用于开漏和推挽应用的4位双向电压电平转换器

UM3204H *CSP12 1.9×1.4*
UM3204Q *QFN14 3.5×3.5*
UM3204QS *QFN14 3.5×3.5*
UM3204UE *TSSOP14*
UM3204QT *QFN12 1.7×2.0*
UM3204QB *QFN12 2.0×2.0*
UM3204QV *QFN12 1.8×1.8*

描述

UM3204 是一款带 ESD 保护的 4 通道电平转换器，提供允许数据在多压系统中传输所需的电平转换。外部应用电压 V_{CCB} 和 V_{CCA} 用来在器件任一端侧设置逻辑电平。器件在 V_{CCA} 端侧的低压逻辑信号在 V_{CCB} 端侧转为高压逻辑信号，反之亦然。UM3204 为双向电平转换器，利用基于传输门的设计来允许任意单根数据线上的双向(V_{CCA}↔V_{CCB})数据传输。UM3204 的 V_{CCA} 侧端口电压范围为+1.65V 至+3.6V; V_{CCB} 侧端口电压范围为+2.3V 至+5.5V，此系列的芯片理想用于低压 ASIC/PLD 与较高压系统间的数据传输。

当输出使能 (OE) 输入为低电平时，UM3204 进入三态输出模式，以减小供电电流。UM3204 旨在由 V_{CCA} 为 OE 输入电路供电。芯片在 V_{CCB} 侧具有±5kV ESD 保护，为外部信号切换应用场合提供更强的保护。

UM3204 为 4 通道电平转换器 ，采用 CSP12 1.9×1.4 封装、QFN14 3.5×3.5 封装、TSSOP14 封装、QFN12 1.7×2.0 封装、QFN12 2.0×2.0 封装和 QFN12 1.8×1.8 封装。

应用

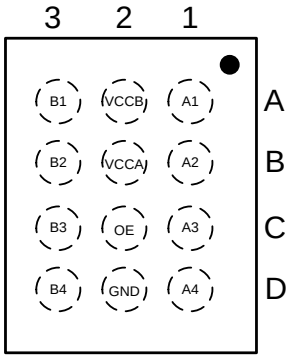
- SPI, MICROWIRE和I^2C电平转换
- 低电压ASIC电平转换
- 智能读卡器
- 手机卡
- 便携式POS系统
- 便携式通信设备
- 低成本串行接口
- 蜂窝电话
- GPS
- 电信设备

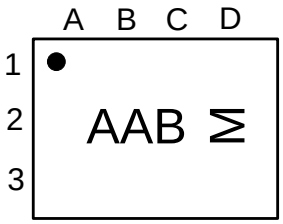
特性

- 最大数据速率：
  24Mbps(推挽)
  2Mbps(开漏)
- 双向电平转换
- A端口输入电压范围为1.65V至3.6V
  B端口输入电压范围为2.3V至5.5V
  (V_{CCA}≤V_{CCB})
- B端口提供±5kV ESD保护
- 无需电源排序，V_{CCA}或V_{CCB}均可优先斜升
- 采用CSP12、QFN14、TSSOP14和QFN12封装

Pin Configurations **Top View**

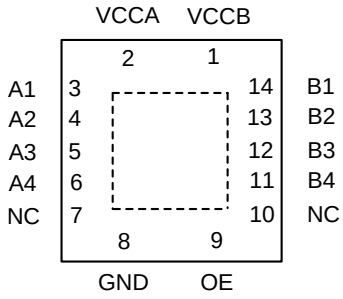
(Top View)

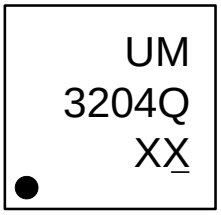




M: Month Code
UM3204H
CSP12 1.9×1.4

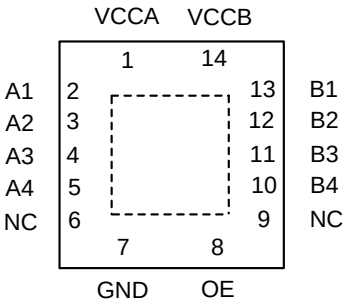
(Top View)

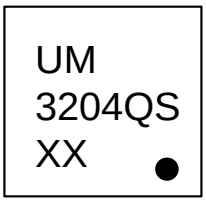




XX: Week Code
UM3204Q
QFN14 3.5×3.5

(Top View)





XX: Week Code
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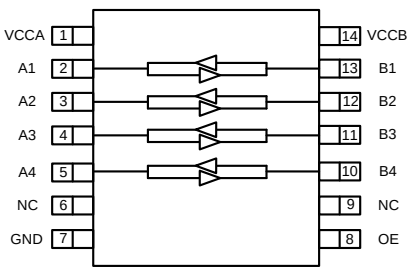
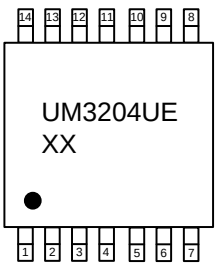
QFN14 3.5×3.5

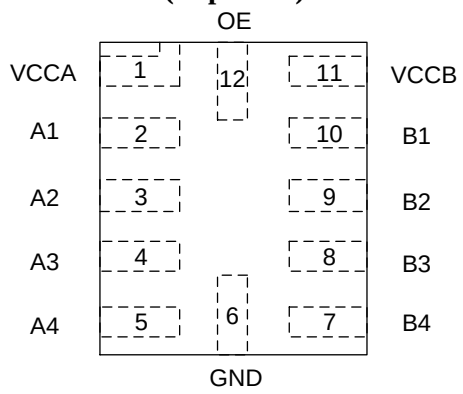
(Top View)

