



High Speed,Low Voltage Dual DPDT Analog Switch

1 Features

- ◆ High bandwidth: 350 MHz
- ◆ Operate from 1.65 V to 5.5 V
- ◆ Low on-state resistance: 3.5Ω @ 4.5 V(typ)
- ◆ Break-before-make switching
- ◆ Rail-to-Rail operation
- ◆ TTL/CMOS compatible
- ◆ Operation temperature range: -40°C to $+85^{\circ}\text{C}$

2 Application

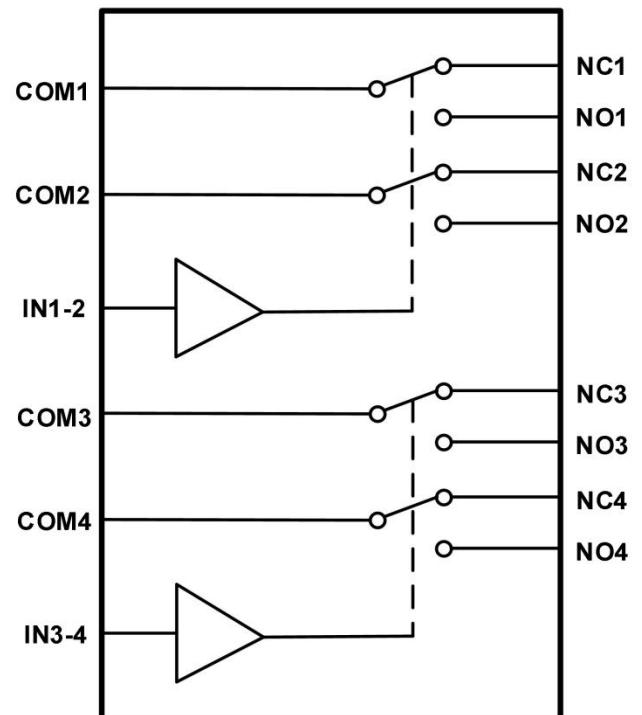
- ◆ Cell phones
- ◆ Video switching
- ◆ Portable instrumentation
- ◆ Battery-Operated equipment
- ◆ Communication systems

3 Description

The WB4599 is a high-speed, low-voltage, dual-independent double-pole double-throw (DPDT) CMOS analog switch that is designed to operate from a single +1.65V to +5.5V power supply. It features high-bandwidth (350 MHz) and low on-resistance (3.5Ω @ 4.5 V).

The WB4599 is configured as a DPDT device with two logic control inputs that control two multiplexer/demultiplexer each. The configuration can also be used as a dual differential 2-to-1 multiplexer/demultiplexer.

4 Circuit diagram





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WB4599

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5 Device Pin and Packages

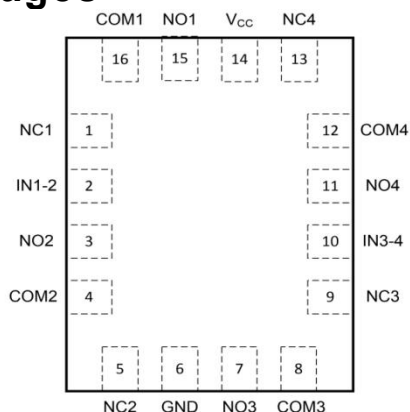


Table 5-1 Pin definition

Name	Pin	Description
NC1	1	Normal closed terminal switch 1
IN1-2	2	Select input,control switch 1 and switch 2
NO2	3	Normal open terminal switch 2
COM2	4	Common terminal switch 2
NC2	5	Normal closed terminal switch 2
GND	6	Ground
NO3	7	Normal open terminal switch 3
COM3	8	Common terminal switch 3
NC3	9	Normal closed terminal switch 3
IN3-4	10	Select input,control switch 3 and switch 4
NO4	11	Normal open terminal switch 4
COM4	12	Common terminal switch 4
NC4	13	Normal closed terminal switch 4
V _{cc}	14	Supply Voltage
NO1	15	Normal open terminal switch 1
COM1	16	Common terminal switch 1

Table 5-2 Function Table

IN1-2	Switch state
0	NC1=COM1,NC2=COM2
1	NO1=COM1,NO2=COM2
IN3-4	Switch state
0	NC3=COM3,NC4=COM4
1	NO3=COM3,NO4=COM4



