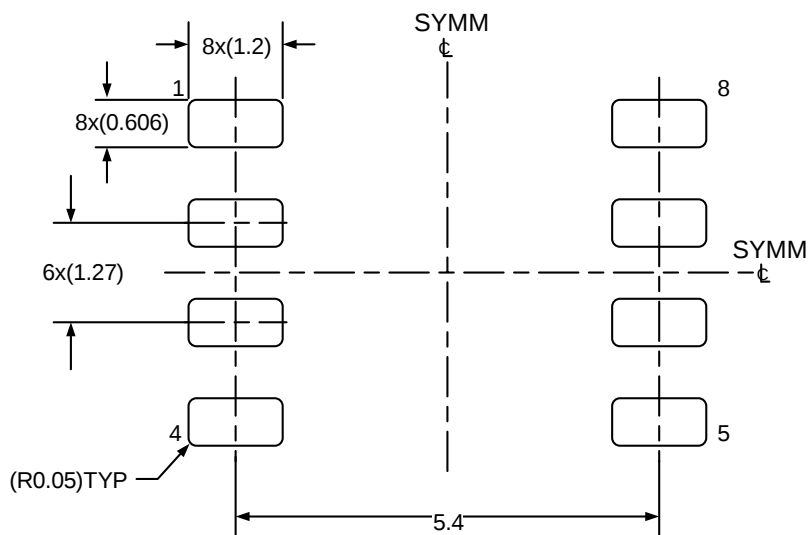
1. Refer to the [Table 4. TSSOP-14L dimensions](#)

Table 4. TSSOP-14L dimensions

SYMBOL	MIN	TYP	MAX
A			1.200
A1	0.050		0.150
A2	0.900		1.050
A3	0.390		0.490
b	0.200		0.290
C	0.130		0.180
D	4.860		5.060
E	6.200		6.600
E1	4.300		4.500
e		0.650	
L1	1.000 REF		
L	0.450		0.750
θ	0°		8°

6.2 Recommended Land Pattern

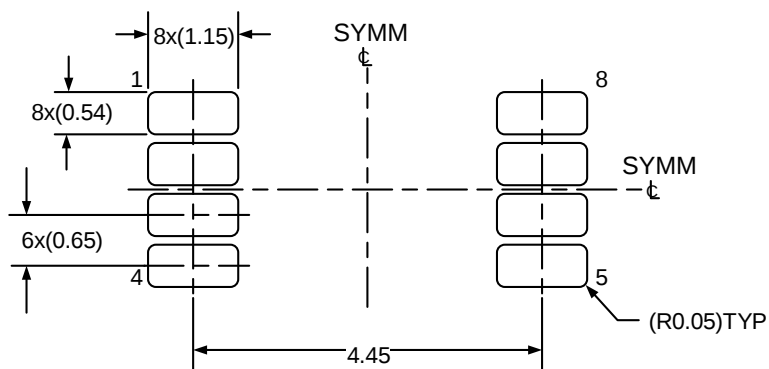
SOIC-8L Land Pattern Example



NOTES:

1. Refer to the IPC-7351 can also help you complete the designs.
2. Exposed metal shown.
3. Drawing is 10X scale.

MSOP-8L Land Pattern Example

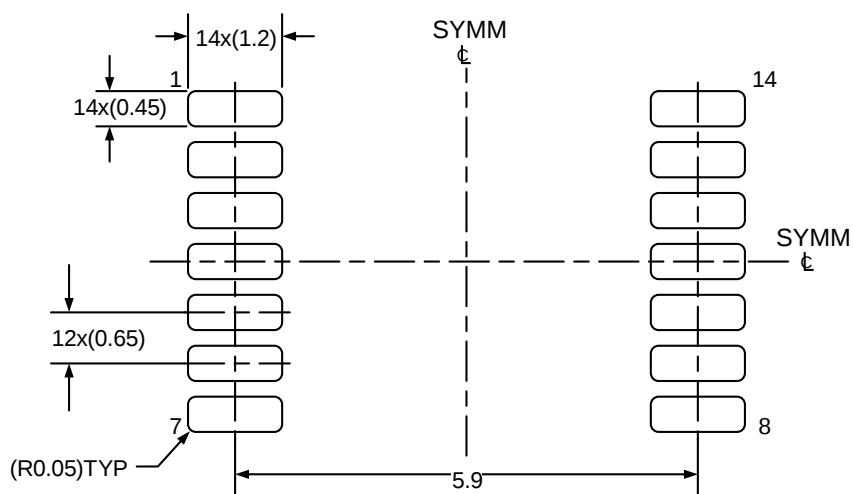


NOTES: (continued)

1. Refer to the IPC-7351 can also help you complete the designs.
2. Exposed metal shown.
3. Drawing is 10X scale.

1. Refer to the IPC-7351 can also help you complete the designs.
2. Exposed metal shown.
3. Drawing is 10X scale.

TSSOP-14L Land Pattern Example



NOTES: (continued)

1. Refer to the IPC-7351 can also help you complete the designs.
2. Exposed metal shown.
3. Drawing is 10X scale.

7 Ordering Information

Ordering Code	Package Type	ECO Plan	Packing Type	MOQ	OP Temp(°C)
GD30CP2903WMTR-IL2	MSOP-8L	Green	Tape & Reel	3000	-40°C to +125°C
GD30CP2903WLTR-IL2	SOIC-8L	Green	Tape & Reel	4000	-40°C to +125°C
GD30CP2901ZLTR-IL4	SOIC-14L	Green	Tape & Reel	2500	-40°C to +125°C
GD30CP2901ZPTR-IL4	TSSOP-14L	Green	Tape & Reel	3000	-40°C to +125°C

8 Revision History

REVISION NUMBER	DESCRIPTION	DATE
1.0	Initial release and device details	2024

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