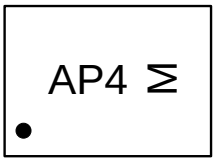




XX: Week Code
UM3204UE
TSSOP14

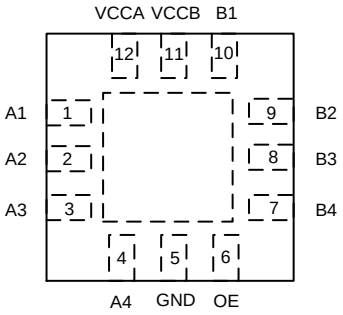
(Top View)

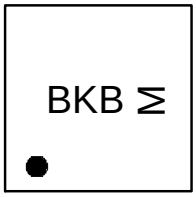




M: Month Code
UM3204QT
QFN12 1.7×2.0

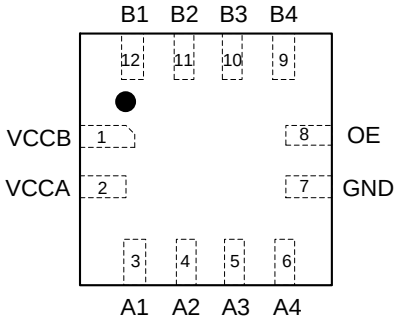
(Top View)

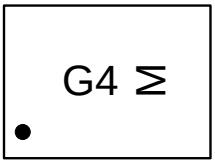




M: Month Code
UM3204QB
QFN12 2.0×2.0

(Top View)





M: Month Code
UM3204QV
QFN12 1.8×1.8

Ball Mapping for UM3204H

	A	B	C	D
1	A1	A2	A3	A4
2	V_{CCB}	V_{CCA}	OE	GND
3	B1	B2	B3	B4

Transparent Top View

Pin Description

Pin Name	Function
V_{CCA}	A-Port supply voltage. 1.65V≤V_{CCA}≤3.6V and V_{CCA}≤V_{CCB}
A1	Input/Output 1. Referenced to V_{CCA}
A2	Input/Output 2. Referenced to V_{CCA}
A3	Input/Output 3. Referenced to V_{CCA}
A4	Input/Output 4. Referenced to V_{CCA}
GND	Ground
OE	3-state output enable. Pull OE low to place all outputs in 3-state mode. Referenced to V_{CCA}
B4	Input/Output 4. Referenced to V_{CCB}
B3	Input/Output 3. Referenced to V_{CCB}
B2	Input/Output 2. Referenced to V_{CCB}
B1	Input/Output 1. Referenced to V_{CCB}
V_{CCB}	B-Port supply voltage. 2.3V≤V_{CCB}≤5.5V

Ordering Information

Part Number	Packaging Type	Marking Code	Shipping Qty
UM3204H	CSP12 1.9×1.4	AAB	3000pcs/7Inch Tape & Reel
UM3204Q	QFN14 3.5×3.5	UM3204Q	3000pcs/13Inch Tape & Reel
UM3204QS	QFN14 3.5×3.5	UM3204QS	3000pcs/13Inch Tape & Reel
UM3204UE	TSSOP14	UM3204UE	3000pcs/13Inch Tape & Reel
UM3204QT	QFN12 1.7×2.0	AP4	3000pcs/7Inch Tape & Reel
UM3204QB	QFN12 2.0×2.0	BKB	3000pcs/7Inch Tape & Reel
UM3204QV	QFN12 1.8×1.8	G4	3000pcs/7Inch Tape & Reel

Absolute Maximum Ratings (Note 1)

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

Symbol	Parameter		Value	Unit
V_{CCA}	Supply Voltage Range		-0.5 to +4.5	V
V_{CCB}	Supply Voltage Range		-0.5 to +6.5	V
V_I	Input Voltage Range	A ports	-0.5 to +4.5	V
		B ports	-0.5 to +6.5	
V_O	Voltage Range applied to any output in the high-impedance or power-off state	A ports	-0.5 to +4.5	V
		B ports	-0.5 to +6.5	
V_O	Voltage Range applied to any output in the high or low state (Note 2)	A ports	-0.5 to (V_{CCA}+0.5)	V
		B ports	-0.5 to (V_{CCB}+0.5)	
I_{IK}	Input Clamp Current	V_I＜0	-50	mA
I_{OK}	Output Clamp Current	V_O＜0	-50	mA
I_O	Continuous Output Current		±50	mA
	Continuous Current through V_{CCA}, V_{CCB}, or GND		±100	mA
T_{OP}	Operating Temperature Range		-40 to +85	℃
T_{STG}	Storage Temperature Range		-65 to +150	℃

Note1. 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.

Note2. The value of V_{CCA} and V_{CCB} are provided in the recommended operating conditions table.

Recommended Operating Conditions (Note 1, 2)

Symbol	Parameter		V_{CCA}	V_{CCB}	Min	Max	Unit
V_{CCA}	Supply Voltage				1.65	3.6	V
V_{CCB}					2.3	5.5	
V_{IH}	High Level Input Voltage	A- Port	1.65V to 1.95V	2.3V to 5.5V	V_{CCI} -0.2	V_{CCI}	V
			2.3V to3.6V		V_{CCI} -0.4	V_{CCI}	
		B- Port	1.65V to 3.6V	2.3V to 5.5V	V_{CCI} -0.4	V_{CCI}	V
		OE			V_{CCA}×0.65	5.5	
V_{IL}	Low Level Input Voltage	A- Port	1.65V to 3.6V	2.3V to 5.5V	0	0.15	V
		B- Port			0	0.15	
		OE			0	V_{CCA}×0.35	
Δt/ΔV	Input Transition Rise or Fall Time	A-Port push-pull driving	1.65V to 3.6V	2.3V to 5.5V		10	ns/V
		B-Port push-pull driving				10	
		Control input				10	

Note1. V_{CCI} is the supply voltage associated with the input port.

Note2. V_{CCA} must be less than or equal to V_{CCB} and must not exceed 3.6 V.