6 Voltage, Temperature, ESD and Thermal Ratings

6.1 Absolute Maximum Ratings⁽¹⁾

Parameters		Min.	Max.	Unit
V _{CC}	Supply voltage range	-0.3	6.0	V
V _{IN}	Input voltage	-0.3	6.0	V
	Analog, digital voltage range ⁽²⁾	-0.3	(V _{CC})+0.3	V
	Continuous current NO, NC or COM	-100	+100	mA
I _{PEAK}	Continuous channel current	-160	+160	mA
T _J	Junction temperature under bias	-65	150	°C
T _{stg}	Storage temperature range	-65	150	°C

(1) 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.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic discharge	Human-Body Model (HBM) ⁽¹⁾	3.5K	V
		Charged-Device Model (CDM) ⁽²⁾	2K	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⁽¹⁾

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

Symbol	Parameter		Min	Max	Units
V _{CC}	Supply voltage	Operating	1.65	5.5	V
V _{CTRL}	Control Input voltage	Operating	0	V _{CC}	V
V _{SW}	Switch I/O voltage	Operating	0	V _{CC}	V
T _A	Ambient temperature		-40	85	°C

(1) All unused digital inputs of the device must be held at V_{CC} or GND to ensure proper device operation.



7 Electrical Specifications

7.1 DC Electrical Characteristics

$V_{CC}=1.65V$ to $5.5V$, FULL= $-40^{\circ}C$ to $+125^{\circ}C$. Typical values are at $T_A=+25^{\circ}C$ (unless otherwise noted)

Parameter	Symbol	Conditions	VCC	Temp	Min	Typ	Max	Units
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}				0		V_{CC}	V
On-Resistance	R_{ON}	V_{NO} or $V_{NC}=V_{CC}/2$, $I_{COM}=-100mA$	4.5V	$+25^{\circ}C$		3.5	6	Ω
			3V	$+25^{\circ}C$		7	10	
			2.3V	$+25^{\circ}C$		12	22	
			1.65V	$+25^{\circ}C$		15	27	
On-Resistance Match Between Channels	ΔR_{ON}	V_{NO} or $V_{NC}=V_{CC}/2$, $I_{COM}=-100mA$	4.5V	$+25^{\circ}C$		0.3	1	Ω
			3V	$+25^{\circ}C$		1	3	
On-Resistance Flatness	$R_{FLAT(ON)}$	$0 \leq V_{NO}$ or $V_{NC} \leq V_{CC}$, $I_{COM}=-100mA$	4.5V	$+25^{\circ}C$		1	1.5	Ω
			3V	$+25^{\circ}C$		3.5	5.5	
			2.3V	$+25^{\circ}C$		9	14	
			1.65V	$+25^{\circ}C$		12	18	
NC, NO Off Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	V_{NO} or $V_{NC}=1V$, $4.5V, V_{COM}=4.5V, 1V$	5.5 V	Full			1	μA
NC, NO, COM On Leakage Current	$I_{NC(ON)}, I_{NO(ON)}, I_{COM(ON)}$	$V_{COM}=1V, 4.5V, V_{NO}$ or $V_{NC}=1V, 4.5V$, or floating	5.5 V	Full			1	μA
Input High Voltage	V_{INH}		4.5V	Full	1.8			V
			3V	Full	1.5			V
Input Low Voltage	V_{INL}		4.5V	Full			0.5	V
			3V	Full			0.4	V
Input Leakage Current	I_{IN}	$V_S=V_{CC}$ or 0	5.5 V	Full			1	μA
Power Supply Current	I_{CC}	$V_S=GND$ or V_{CC}	5.5 V	Full			1	μA

**7.2 Switch And AC Characteristics**

$V_{CC}=1.65V$ to $5.5V$, FULL= $-40^{\circ}C$ to $+125^{\circ}C$. Typical values are at $T_A=+25^{\circ}C$ (unless otherwise noted)

