

# BCT4330

## High Speed Low Voltage Quad SPDT Analog Switch

### GENERAL DESCRIPTION

The BCT4330 is a high-speed, low-voltage, quad, bidirectional, single-pole double-throw (SPDT) COMS analog switch that is designed to operate from a single +1.8V to +5.5V power supply. It features high-bandwidth (500MHz) and low on-resistance (5Ω TYP).

The BCT4330 is configured as a quad single-pole double-throw (SPDT) device with one logic control inputs that control two multiplexer/demultiplexer each. The configuration can also be used as a dual differential 2-to-1 multiplexer/demultiplexer.

BCT4330 is available in SOP16 packages, TSSOP16 packages, SSOP16 packages, QFN3X3-16L packages and QFN3X3-20L packages.


### FEATURES

- Low Voltage Operation: 1.8V to 5.5V
- On-Resistance: 5Ω (TYP)
- -3dB Bandwidth: 500MHz
- Rail-to-Rail Input and Output Operation
- High Off-Isolation: -55dB at 10MHz
- Low Crosstalk: -60dB at 10MHz
- Low Power Consumption(<0.01uW)
- -40°C to +85°C Operating Temperature Range

### APPLICATIONS

- Communication Systems
- Portable Instrumentation
- Audio and Video Switching
- PCMCIA Cards
- Computer Peripherals
- Modems
- PDAs

### ORDERING INFORMATION

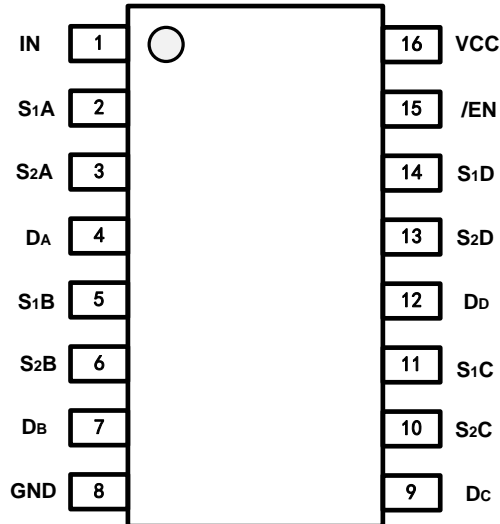
Order Number	Package Type	Temperature Range	Marking	QTY/Reel
BCT4330EOE-TR	SOP16	-40°C to +85°C	 4330 XXXXXX	3000
BCT4330ECE-TU	TSSOP16			---
BCT4330ECE-TR				3000
BCT4330ESE-TU	SSOP16			---
BCT4330EGE-TR	QFN3X3-16L			3000
BCT4330EGP-TR	QFN3X3-20L			6000

Mark Note:

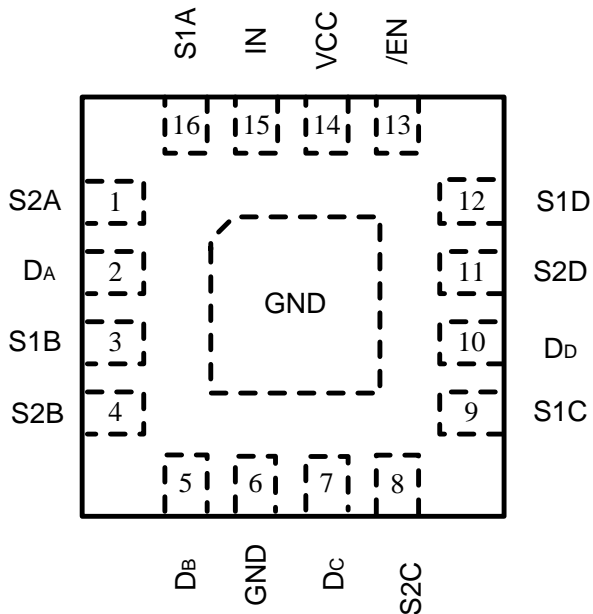
"XXXXXX" in Marking will be appeared as the batch code.

