

DIO3714

CMOS Quad Bilateral Analog Switch

Description

The DIO3714 is a CMOS analog IC configured as quad bilateral single-pole, single-throw (SPST) switches. It can be applied for the transmission or multiplexing of analog or digital signals.

The DIO3714 features a low on-resistance (4.5Ω typ) and a very low off-leakage current (5 nA typ). It has integrated four bilateral switches and each one has independent controls. The operating range of this CMOS device is from 1.8 V to 5.5 V .

The DIO3714 operates over an ambient temperature range of -40°C to 125°C . It offers two green packages with SOP-14 and TSSOP-14.

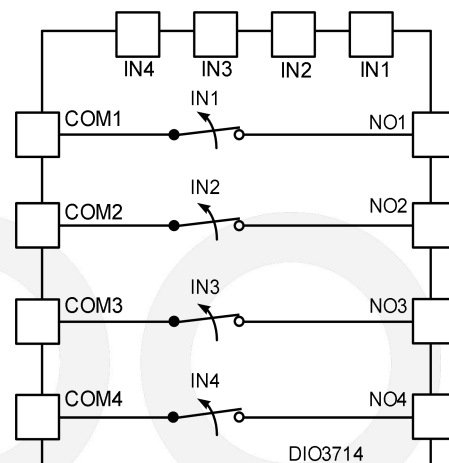
Features

- -3 dB Bandwidth: 200 MHz
- Single supply voltage: 1.8 V to 5.5 V
- Low on-resistance: 4.5Ω (typ) with 4.5 V supply
- High off-isolation: -72 dB ($R_L = 50 \Omega$, $f = 1 \text{ MHz}$)
- Guaranteed on-resistance match between channels
- Extremely low off-state switch leakage: 5 nA (typ) at 25°C
- Operating temperature range: -40°C to 125°C
- Packages: SOP-14 and TSSOP-14

Application

- Transmission-gate logic implementation
- Analog and digital multiplexing and demultiplexing
- A/D and D/A conversion
- Signal gating
- Battery-operated equipment
- Factory automation
- Communications circuits

Functional Diagrams



■ Ordering Information

Part Number	Top Marking	RoHS	T _A	Package	
DIO3714SO14	DIOCG1D	Green	-40°C to 125°C	SOP14	Tape & Reel, 2500
DIO3714TP14	DIOCG1D	Green	-40°C to 125°C	TSSOP14	Tape & Reel, 2500

If you encounter any issue in the process of using the device, please contact our customer service at marketing@dioo.com or phone us at (+86)-21-62116882. If you have any improvement suggestions regarding the datasheet, we encourage you to contact our technical writing team at docs@dioo.com. Your feedback is invaluable for us to provide a better user experience.

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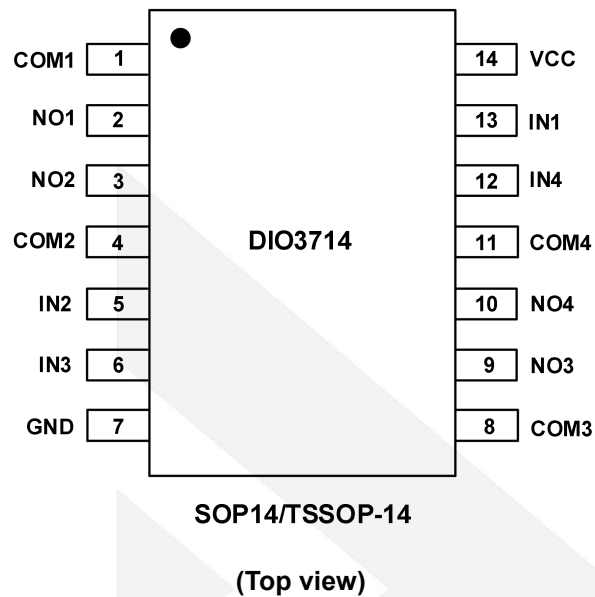
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1. Pin Assignment and Functions