Parameter	Symbol	Conditions	VCC	Temp	Min	Typ	Max	Units
Turn-On Time	t_{ON}	$V_{COM}=V_{CC}$, $R_L=300\Omega$, $C_L=35pF$	5V 3.3V	+25°C		10 14		ns
Turn-Off Time	t_{OFF}	$V_{COM}=V_{CC}$, $R_L=300\Omega$, $C_L=35pF$	5V 3.3V	+25°C		20 22		ns
Break-Before - Make Time Delay	t_{BBM}	$V_{NO1}=V_{NC1}=V_{NO2}=V_{NC2}=3V$ $R_L=300\Omega$, $C_L=35pF$	5V 3.3V	+25°C		12 20		ns
Off Isolation	O_{ISO}	$R_L=50\Omega$, Switch OFF	3.3V	+25°C		-52		dB
		$f=10MHz$ $f=1MHz$				-73		
Crosstalk Isolation	X_{TALK}	$R_L=50\Omega$, Switch OFF, $f=10MHz$	3.3V	+25°C		-89		dB
-3dB Bandwidth	BW	$R_L=50\Omega$, Switch ON	3.3V	+25°C		350		MHz
Charge Injection	Q	$C_L=1nF$, $V_{GEN}=0V$, $R_{GEN}=0\Omega$	5V 3.3V	+25°C		6 4		pC
NC,NO Off Capacitance	$C_{NC(OFF)}$, $C_{NO(OFF)}$	$f=1MHz$	3.3V	+25°C		15		pF
NC,NO,COM On Capacitance	$C_{NC(ON)}$, $C_{NO(ON)}$, $C_{COM(ON)}$	$f=1MHz$	3.3V	+25°C		8		pF



8 Typical Characteristics

$V_{CC}=1.65V$ or $5.5V$, FULL= $-40^{\circ}C$ to $+125^{\circ}C$. Typical values are at $T_A=+25^{\circ}C$ (unless otherwise noted)