### PIN CONFIGURATION (Top View)

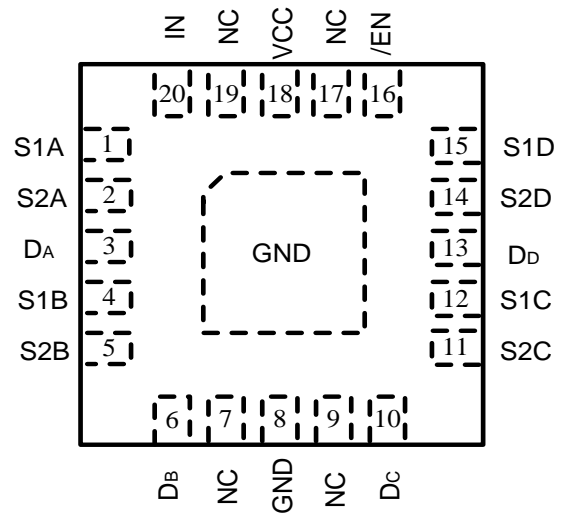
SOP16 / TSSOP16 / SSOP16



QFN3X3-16L



QFN3X3-20L



### PIN DESCRIPTIONS

Pin			Name	Function
SOP16 TSSOP16 SSOP16	QFN3X3-16L	QFN3X3-20L		
1	15	20	IN	Select Input
2	16	1	S <sub>1</sub> A	Normally Closed Terminal Switch 1
3	1	2	S <sub>2</sub> A	Normally Open Terminal Switch 1
4	2	3	D <sub>A</sub>	Common Terminal Switch 1
5	3	4	S <sub>1</sub> B	Normally Closed Terminal Switch 2
6	4	5	S <sub>2</sub> B	Normally Open Terminal Switch 2
7	5	6	D <sub>B</sub>	Common Terminal Switch 2
8	6	8	GND	Ground
9	7	10	D <sub>C</sub>	Common Terminal Switch 3
10	8	11	S <sub>2</sub> C	Normally Open Terminal Switch 3
11	9	12	S <sub>1</sub> C	Normally Closed Terminal Switch 3
12	10	13	D <sub>D</sub>	Common Terminal Switch 4
13	11	14	S <sub>2</sub> D	Normally Open Terminal Switch 3
14	12	15	S <sub>1</sub> D	Normally Closed Terminal Switch 4
15	13	16	/EN	Switch-Enable Input
16	14	18	VCC	Positive Power Supply
----	---	7,9,17,19	NC	Not Connect

### LOGIC DIAGRAM

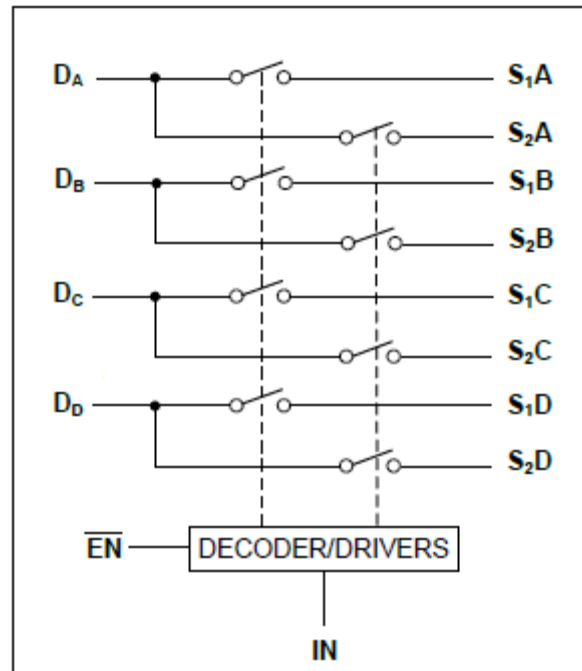


Figure1. Block Diagram

### TRUTH TABLE

$\overline{EN}$	IN	SWITCH STATE
0	0	$D_A = S_1A$ , $D_B = S_1B$ , $D_C = S_1C$ , $D_D = S_1D$
0	1	$D_A = S_2A$ , $D_B = S_2B$ , $D_C = S_2C$ , $D_D = S_2D$
1	X	Disabled



# BCT4330

## High Speed Low Voltage Quad SPDT Analog Switch

### ABSOLUTE MAXIMUM RATINGS

VCC, IN, /EN, to GND.....-0.3V to +6.0V  
All Other Pins to GND (Note 1).....-0.3V to (VCC + 0.3V)  
Continuous Current (NOx, NCx, COMx) .....  $\pm 100\text{mA}$   
Operating Temperature Range.....-40°C to +85°C  
Storage Temperature Range.....-65°C to +150°C  
Junction Temperature .....+150°C  
Lead Temperature (soldering, 10s) .....+260°C  
Package Thermal Resistance @ TA = +25°C  
SOP16  $\theta_{JA}$ .....82°C/W  
TSSOP16  $\theta_{JA}$ .....100°C/W  
SSOP16  $\theta_{JA}$ .....103°C/W  
QFN3X3-16L  $\theta_{JA}$ .....58°C/W  
QFN3X3-20L  $\theta_{JA}$ .....50°C/W

### ESD Protection

Human Body Model .....  $\pm 4000\text{V}$

### CAUTION

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. Broadchip recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

Broadchip reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact Broadchip sales office to get the latest datasheet.

### RECOMMENDED OPERATING CONDITIONS

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications.

Symbol	Parameter	Min.	Max.	Unit
V <sub>CC</sub>	Supply Voltage	1.8	5.5	V
V <sub>CTRL</sub>	Control Input Voltage(IN) <sup>(2)</sup>	0	VCC	V
V <sub>SW</sub>	Switch I/O Voltage	0	VCC	V
T <sub>A</sub>	Operating Temperature	-40	+85	°C

#### Notes:

1. The input and output negative ratings maybe exceed if the input and output diode current ratings are observed.
2. The control input must be held HIGH or LOW; it must not float.