Electrical Characteristics (Note 1, 2, 3)

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

Parameter		Test Conditions	V_{CCA}	V_{CCB}	T_A=25°C		-40°C to 85°C		Unit
					Typ	Max	Min	Max	
V_{OHA}		I_{OH}=-20μA	1.65V to 3.6V	2.3V to 5.5V			V_{CCA}×0.8		V
V_{OLA}		I_{OL}=1mA	1.65V to 3.6V	2.3V to 5.5V				0.4	V
V_{OHB}		I_{OH}=-20μA	1.65V to 3.6V	2.3V to 5.5V			V_{CCB}×0.8		V
V_{OLB}		I_{OL}=1mA	1.65V to 3.6V	2.3V to 5.5V				0.4	V
I_I	OE	V_I=V_{CCI} or GND	1.65V to 3.6V	2.3V to 5.5V		±1		±2	μA
I_{OZ}	A or B Port	OE=V_{IL}	1.65V to 3.6V	2.3V to 5.5V		±1		±2	μA
I_{CCA}		V_I=V_O=open, I_O=0	1.65V to V_{CCB}	2.3V to 5.5V				2.4	μA
			3.6V	0V				2.2	
			0V	5.5V				-1	
I_{CCB}		V_I=V_O=open, I_O=0	1.65V to V_{CCB}	2.3V to 5.5V				12	μA
			3.6V	0V				-1	
			0V	5.5V				1	
I_{CCA} +I_{CCB}		V_I=V_O=open, I_O=0	1.65V to 3.6V	2.3V to 5.5V				14.4	μA
C_i	OE		3.3V	3.3V	2.5			3.5	pF
C_{iO}	A Port		3.3V	3.3V	5			6.5	pF
	B Port				12			16.5	

Note1. V_{CCI} is the supply voltage associated with the input port.

Note2. V_{CCO} is the supply voltage associated with the output port.

Note3. V_{CCA} must be less than or equal to V_{CCB} and must not exceed 3.6 V.

Timing Requirements

Over recommended operating free-air temperature range, V_{CCA}= 1.8V±0.15V (unless otherwise noted)

			V_{CCB}=2.5V ±0.2V		V_{CCB}=3.3V ±0.3V		V_{CCB}=5V ±0.5V		Unit
			Min	Max	Min	Max	Min	Max	
Data Rate	Push-pull driving			24		24		24	Mbps
	Open-drain driving			2		2		2	
t_w Pulse duration	Push-pull driving	Data inputs	41		41		41		ns
	Open-drain driving		500		500		500		

Timing Requirements

Over recommended operating free-air temperature range, V_{CCA}= 2.5V±0.2V (unless otherwise noted)

			V_{CCB}=2.5V ±0.2V		V_{CCB}=3.3V ±0.3V		V_{CCB}=5V ±0.5V		Unit
			Min	Max	Min	Max	Min	Max	
Data Rate	Push-pull driving			24		24		24	Mbps
	Open-drain driving			2		2		2	
t_w Pulse duration	Push-pull driving	Data inputs	41		41		41		ns
	Open-drain driving		500		500		500		

Timing Requirements

Over recommended operating free-air temperature range, V_{CCA}= 3.3V±0.3V (unless otherwise noted)

			V_{CCB}=3.3V±0.3V		V_{CCB}=5V±0.5V		Unit
			Min	Max	Min	Max	
Data Rate	Push-pull driving			24		24	Mbps
	Open-drain driving			2		2	
t_w Pulse duration	Push-pull driving	Data inputs	41		41		ns
	Open-drain driving		500		500		

Switching Characteristics

Over recommended operating free-air temperature range, V_{CCA}= 1.8V±0.15V (unless otherwise noted)

Parameter	From (Input)	To (Output)	Test Conditions	V_{CCB}=2.5V ±0.2V		V_{CCB}=3.3V ±0.3V		V_{CCB}=5V ±0.5V		Unit
				Min	Max	Min	Max	Min	Max	
t_{PHL}	A	B	Push-pull		4.6		4.7		5.8	ns
			Open-drain	2.9	8.8	2.9	9.6	3	10	
t_{PLH}			Push-pull		6.8		6.8		7	
			Open-drain	45	260	36	208	27	198	
t_{PHL}	B	A	Push-pull		4.4		4.5		4.7	ns
			Open-drain	1.9	5.3	1.1	4.4	1.2	4	
t_{PLH}			Push-pull		5.3		4.5		0.5	
			Open-drain	45	175	36	140	27	102	
t_{dis}	OE	A			200		200		200	ns
		B			200		200		200	
t_{en}	OE	A			50		40		35	ns
		B			50		40		35	
t_{rA}	A port rise time		Push-pull	3.2	9.5	2.3	9.3	2	7.6	ns
			Open-drain	38	165	30	132	22	95	
t_{rB}	B port rise time		Push-pull	4	10.8	2.7	9.1	2.7	7.6	ns
			Open-drain	34	145	23	106	10	58	
t_{fA}	A port fall time		Push-pull	2	5.9	1.9	6	1.7	3.3	ns
			Open-drain	4.4	6.9	4.3	6.4	4.2	6.1	
t_{fB}	B port fall time		Push-pull	2.9	7.6	2.8	7.5	2.8	8.8	ns
			Open-drain	6.9	13.8	7.5	16.2	7	16.2	
$t_{SK(O)}$	Channel-to-channel				1		1		1	ns
Max data rate			Push-pull		24		24		24	Mbps
			Open-drain		2		2		2	

Switching Characteristics

Over recommended operating free-air temperature range, V_{CCA}= 2.5V±0.2V (unless otherwise noted)