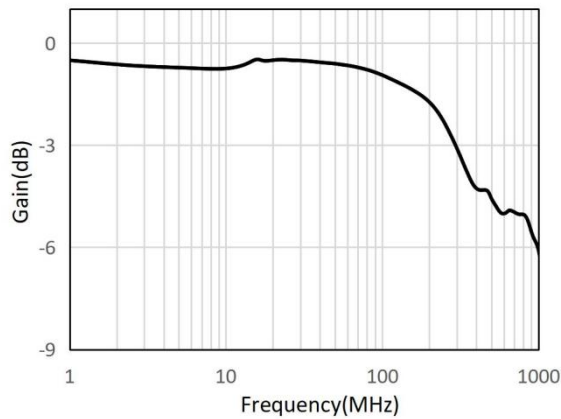


Fig.8-1. Bandwidth vs Frequency at 3.3V V_{CC}

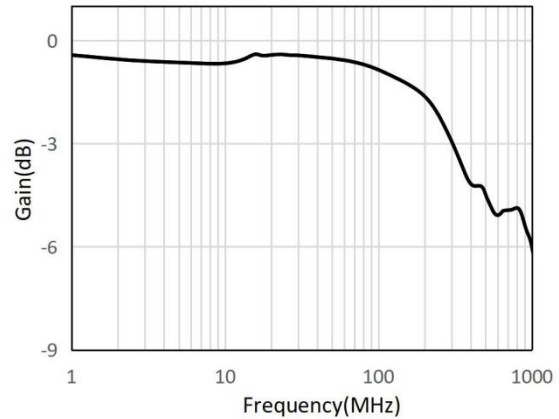


Fig.8-2. Bandwidth vs Frequency at 5V V_{CC}

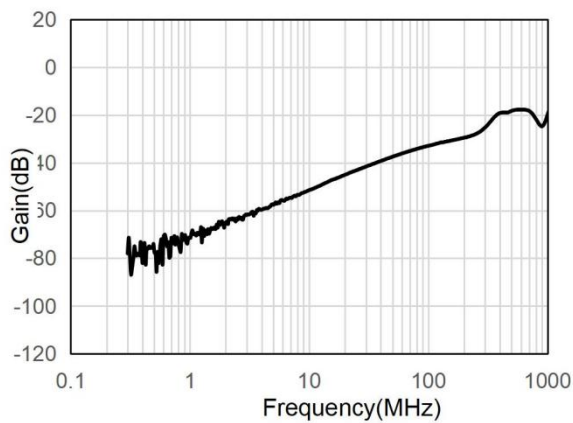


Fig.8-3. Off Isolation vs Frequency at 3.3V V_{CC}

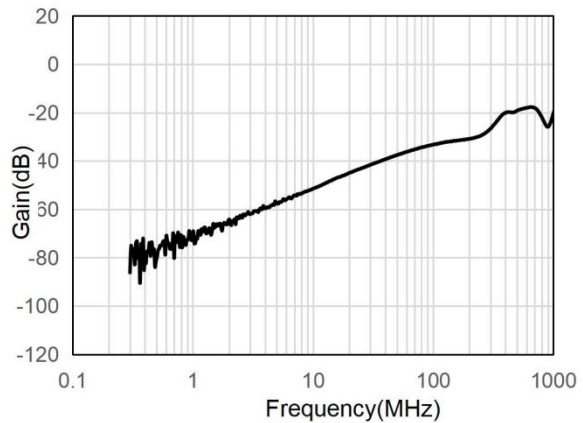


Fig.8-4. Off Isolation vs Frequency at 5V V_{CC}



9 Measurement Information

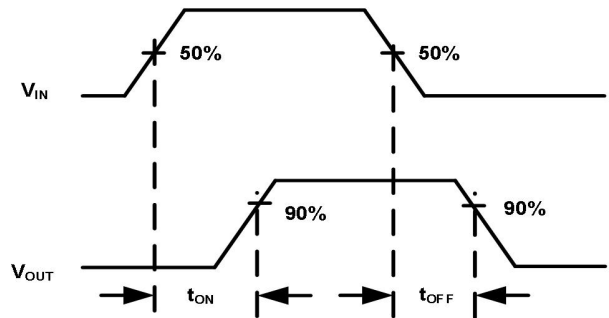
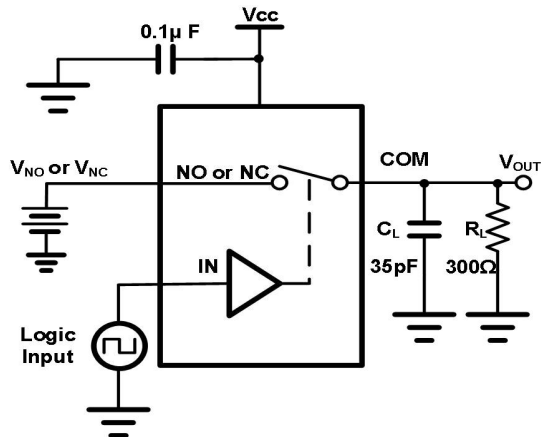


Fig.9-1. Switching Time

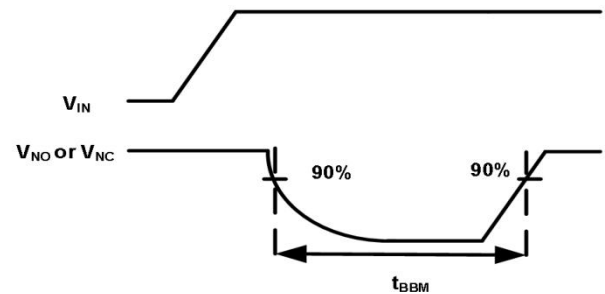
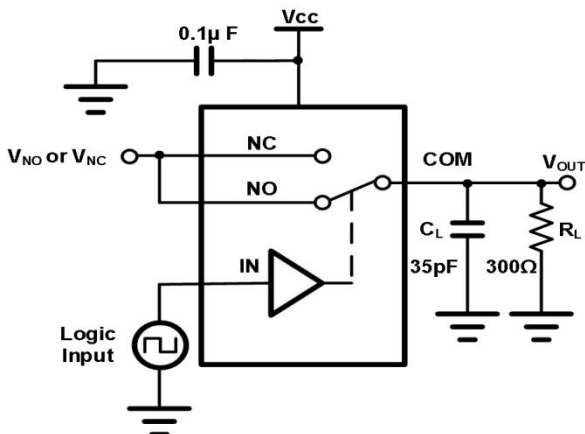