### DC ELECTRICAL CHARACTERISTICS

Unless otherwise noted. TA = +25°C. (Note 1)

PARAMETER	SYM	CONDITIONS	V <sub>CC</sub> (V)	MIN	TYP	MAX	UNITS
Supply Voltage	V <sub>CC</sub>			1.8		5.5	V
Quiescent Supply Current	I <sub>CC</sub>	/EN=0V, IN=0V or V <sub>CC</sub> , I <sub>OUT</sub> =0	5.5			1	uA
Switch On Resistance	R <sub>ON</sub>	0V ≤ V <sub>SW</sub> ≤ V <sub>CC</sub> , I <sub>SW</sub> =10mA,	4.5		5.0	8.0	Ω
			2.7		12	24	Ω
On Resistance Matching Between Channels	ΔR <sub>ON</sub>	V <sub>SW</sub> =0V, I <sub>SW</sub> =10mA,	4.5		0.3	1.0	Ω
			2.7		1.0	3.0	Ω
Flatness for On Resistance	ΔR <sub>ON</sub>	0V ≤ V <sub>SW</sub> ≤ V <sub>CC</sub> , I <sub>SW</sub> =10mA,	4.5		2.0	3.0	Ω
			2.7		12	20	Ω
Off leakage Current of Open Data Paths (NCx and NOx Pin)	I <sub>OFF</sub>	0V ≤ V <sub>SW</sub> ≤ V <sub>CC</sub>	1.8 to 5.5	-1		1	uA
On leakage Current of Close Data Paths (NCx, NOx and COMx Pin)	I <sub>ON</sub>	0V ≤ V <sub>SW</sub> ≤ V <sub>CC</sub>	1.8 to 5.5	-1		1	uA
Input Voltage High (IN, /EN)	V <sub>IH</sub>		1.8 to 5.5	1.5			V
Input Voltage Low (IN, /EN)	V <sub>IL</sub>		1.8 to 5.5			0.4	V

### AC ELECTRICAL CHARACTERISTICS

Unless otherwise noted. TA = +25°C. (Note 1)

PARAMETER	SYM	CONDITIONS	V <sub>CC</sub> (V)	MIN	TYP	MAX	UNITS
Turn-On Time	t <sub>ON</sub>	R <sub>L</sub> =300Ω, C <sub>L</sub> =35pF, V <sub>SW</sub> =0 to 1.5 V	3.0		35		ns
Turn-Off Time	t <sub>OFF</sub>	R <sub>L</sub> =300Ω, C <sub>L</sub> =35pF, V <sub>SW</sub> =0 to 1.5 V	3.0		45		ns
Break-Before-Make Time	t <sub>BBM</sub>	V <sub>NC</sub> = V <sub>NC</sub> =1.5 V , R <sub>L</sub> =300Ω, C <sub>L</sub> =35pF	3.0		6		ns
Charge Injection	Q	V <sub>G</sub> = 0V, R <sub>G</sub> = 0Ω, C <sub>L</sub> = 1nF	3.0		5		pC
-3db Bandwidth <sup>(2)</sup>	BW	V <sub>S</sub> =0dBm, R <sub>L</sub> =50Ω, C <sub>L</sub> =5pF	3.0		500		MHz
Off Isolation <sup>(2)</sup>	O <sub>IRR</sub>	V <sub>S</sub> =0dBm, f=10MHz, R <sub>L</sub> =50Ω	3.0		-55		dB
Crosstalk <sup>(2)</sup>	X <sub>TALK</sub>	V <sub>S</sub> =0dBm, f=10MHz, R <sub>L</sub> =50Ω	3.0		-60		dB
Output On Capacitance <sup>(2)</sup>	C <sub>ON</sub>	/OE=0V, f=1MHz	3.0		10		pF
Output Off Capacitance <sup>(2)</sup>	C <sub>OFF</sub>	/OE=3.3V, f=1MHz	3.0		6		pF

Note 1: Devices are 100% tested at TA = +25°C. Limits across the full temperature range are guaranteed by design and correlation.

Note 2: Guaranteed by characterization.