Parameter	From (Input)	To (Output)	Test Conditions	V_{CCB}=2.5V ±0.2V		V_{CCB}=3.3V ±0.3V		V_{CCB}=5V ±0.5V		Unit
				Min	Max	Min	Max	Min	Max	
t_{PHL}	A	B	Push-pull		3.2		3.3		3.4	ns
			Open-drain	1.7	6.3	2	6	2.1	5.8	
t_{PLH}			Push-pull		3.5		4.1		4.4	
			Open-drain	43	250	36	206	27	190	
t_{PHL}	B	A	Push-pull		3		3.6		4.3	ns
			Open-drain	1.8	4.7	2.6	4.2	1.2	4	
t_{PLH}			Push-pull		2.5		1.6		0.7	
			Open-drain	44	170	37	140	27	103	
t_{dis}	OE	A			200		200		200	ns
		B			200		200		200	
t_{en}	OE	A			50		40		35	ns
		B			50		40		35	
t_{rA}	A port rise time		Push-pull	2.8	7.4	2.6	6.6	1.8	5.6	ns
			Open-drain	34	149	28	121	24	89	
t_{rB}	B port rise time		Push-pull	3.2	8.3	2.9	7.2	2.4	6.1	ns
			Open-drain	35	151	24	112	12	64	
t_{fA}	A port fall time		Push-pull	1.9	5.7	1.9	5.5	1.8	5.3	ns
			Open-drain	4.4	6.9	4.3	6.2	4.2	5.8	
t_{fB}	B port fall time		Push-pull	2.2	7.8	2.4	6.7	2.6	6.6	ns
			Open-drain	5.1	8.8	5.4	9.4	5.4	10.4	
$t_{SK(O)}$	Channel-to-channel				1		1		1	ns
Max data rate			Push-pull	24		24		24		Mbps
			Open-drain	2		2		2		

Switching Characteristics

Over recommended operating free-air temperature range, V_{CCA}= 3.3V±0.3V (unless otherwise noted)

Parameter	From (Input)	To (Output)	Test Conditions	V_{CCB}=3.3V ±0.3V		V_{CCB}=5V ±0.5V		Unit
				Min	Max	Min	Max	
t_{PHL}	A	B	Push-pull		2.4		3.1	ns
			Open-drain	1.2	4.2	1.4	4.6	
t_{PLH}			Push-pull		4.2		4.4	
			Open-drain	36	204	28	165	
t_{PHL}	B	A	Push-pull		2.5		3.3	ns
			Open-drain	1	124	1	97	
t_{PLH}			Push-pull		2.5		2.6	
			Open-drain	3	139	3	105	
t_{dis}	OE	A			200		200	ns
		B			200		200	
t_{en}	OE	A			40		35	ns
		B			40		35	
t_{rA}	A port rise time		Push-pull	2.3	5.6	1.9	4.8	ns
			Open-drain	25	116	19	85	
t_{rB}	B port rise time		Push-pull	2.5	6.4	2.1	7.4	ns
			Open-drain	26	116	14	72	
t_{fA}	A port fall time		Push-pull	2	5.4	1.9	5	ns
			Open-drain	4.3	6.1	4.2	5.7	
t_{fB}	B port fall time		Push-pull	2.3	7.4	2.4	7.6	ns
			Open-drain	5	7.6	4.8	8.3	
$t_{SK(O)}$	Channel-to-channel				1		1	ns
Max data rate			Push-pull	24		24		Mbps
			Open-drain	2		2		

Applications Information

The UM3204 can be used in level-translation applications for interfacing devices or systems operating at different interface voltages with one another. The UM3204 is ideal for use in application where an open-drain driver is connected to the data I/Os. The UM3204 can also be used in applications where a push-pull driver is connected to the data I/Os, but the UM3304 might be a better option for such push-pull applications.

Block Diagram

The UM3204 (block diagram see Figure 1) does not require a direction-control signal to control the direction of data flow from A to B or from B to A. Each A-port I/O has an internal 10-kΩ pull-up resistor to V_{CCA}, and each B-port I/O has an internal 10-kΩ pull-up resistor to V_{CCB}. During a rising edge, the one-shot turns on the PMOS transistors (PU1, PU2) for a short duration, which speed up the low-to-high transition.

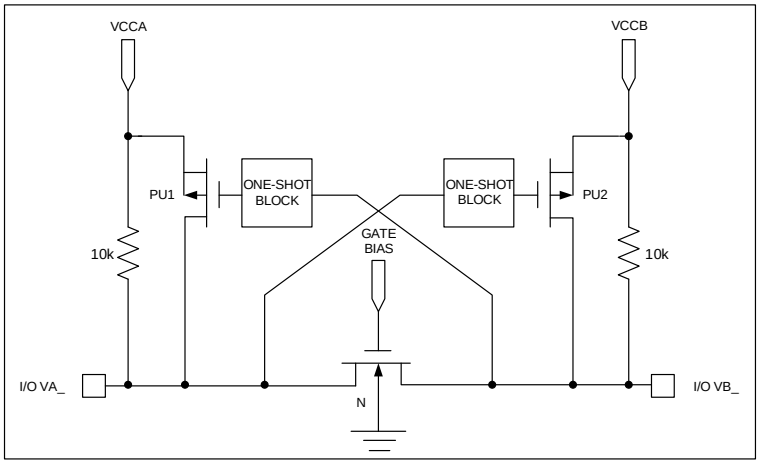


Figure 1 Block Diagram of UM3204 I/O Cell

Input Driver Requirements

The fall time (t_{fA}, t_{fB}) of a signal depends on the output impedance of the external device driving the data I/Os of the UM3204. Similarly, the t_{PHL} and the maximum date rates also depend on the output impedance of the external driver. The values for t_{fA}, t_{fB}, t_{PHL}, and the maximum date rates in the data sheet assume that the output impedance of the external driver is less than 50Ω.

Power Up

During operation, ensure that $V_{CCA} \leq V_{CCB}$ at all times. During power-up sequencing, $V_{CCA} \geq V_{CCB}$ does not damage the device, so any power supply can be ramped up first. The UM3204 has circuitry that disables all output ports when either V_{CC} is switched off ($V_{CCA/B}$=0V).