Pin No.	Name	Description
1	COM1	Common port
2	NO1	Data port
3	NO2	Data port
4	COM2	Common port
5	IN2	Control port
6	IN3	Control port
7	GND	Ground
8	COM3	Common port
9	NO3	Data port
10	NO4	Data port
11	COM4	Common port
12	IN4	Control port
13	IN1	Control port
14	VCC	Power supply

Table 1. Function table

Select input	Switch status
Channel 1/2/3/4	
High	All switches ON
Low	All switches OFF

2. Absolute Maximum Ratings

Exceeding the maximum ratings listed under Absolute Maximum Ratings when designing is likely to damage the device permanently. Do not design to the maximum limits because long-time exposure to them might impact the device's reliability. The ratings are obtained over an operating free-air temperature range unless otherwise specified.

Symbol	Parameter	Rating	Unit
V_{CC}	Supply voltage	-0.3 to 6.0	V
V_S	DC switch voltage	-0.3 to $V_{CC} + 0.3$	V
V_{IN}	DC input voltage	-0.3 to $V_{CC} + 0.3$	V
I_{SW}	Switch current	-50 to 50	mA
I_{PEAK}	Peak switch current (pulse at 1 ms duration, <10% duty cycle)	-80 to 80	mA
T_{STG}	Storage temperature range	-65 to 150	°C
T_J	Junction temperature	150	°C
T_L	Lead temperature range	260	°C

3. Recommended Operating Condition

Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. The ratings are obtained over an operating free-air temperature range unless otherwise specified.

Symbol	Parameter	Rating	Unit
V_{CC}	Supply voltage	1.8 to 5.5	V
V_{CNTRL}	Control input voltage	0 to 5.5	V
V_{SW}	Switch input voltage	0 to 5.5	V
T_A	Operating temperature	-40 to 85	°C

4. Electrical Characteristics

4.1. DC electrical characteristics

All typical values are at $T_A = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Conditions	Temp	Min	Typ	Max	Unit
V_{IH}	Input voltage high (Channel 1/2/3/4)	$V_{CC} = 5.0\text{ V}$	$-40\text{ to }85^\circ\text{C}$	2.1			V
		$V_{CC} = 3.0\text{ V}$		1.5			
V_{IL}	Input voltage low (Channel 1/2/3/4)	$V_{CC} = 5.0\text{ V}$	$-40\text{ to }85^\circ\text{C}$			0.9	V
		$V_{CC} = 3.0\text{ V}$				0.6	
I_{IN}	Control input leakage (IN1, IN2, IN3, IN4)	$V_{CC} = 1.8\text{ V to }5.5\text{ V}$ $V_{IN} = 0\text{ V or }5.5\text{ V or }3.6\text{ V}$	$-40\text{ to }85^\circ\text{C}$			1	μA
$I_{NO(OFF)}$	Source off leakage current	$V_{CC} = 1.8\text{ V to }5.5\text{ V}$ $V_{NO} = 1.0\text{ V, }4.5\text{ V}$ $V_{COM} = 4.5\text{ V, }1.0\text{ V, see Figure 2}$	$-40\text{ to }85^\circ\text{C}$			2	μA
			25°C		5		nA
$I_{NO(ON)}$ $I_{COM(ON)}$	On leakage current	$V_{CC} = 1.8\text{ V to }5.5\text{ V}$ $V_{NO} = 1.0\text{ V, }4.5\text{ V}$ $V_{COM} = 1.0\text{ V, }4.5\text{ V, or floating}$	$-40\text{ to }85^\circ\text{C}$			2	μA
R_{ON}	Switch on resistance	$V_{CC} = 2.7\text{ V, }V_{NO} = 1.2\text{ V}$ $I_{COM} = -10\text{ mA, see Figure 1}$	25°C		12		Ω
			$-40\text{ to }85^\circ\text{C}$			15	
		$V_{CC} = 4.5\text{ V, }V_{NO} = 3.5\text{ V}$ $I_{COM} = -10\text{ mA, see Figure 1}$	25°C		4.5		Ω
			$-40\text{ to }85^\circ\text{C}$			5.0	
ΔR_{ON}	On resistance matching between channels	$V_{CC} = 2.7\text{ V, }V_{NO} = 1.5\text{ V}$ $I_{COM} = -10\text{ mA}$	25°C			0.3	Ω
			$-40\text{ to }85^\circ\text{C}$			0.8	
		$V_{CC} = 4.5\text{ V, }V_{NO} = 3.5\text{ V}$ $I_{COM} = -10\text{ mA}$	25°C			0.2	Ω
			$-40\text{ to }85^\circ\text{C}$			0.8	
$R_{FLT(ON)}$	On resistance flatness	$V_{CC} = 2.7\text{ V, }V_{NO} = 1.0\text{ V, }1.5\text{ V, }2.0\text{ V,}$ $I_{COM} = -10\text{ mA}$	$-40\text{ to }85^\circ\text{C}$		5.0		Ω
		$V_{CC} = 4.5\text{ V, }V_{NO} = 1.0\text{ V, }2.0\text{ V, }3.5\text{ V,}$ $I_{COM} = -10\text{ mA}$	$-40\text{ to }85^\circ\text{C}$		1.6		
I_{CC}	Power supply current	$V_{CC} = 1.8\text{ V to }5.5\text{ V}$ $V_{IN} = 0\text{ V or }V_{CC}$		-1		1	μA
OIRR	Off-isolation	$R_L = 50\ \Omega, C_L = 5\text{ pF}$ Signal = 0 dBm	$f = 1\text{ MHz}$ 25°C		-72		dB
			$f = 10\text{ MHz}$ 25°C		-45		