### TEST CIRCUITS

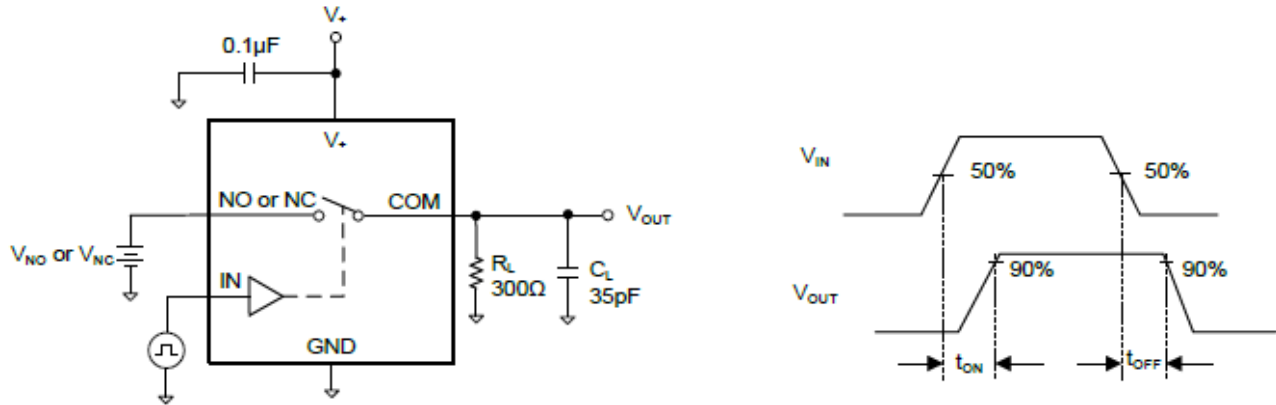


Figure 2. Switching Time

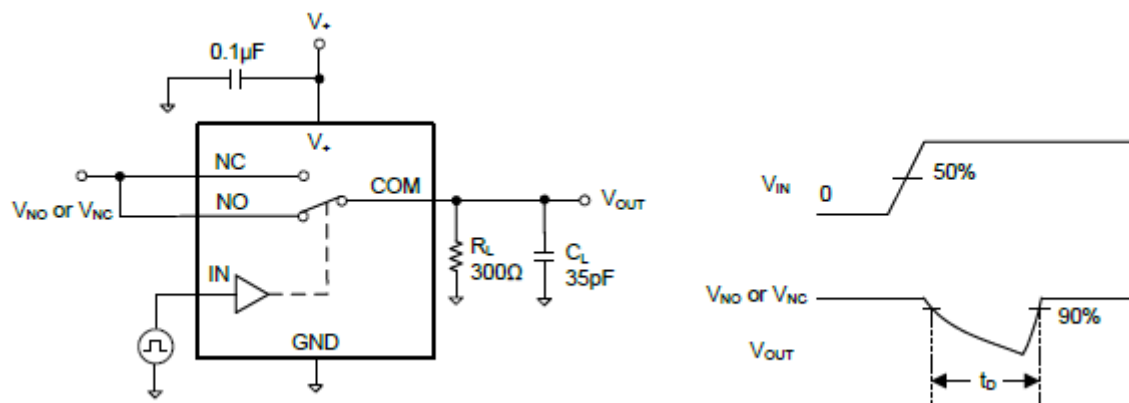


Figure 3. Break-Before-Make Interval

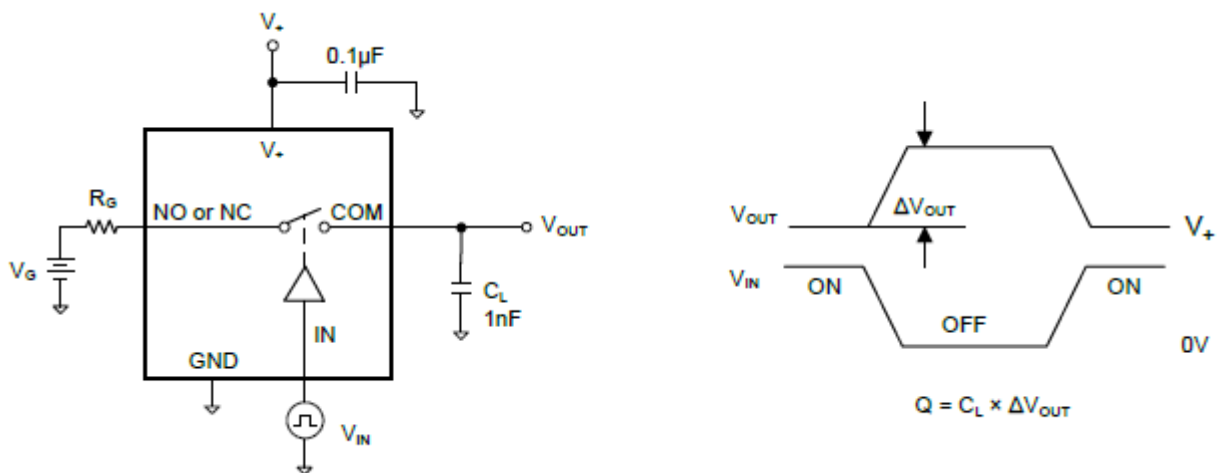


Figure 4. Charge Injection