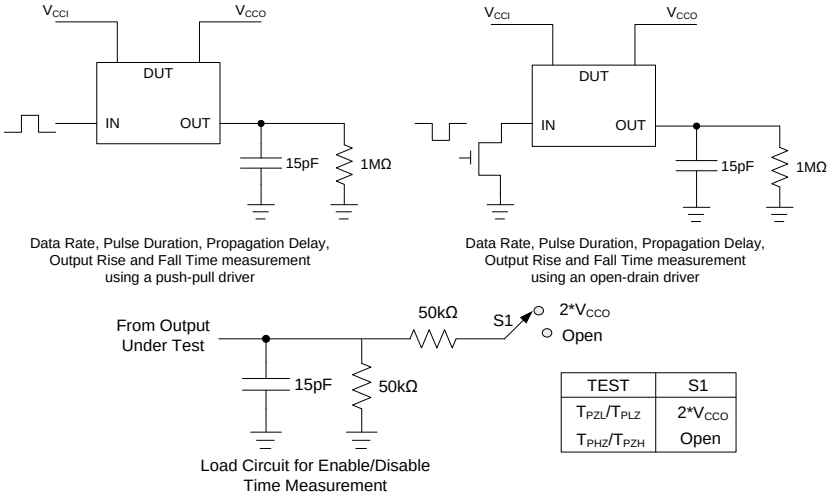
Enable and Disable

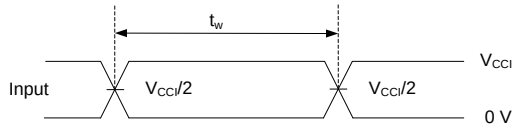
The UM3204 has an OE input that is used to disable the device by setting OE = low, which places all I/Os in the high-impedance (Hi-Z) state. The disable time (tdis) indicates the delay between the time when OE goes low and when the outputs actually get disabled (Hi-Z). The enable time (ten) indicates the amount of time the user must allow for the one-shot circuitry to become operational after OE is taken high.

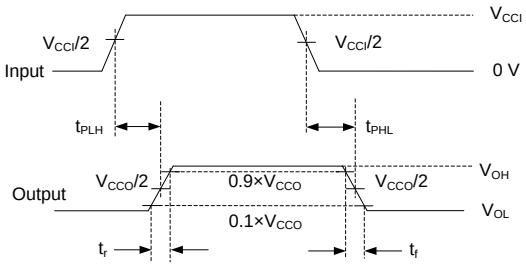
Pull-up or Pull-down Resistors on I/O Lines

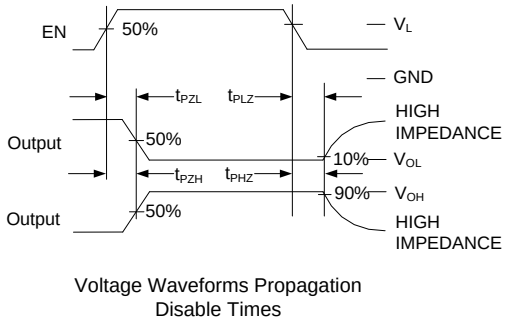
Each A-port I/O has an internal 10-kΩ pull-up resistor to V_{CCA}, and each B-port I/O has an internal 10-kΩ pull-up resistor to V_{CCB}. If a smaller value of pull-up resistor is required, an external resistor must be added from the I/O to V_{CCA} or V_{CCB} (in parallel with the internal 10-kΩ resistor).

Test Circuits









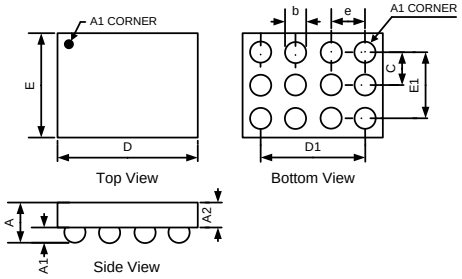
A. C_L includes probe and jig capacitances.
B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.
Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR≤100MHz, Z_O=50Ω, dv/dt≥1V/ns.
D. The outputs are measured one at a time, with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
F. t_{PZL} and t_{PZH} are the same as t_{en}.
G. t_{PLH} and t_{PHL} are the same as t_{pd}.
H. V_{CCI} is the V_{CC} associated with the input port.
I. V_{CCO} is the V_{CC} associated with the output port.
J. All parameters and waveforms are not applicable to all devices.

Figure 2 Load Circuits and Voltage Waveforms

Package Information

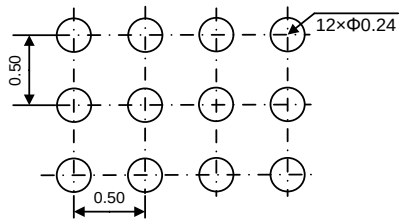
CSP12 1.9×1.4

Outline Drawing



DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	-	-	0.68	-	-	0.027
A1	0.21	0.231	0.24	0.0083	0.0091	0.0094
A2	0.40	0.42	0.44	0.0157	0.0165	0.0173
b	0.27	0.30	0.32	0.011	0.012	0.013
C	0.50TYP			0.020TYP		
D	1.82	-	1.90	0.072	-	0.075
D1	1.50TYP			0.059TYP		
E	1.32	-	1.40	0.052	-	0.055
E1	1.00TYP			0.039TYP		
e	0.50TYP			0.020TYP		

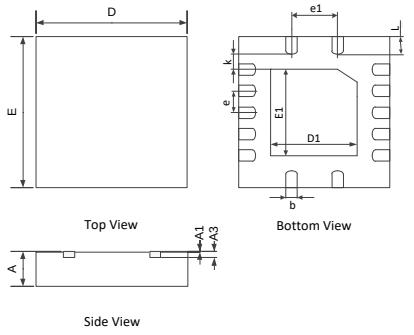
Land Pattern



NOTES:
1. Bump is Lead Free Sn/Ag/Cu.
2. Unit: mm.
3. Non-solder mask defined copper landing pad.
4. Laser Mark on silicon die back; back-lapped.