Fig.9-2. Break-Before-Make Interval

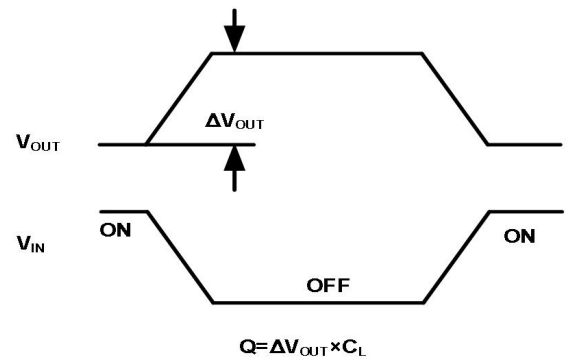
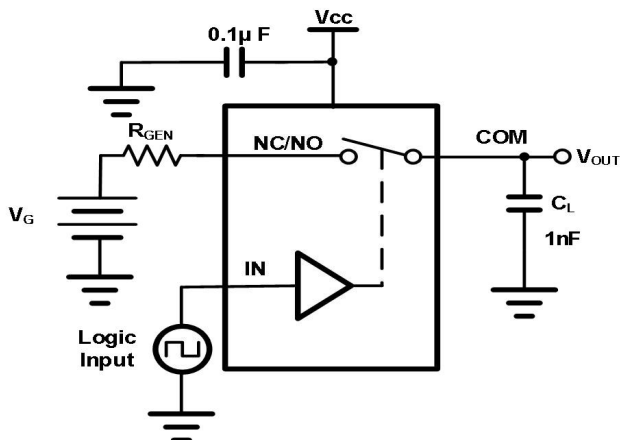