### TEST CIRCUITS (Continued)

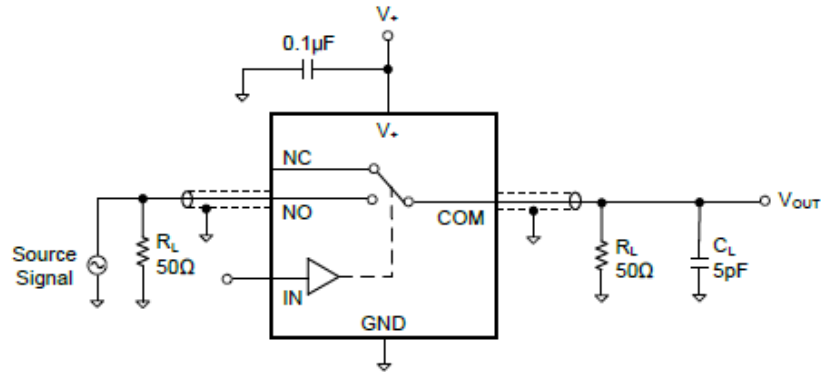


Figure 5. Off Isolation

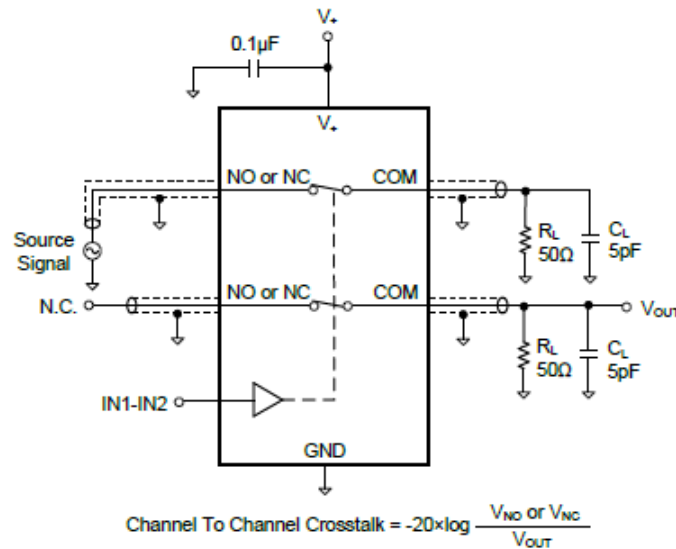


Figure 6. Channel-to-Channel Crosstalk

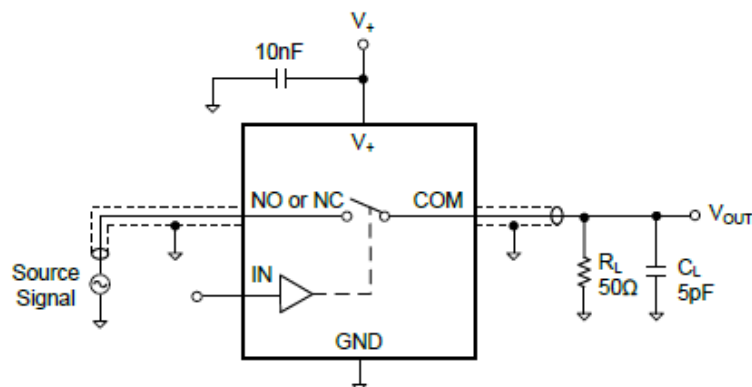
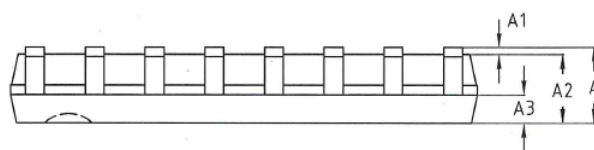
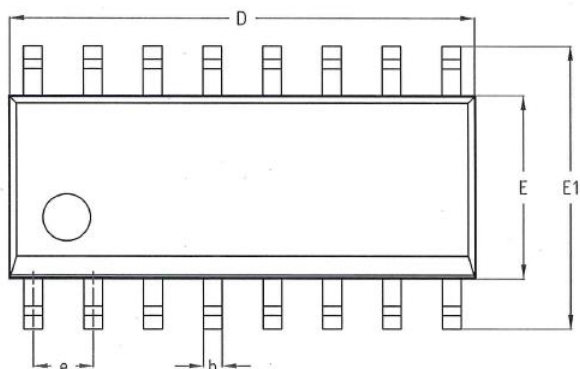