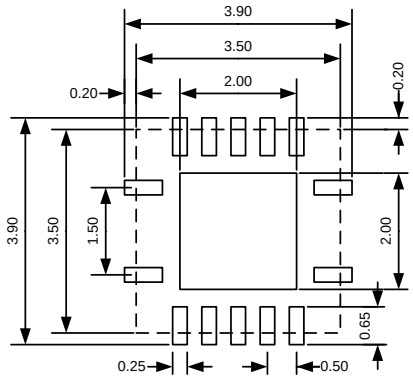
QFN14 3.5×3.5

Outline Drawing



DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.700	-	0.850	0.028	-	0.031
A1	0.000	0.02	0.050	0.000	0.0008	0.002
A3	0.203REF			0.008REF		
D	3.424	3.500	3.576	0.135	0.138	0.141
E	3.424	3.500	3.576	0.135	0.138	0.141
D1	1.900	-	2.150	0.077	-	0.085
E1	1.900	-	2.150	0.077	-	0.085
k	0.200MIN			0.008MIN		
b	0.200	0.250	0.300	0.008	0.010	0.012
e	0.500TYP			0.020TYP		
e1	1.500TYP			0.059TYP		
L	0.324	-	0.476	0.013	-	0.019

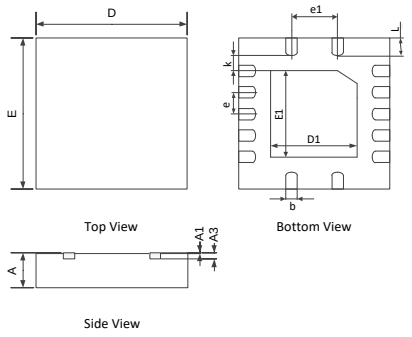
Land Pattern



NOTES:
1. Compound dimension: 3.50×3.50;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

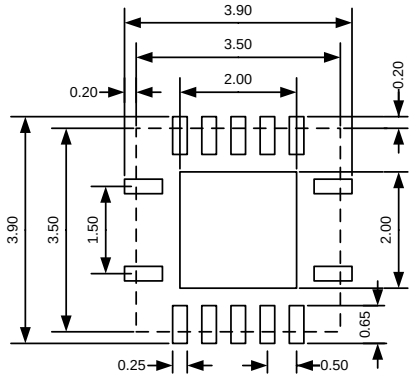
QFN14 3.5×3.5

Outline Drawing



DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.700	-	0.850	0.028	-	0.031
A1	0.000	0.02	0.050	0.000	0.0008	0.002
A3	0.203REF			0.008REF		
D	3.424	3.500	3.576	0.135	0.138	0.141
E	3.424	3.500	3.576	0.135	0.138	0.141
D1	1.900	-	2.150	0.077	-	0.085
E1	1.900	-	2.150	0.077	-	0.085
k	0.200MIN			0.008MIN		
b	0.200	0.250	0.300	0.008	0.010	0.012
e	0.500TYP			0.020TYP		
e1	1.500TYP			0.059TYP		
L	0.324	-	0.476	0.013	-	0.019

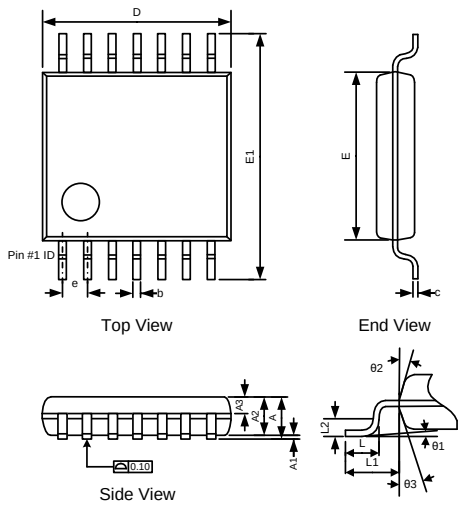
Land Pattern



NOTES:
1. Compound dimension: 3.50×3.50;
2. Unit: mm;
3.General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

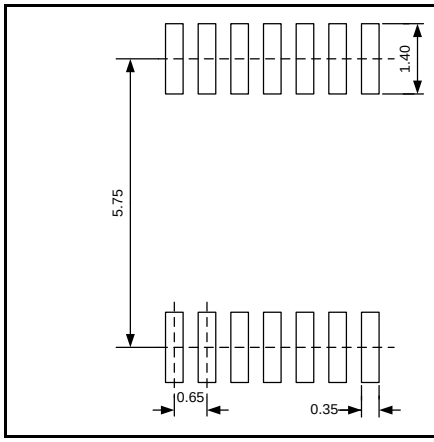
TSSOP14

Outline Drawing



DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	-	-	1.20	-	-	0.047
A1	0.05	-	0.15	0.002	-	0.006
A2	0.90	1.00	1.05	0.035	0.039	0.041
A3	0.34	0.44	0.54	0.013	0.017	0.021
b	0.20	-	0.28	0.008	-	0.011
c	0.10	-	0.19	0.004	-	0.007
D	4.86	4.96	5.06	0.191	0.195	0.199
E	4.30	4.40	4.50	0.169	0.173	0.177
E1	6.20	6.40	6.60	0.244	0.252	0.260
e	0.65BSC			0.026BSC		
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	1.00REF			0.039REF		
L2	0.25BSC			0.010BSC		
θ1	0 °	-	8 °	0 °	-	8 °
θ2	10 °	12 °	14 °	10 °	12 °	14 °
θ3	10 °	12 °	14 °	10 °	12 °	14 °