Note:

(1) Specifications subject to change without notice.

4.2. AC electrical characteristics

All typical values are at $V_{CC} = 1.8$ to 5.5 V, $T_A = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Conditions	Temp	Min	Typ	Max	Unit
T _{ON}	Turn-on time	V _{NO} = 1.5 V, R _L = 300 Ω, C _L = 35 pF	25°C			23	ns
T _{OFF}	Turn-off time	V _{NO} = 1.5 V, R _L = 300 Ω, C _L = 35 pF	25°C			20	ns
X _{TALK}	Crosstalk	R _L = 50 Ω, C _L = 5 pF, signal = 0 dBm, see Figure 5	f = 10 MHz	25°C	-55		dB
			f = 1 MHz	25°C	-75		
BW	-3dB bandwidth	R _L = 50 Ω, C _L = 5 pF, signal = 0 dBm, see Figure 4	25°C		200		MHz

Note:

(1) Specifications subject to change without notice.

4.3. Capacitance

All typical values are at $V_{CC} = 3.3\text{ V}$ at 25°C , unless otherwise specified.

Symbol	Parameter	Conditions	Temp	Min	Typ	Max	Unit
C _{ON}	On capacitance	f = 1 MHz, see Figure 3	25°C		10		pF

5. Test Diagrams

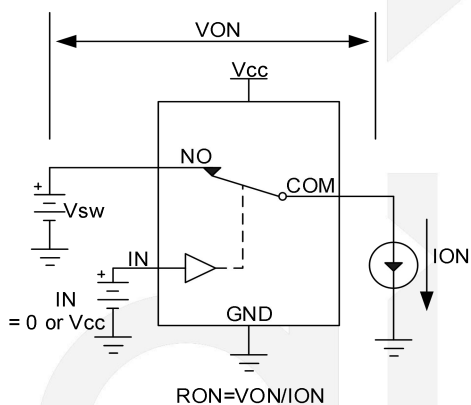


Figure 1. Switch on resistor

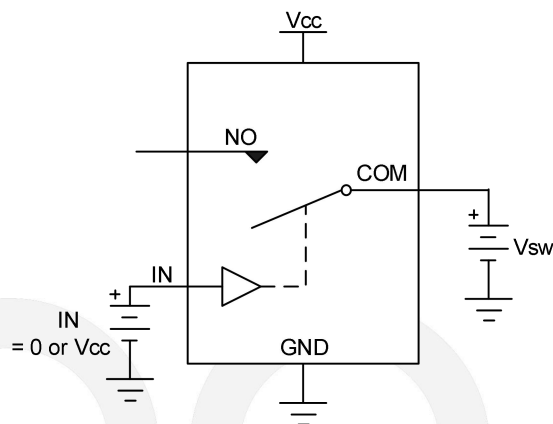