Figure 7. -3dB Bandwidth

### PACKAGE OUTLINE DIMENSIONS

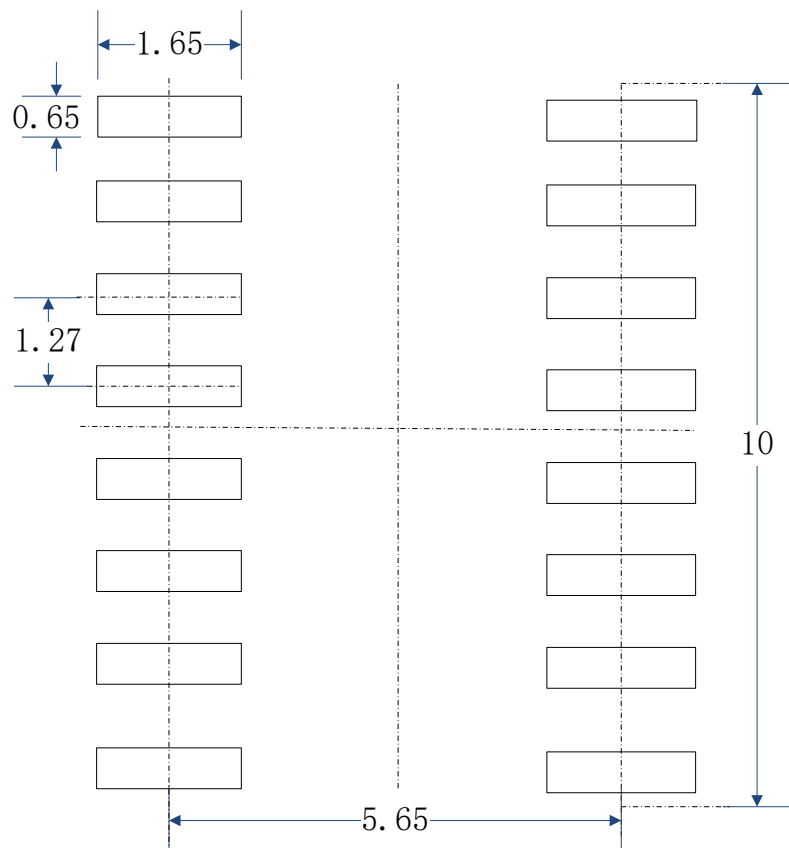
SOP16



机械尺寸/mm Dimensions			
字符 SYMBOL	最小值 MIN	典型值 NOMINAL	最大值 MAX
A	—	—	1.75
A1	0.10	—	0.25
A2	1.35	1.45	1.55
A3	0.60	0.65	0.70
b	0.35	—	0.50
c	0.19	—	0.25
D	9.80	9.90	10.00
E	3.80	3.90	4.00
E1	5.80	6.00	6.20
e	1.27 BSC		
h	0.30	—	0.50
L	0.40	—	0.80
θ	0°	—	8°

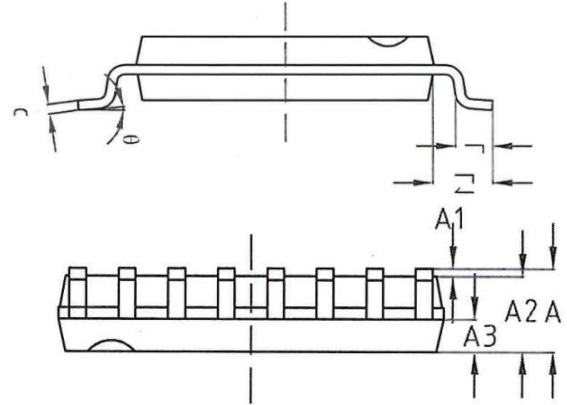
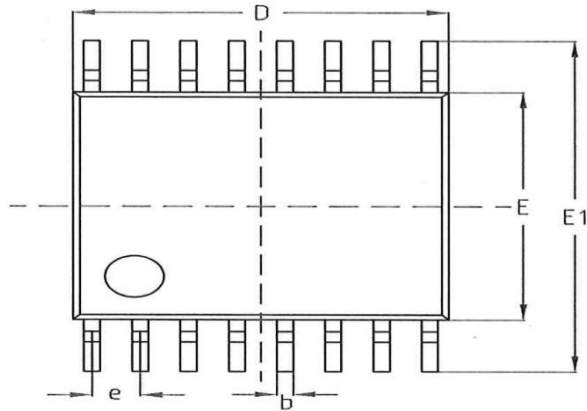
## PCB Layout Pattern

SOP16



### PACKAGE OUTLINE DIMENSIONS

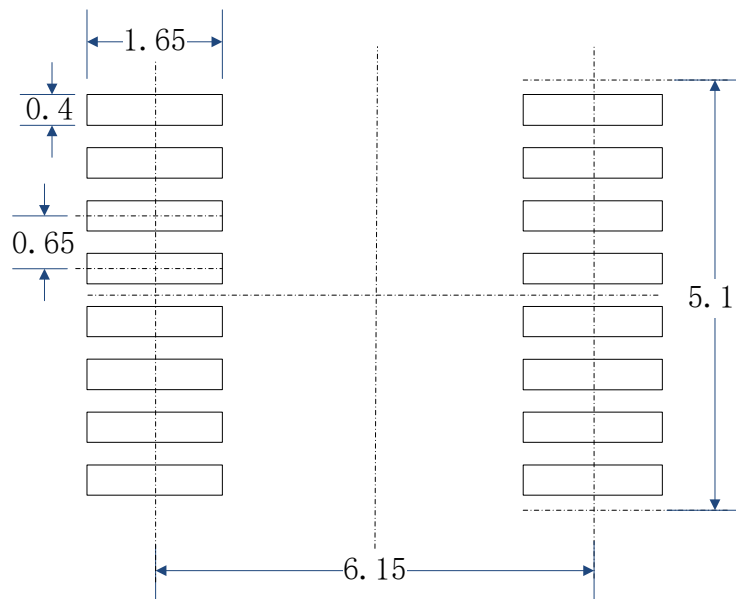
TSSOP16



机械尺寸/mm Dimensions			
字符 SYMBOL	最小值 MIN	典型值 NOMINAL	最大值 MAX
A	-	-	1.20
A1	0.05	-	0.15
A2	0.90	1.00	1.05
A3	0.39	0.44	0.49
b	0.20	-	0.28
c	0.13	-	0.17
D	4.90	5.00	5.10
E	4.30	4.40	4.50
E1	6.20	6.40	6.60
e	0.65 BSC		
L1	1.00REF		
L	0.45	0.60	0.75
θ	0°	-	8°