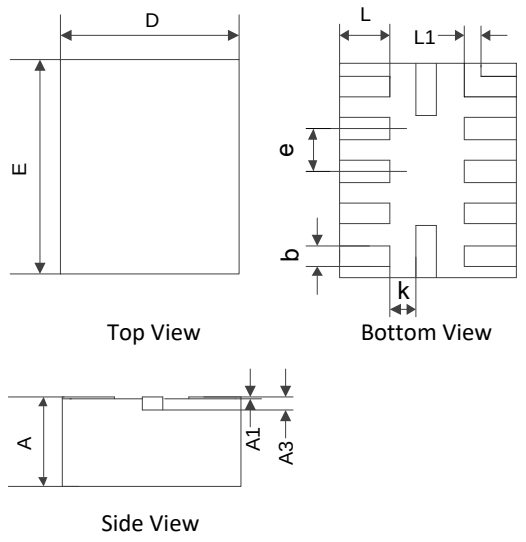
Land Pattern



NOTES:
1. Compound dimension: 4.96×4.40;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

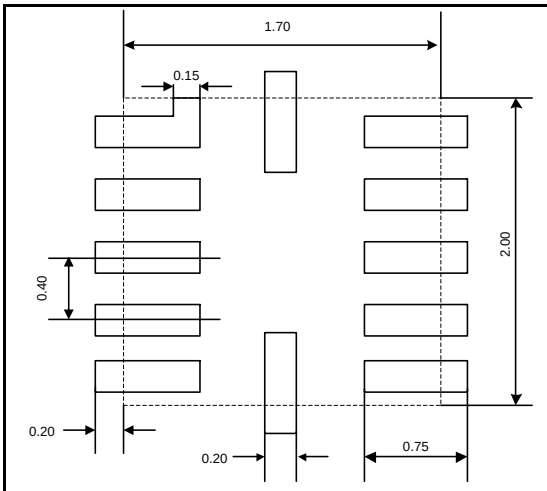
QFN12 1.7×2.0

Outline Drawing



DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	-	0.05	0.000	-	0.002
A3	0.152REF			0.006REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	1.60	1.70	1.80	0.063	0.067	0.071
E	1.90	2.00	2.10	0.075	0.079	0.083
e	0.40TYP			0.016TYP		
k	0.25REF			0.010REF		
L	0.40	0.50	0.60	0.016	0.020	0.024
L1	0.150REF			0.006REF		

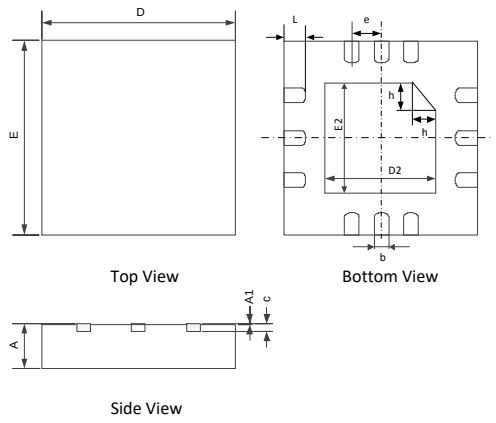
Land Pattern



NOTES:
1. Compound dimension: 1.7×2.0 ;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

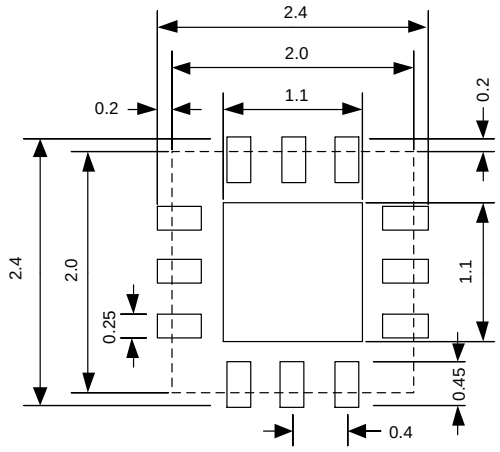
QFN12 2.0×2.0

Outline Drawing



Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.45	-	0.60	0.018	-	0.024
A1	0.00	-	0.05	0.000	-	0.002
c	0.10	-	0.20	0.004	-	0.008
b	0.15	-	0.25	0.006	-	0.010
D	1.90	-	2.10	0.075	-	0.083
E	1.90	-	2.10	0.075	-	0.083
D2	1.00	-	1.20	0.039	-	0.057
E2	1.00	-	1.20	0.039	-	0.057
e	0.40BSC			0.016BSC		
h	0.15	-	0.25	0.006	-	0.010
L	0.15	-	0.25	0.006	-	0.010

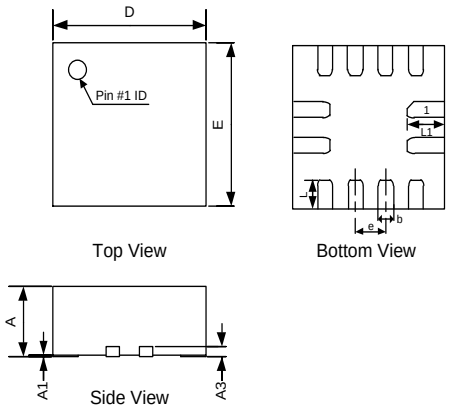
Land Pattern



NOTES:
1. Compound dimension: 2.0×2.0 ;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