Figure 2. Switch off leakage

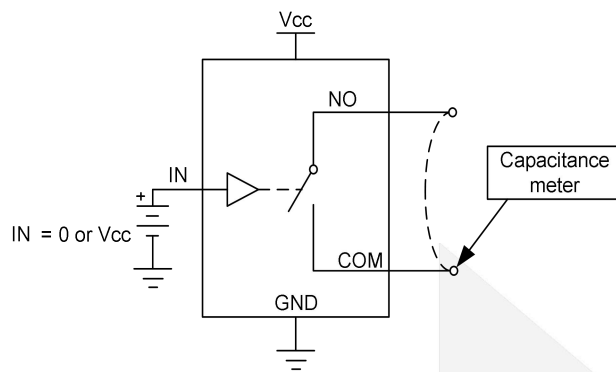


Figure 3. On/off capacitance test

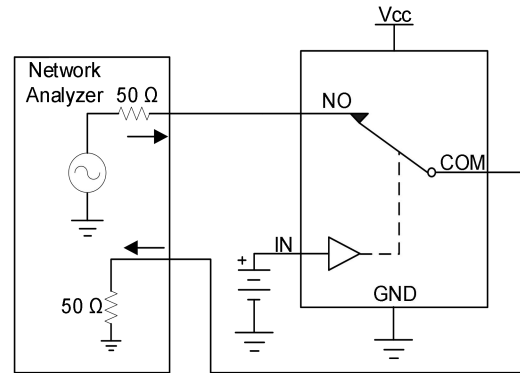


Figure 4. Bandwidth

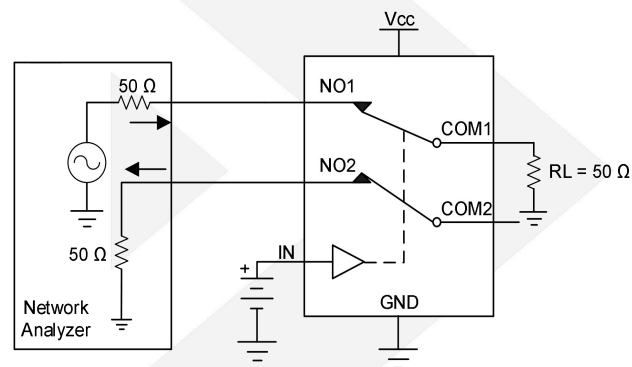


Figure 5. Channel-to-channel crosstalk

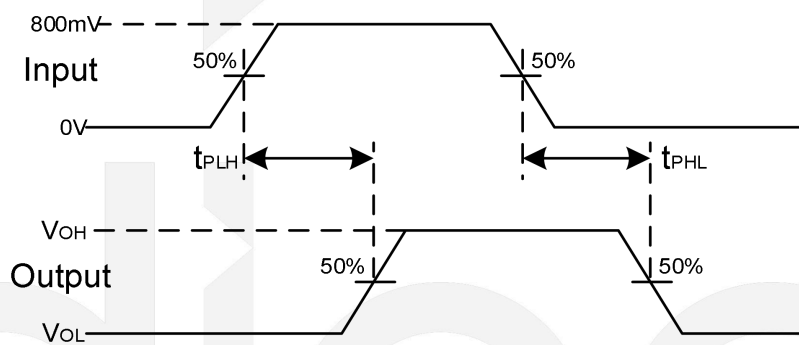


Figure 6. Propagation delay

6. Typical Characteristics

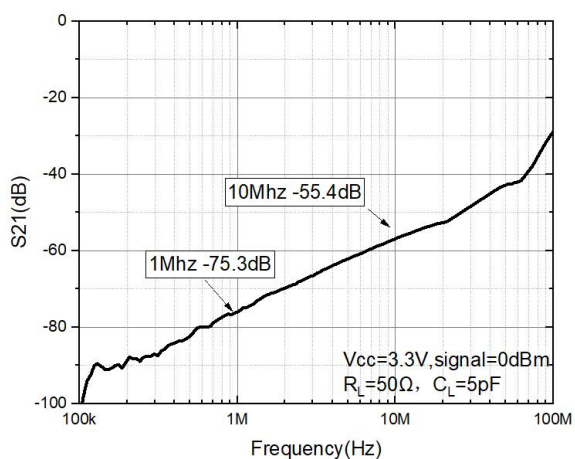


Figure 7. Crosstalk

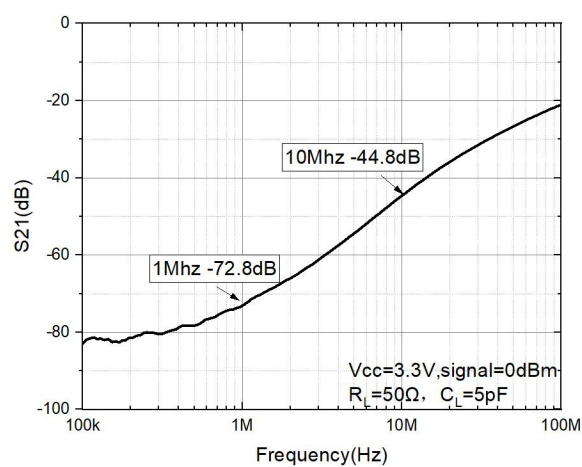
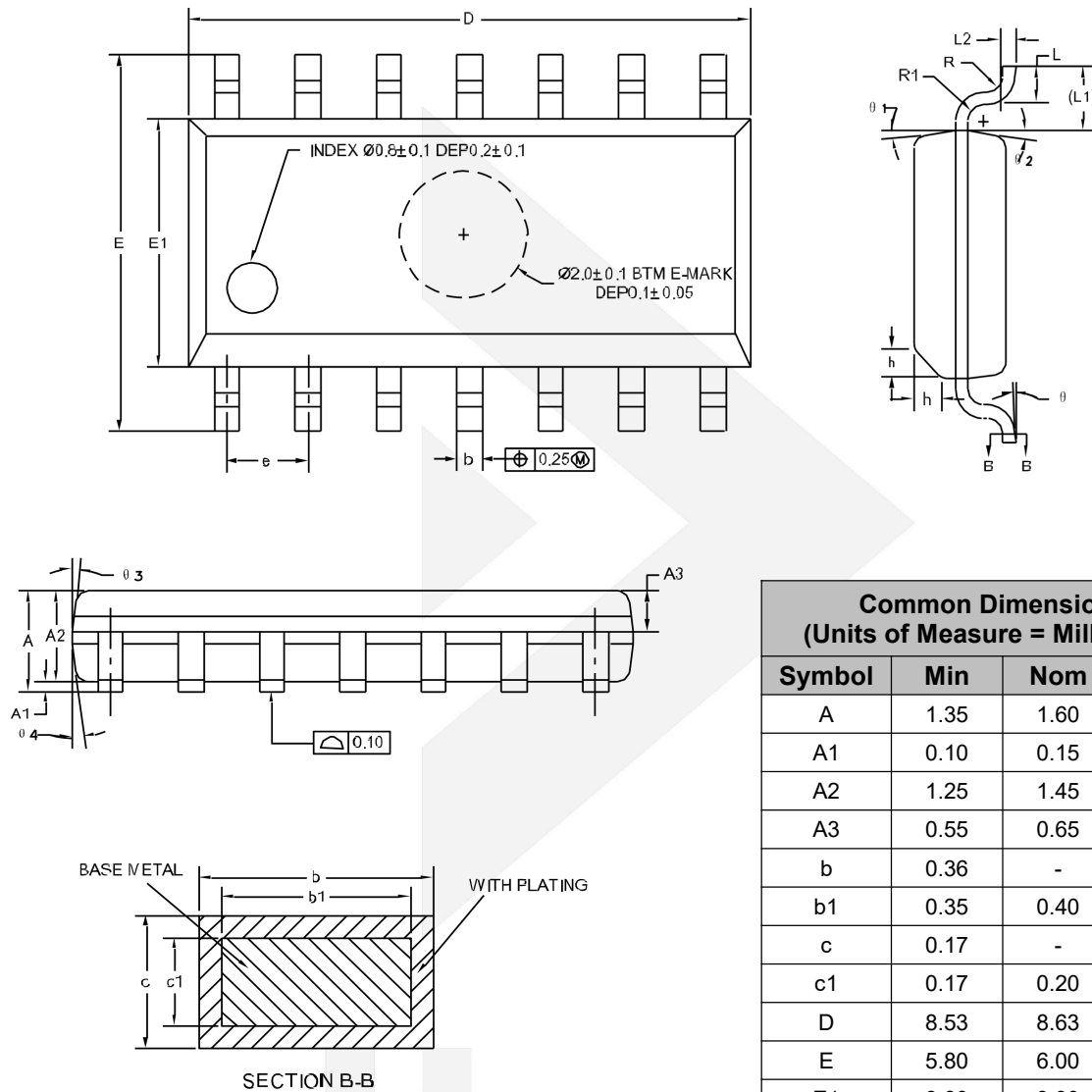