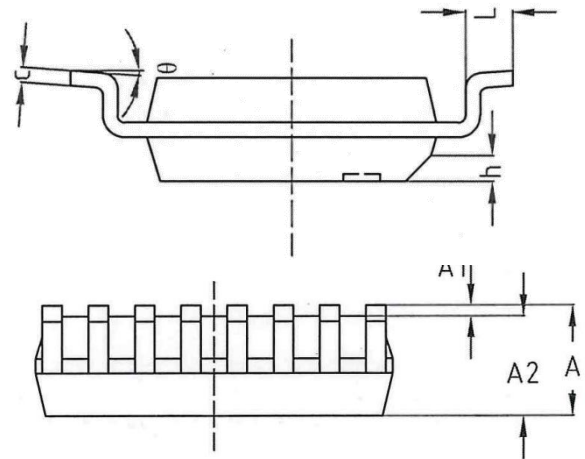
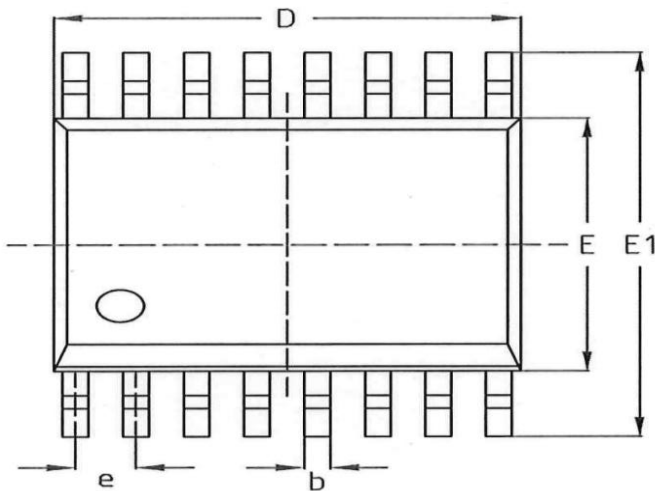
## PCB Layout Pattern

TSSOP16



### PACKAGE OUTLINE DIMENSIONS

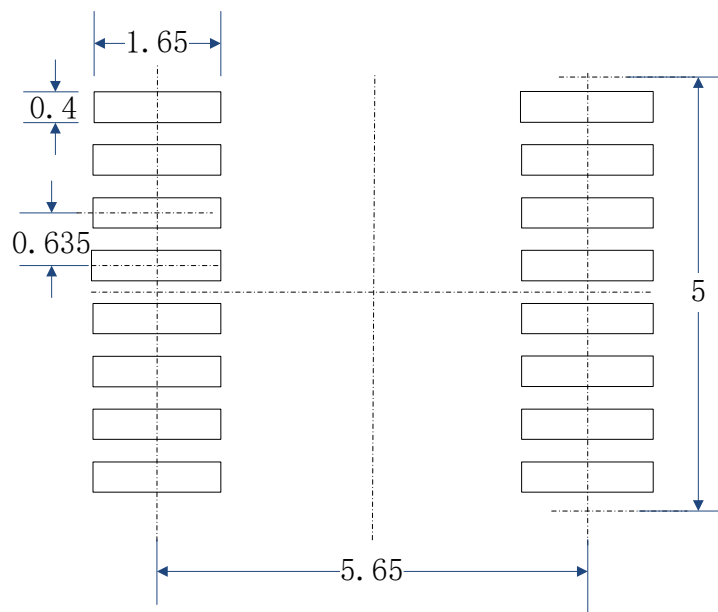
SSOP16



机械尺寸/mm Dimensions			
字符 SYMBOL	最小值 MIN	典型值 NOMINAL	最大值 MAX
A	—	—	1.75
A1	0.10	0.15	0.25
A2	1.35	1.45	1.55
b	0.23	—	0.31
c	0.19	—	0.25
D	4.80	4.90	5.00
E	3.80	3.90	4.00
E1	5.80	6.00	6.20
e	0.635 BSC		
h	0.30	—	0.50
L	0.50	—	0.80
θ	0°	—	8°