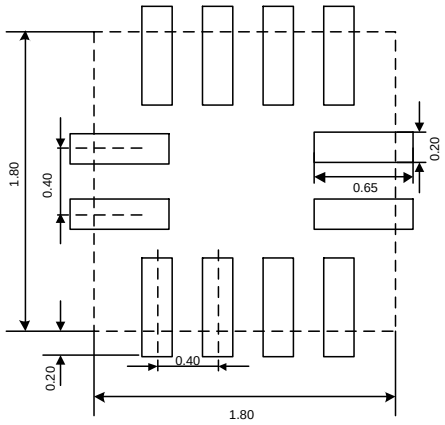
QFN12 1.8×1.8

Outline Drawing



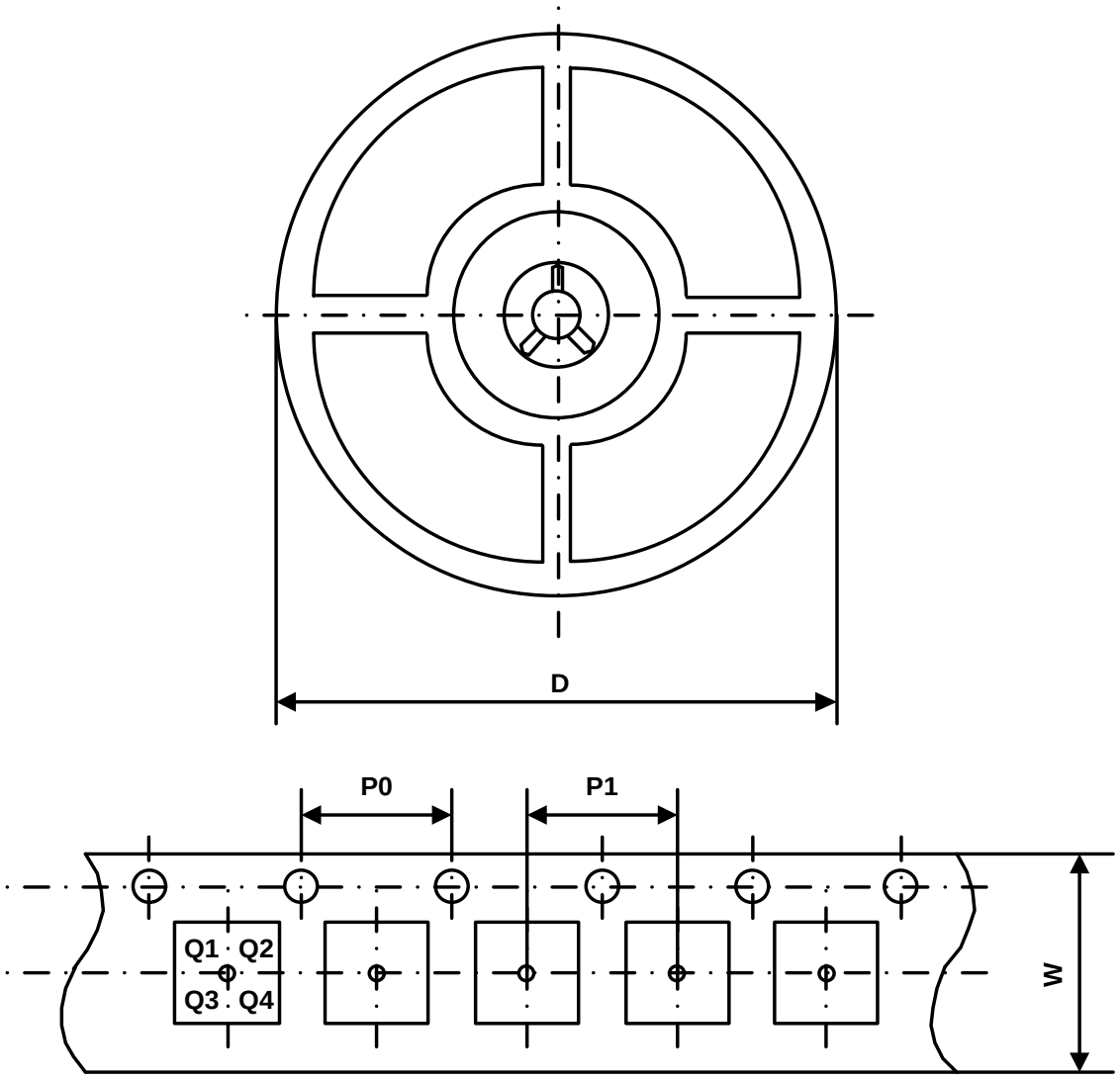
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.50	0.55	0.60	0.020	0.022	0.024
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.127REF			0.005REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	1.75	1.80	1.85	0.069	0.071	0.073
E	1.75	1.80	1.85	0.069	0.071	0.073
e	0.35	0.40	0.45	0.014	0.016	0.018
L	0.35	0.40	0.45	0.014	0.016	0.018
L1	0.375	0.425	0.475	0.015	0.017	0.019

Land Pattern



NOTES:
1. Compound dimension: 1.80×1.80.
2. Unit: mm.
3. General tolerance ±0.05mm unless otherwise specified.
4. The layout is just for reference.

Packing Information



Part Number	Package Type	Carrier Width (W)	Pitch (P0)	Pitch (P1)	Reel Size (D)	PIN 1 Quadrant
UM3204H	CSP12 1.9×1.4	8 mm	4 mm	4 mm	180 mm	Q2
UM3204Q	QFN14 3.5×3.5	12 mm	4 mm	8 mm	330 mm	Q1
UM3204QS	QFN14 3.5×3.5	12 mm	4 mm	8 mm	330 mm	Q1
UM3204UE	TSSOP14	16 mm	4 mm	8mm	330 mm	Q1
UM3204QT	QFN12 1.7×2.0	8 mm	4 mm	4 mm	180 mm	Q1
UM3204QB	QFN12 2.0×2.0	8 mm	4 mm	4 mm	180 mm	Q1
UM3204QV	QFN12 1.8×1.8	8 mm	4 mm	4 mm	180 mm	Q1

GREEN COMPLIANCE

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All Union components are compliant with the RoHS directive, which helps to support customers in their compliance with environmental directives. For more green compliance information, please visit:
http://www.union-ic.com/index.aspx?cat_code=RoHSDeclaration

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