Fig.9-3. Charge Injection



9 Measurement Information(Continued)

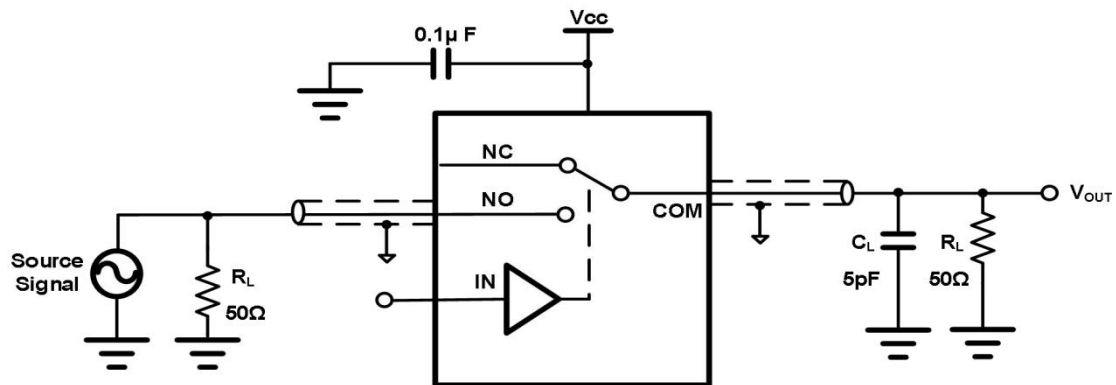


Fig.9-4. Off Isolation

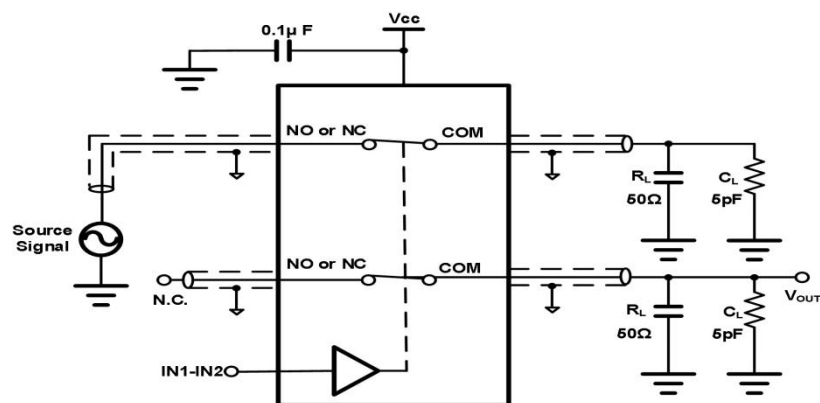


Fig.9-5. Channel To Channel Crosstalk

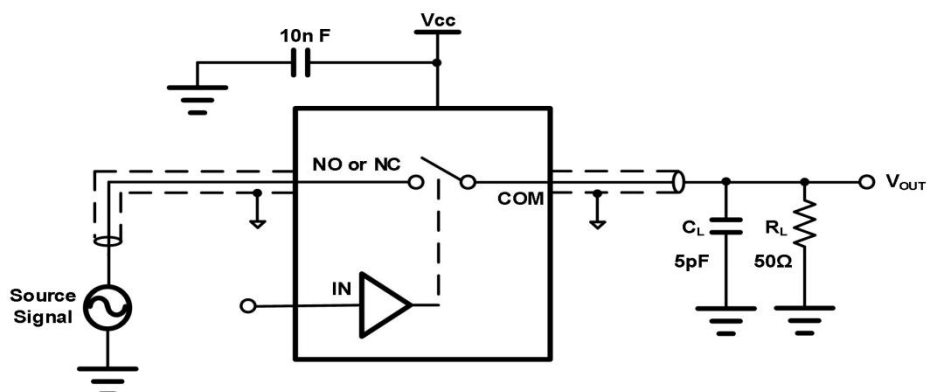


Fig.9-6. -3dB Bandwidth



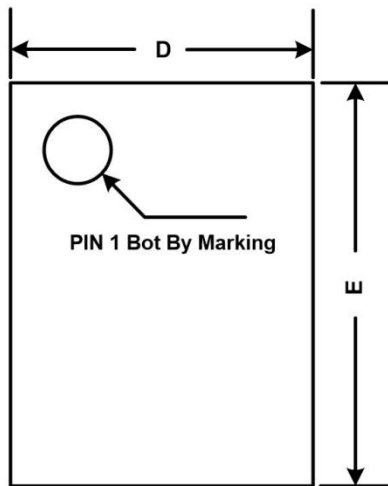
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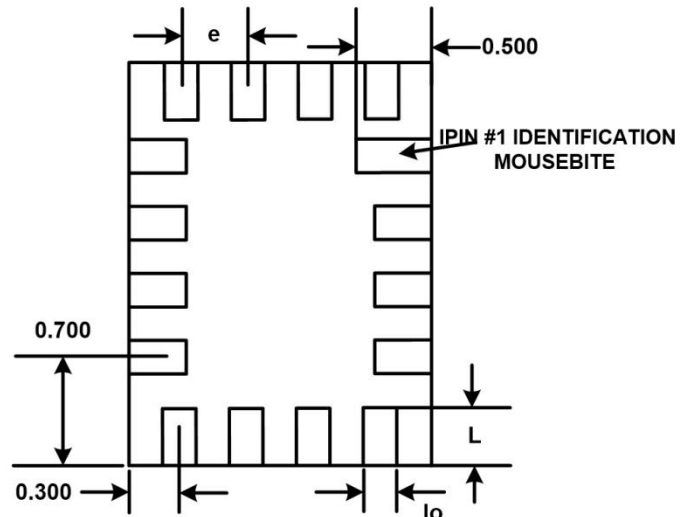
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10 Package Outline Dimension

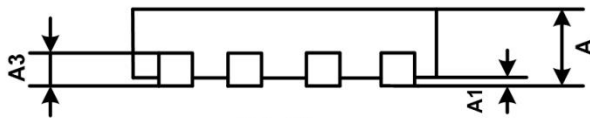
UTQFN1.8×2.6-16L



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	>0.50	0.55	0.60	>0.19	0.21	0.23
A1	0.00	-	0.05	0.00	-	0.02
A3	0.15REF			0.06REF		
D	1.75	1.80	1.85	0.68	0.70	0.72
E	2.55	2.60	2.65	0.99	1.01	1.03
L	0.30	0.40	0.50	0.12	0.16	0.19
lo	0.15	0.20	0.25	0.06	0.08	0.10
e	0.40BSC			0.16BSC		



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Notes For Attention

- When making the purchase, please ensure you recognize the company's trademark. If you have any questions, please contact the company's headquarters.
- When designing the circuit, please do not exceed the absolute maximum ratings of the components; otherwise, it will affect the reliability of the entire machine.
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