Figure 8. Off isolation

7. Physical Dimensions

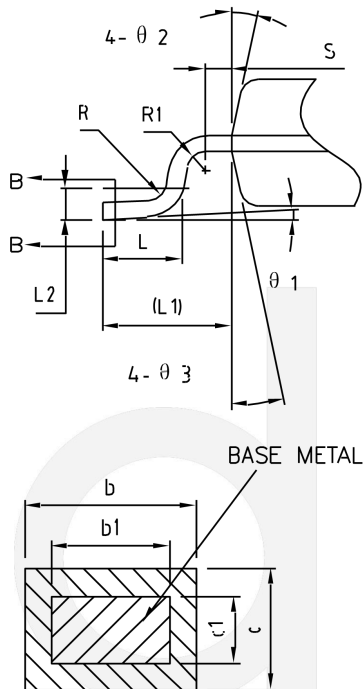
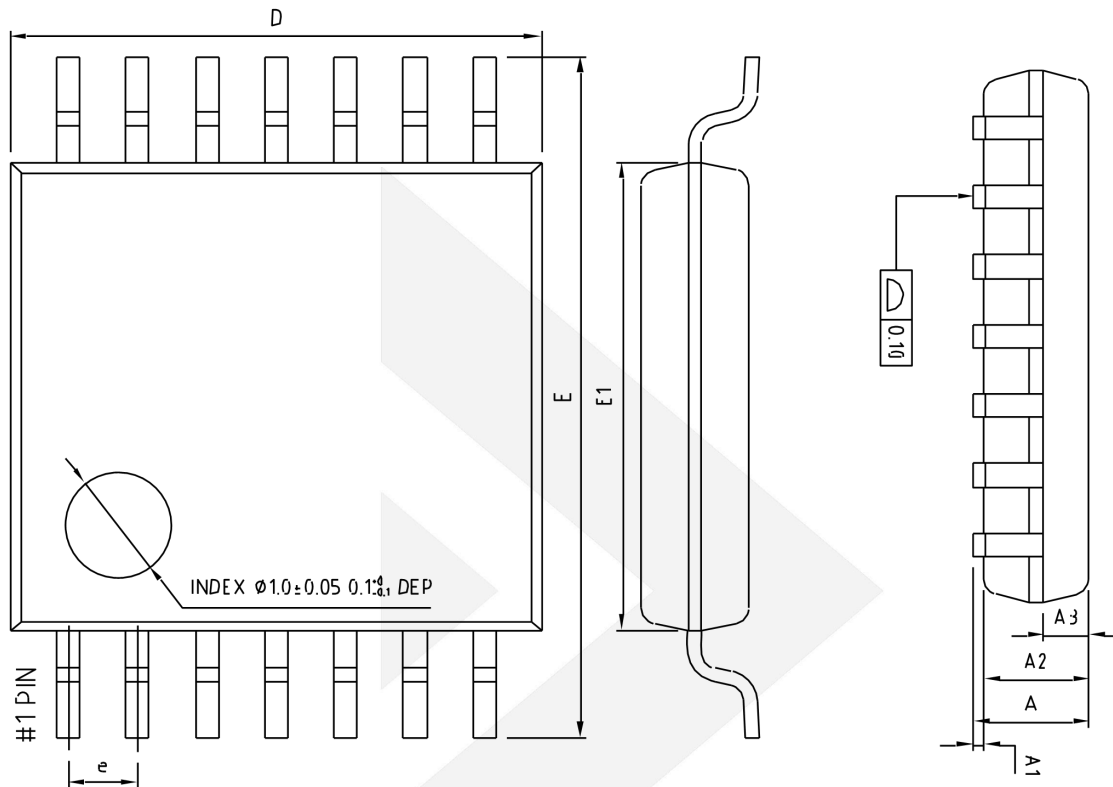
7.1. SOP-14