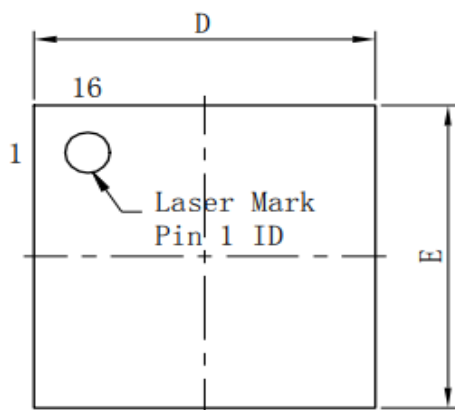
## PCB Layout Pattern

SSOP16

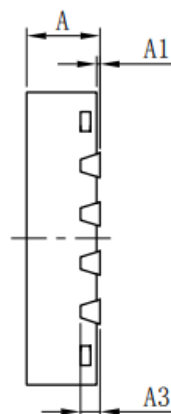


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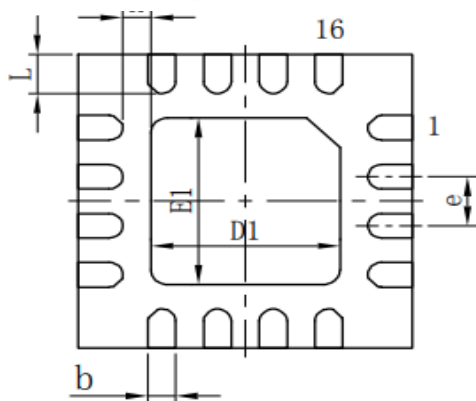
QFN3X3-16L



Top View



Side View



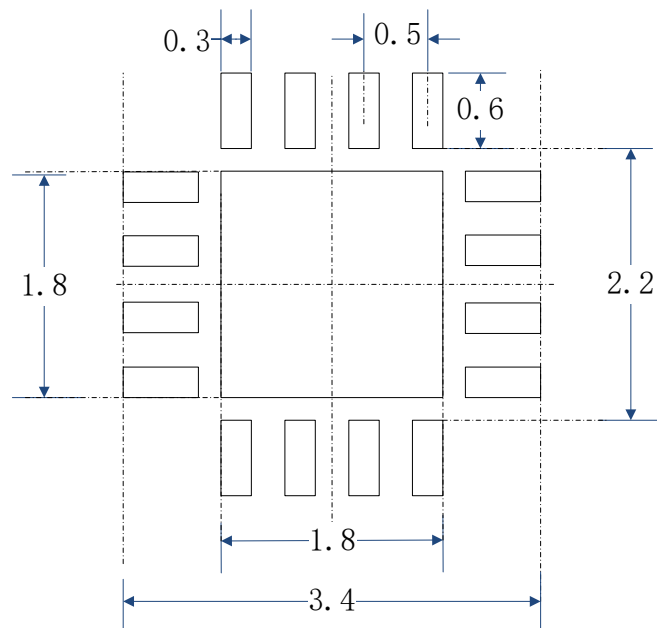
Bottom View

标注	尺寸	最小	标准	最大	标注	尺寸	最小	标准	最大
A		0.70	0.75	0.80	D1		1.60	1.70	1.80
A1		0.00	—	0.05	E1		1.60	1.70	1.80
A3		0.203REF			e		0.50TYP		
b		0.20	0.25	0.30	K		0.20	—	—
D		2.90	3.00	3.10	L		0.30	0.40	0.50
E		2.90	3.00	3.10					



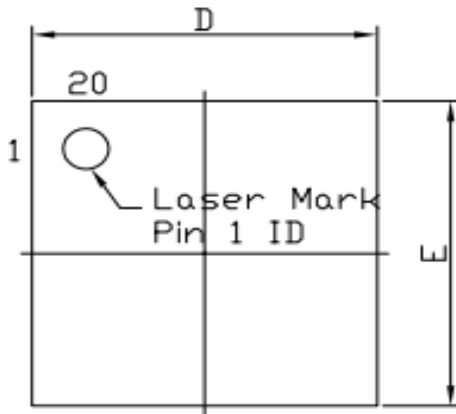
## PCB Layout Pattern

QFN3X3-16L

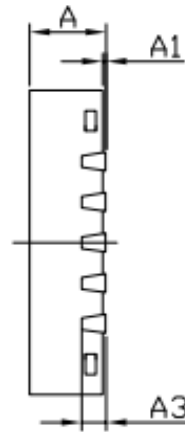


### PACKAGE OUTLINE DIMENSIONS

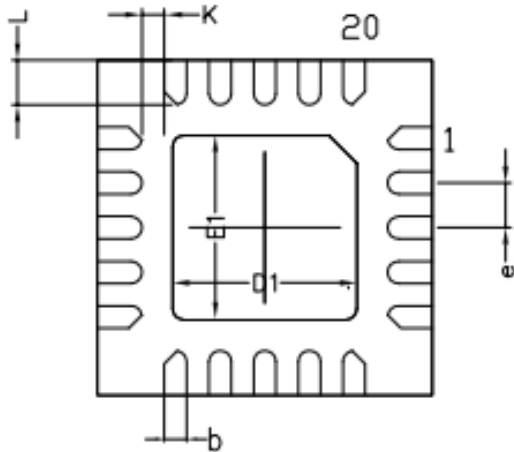
QFN3X3-20L



Top View



Side View



bottom View

标注	尺寸	最小	标准	最大	标注	尺寸	最小	标准	最大
A		0.70	0.75	0.80	D1		1.55	1.65	1.75
A1		0.00	—	0.05	E1		1.55	1.65	1.75
A3		0.203REF			e		0.40TYP		
b		0.15	—	0.25	K		0.20	—	—
D		2.90	3.00	3.10	L		0.30	0.40	0.50
E		2.90	3.00	3.10					



QFN3X3-20L