Common Dimensions
(Units of Measure = Millimeter)

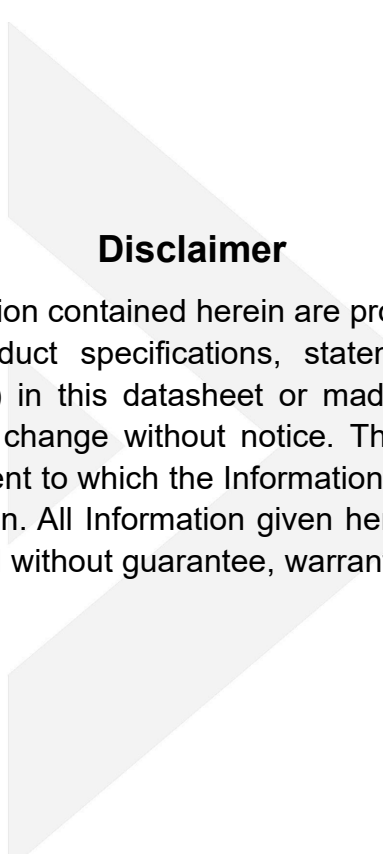
Symbol	Min	Nom	Max
A	1.35	1.60	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
A3	0.55	0.65	0.75
b	0.36	-	0.49
b1	0.35	0.40	0.45
c	0.17	-	0.25
c1	0.17	0.20	0.23
D	8.53	8.63	8.73
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25 BSC		
R	0.07	-	-
R1	0.07	-	-
h	0.30	0.40	0.50
θ	0°	-	8°
θ_1	6°	8°	10°
θ_2	6°	8°	10°
θ_3	5°	7°	9°
θ_4	5°	7°	9°

7.2. TSSOP-14



SECTION B-B

Common Dimensions (Units of Measure = Millimeter)			
Symbol	Min	Nom	Max
A	-	-	1.20
A1	0.05	-	0.15
A2	0.90	1.00	1.05
A3	0.34	0.44	0.54
b	0.20	-	0.28
b1	0.20	0.22	0.24
c	0.10	-	0.19
c1	0.10	0.13	0.15
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65 BSC		
L	0.45	0.60	0.75
L1	1.00 REF		
L2	0.25 BSC		
R	0.09	-	-
R1	0.09	-	-
S	0.20	-	-
θ1	0°	-	8°
θ2	10°	12°	14°
θ3	10°	12°	14°

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