Description

The PCF8574 is mainly used to expand general-purpose input and output (GPIO) ports. Port data is transmitted via the standard two-line I²C protocol.

The PCF8574 features 8-bit quasi-bidirectional GPIO ports (P0~P7), which can directly drive LEDs. Each quasi-bidirectional GPIO port can be used as an input or output without the use of a data-direction control signal.

After power on, all GPIO ports are high.

Features

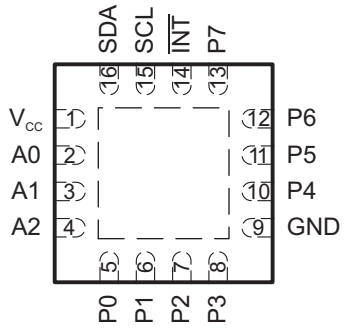
- I/O interface expander controlled by I²C
- Power supply voltage: 1.4V ~ 5.5 V
- Operating temperature: - 40 °C ~ +85 °C
- Standby power consumption: <1uA
- Can drive LED directly
- Open-drain interrupt output

Applications

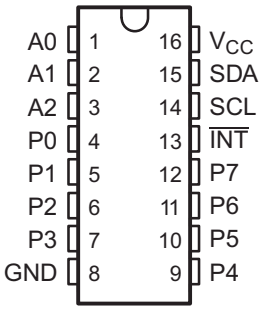
- Communication cabinet
- Servers
- Industrial automation
- Products with GPIO-Limited Processors

Pin Configuration and Functions

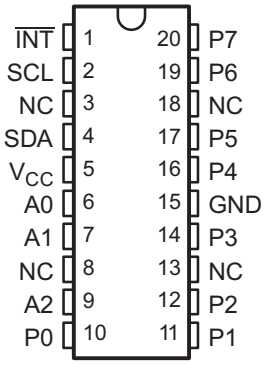
RGT PACKAGE
(TOP VIEW)



DW OR N PACKAGE
(TOP VIEW)



DGV OR PW PACKAGE
(TOP VIEW)



Pin Functions

PIN				DESCRIPTION
NAME	QFN-16	SOW-16	TSSOP-20	
A[0:2]	2, 3, 4	1, 2, 3	6, 7, 9	Address selects. Connect to VCC or GND pin.
GND	9	8	15	Ground.
INT	14	13	1	Interrupt output. Open-drain output, requires a pull-up resistor.
NC	-	-	3, 8, 13, 18	Do not connect.
P[0:7]	5, 6, 7, 8 10, 11, 12, 13	4, 5, 6, 7 9, 10, 11, 12	10, 11, 12, 14 16, 17, 19, 20	Quasi-bidirectional GPIO port.
SCL	15	14	2	Serial clock pin. Open drain output, requires a pull-up resistor.
SDA	16	15	4	Serial data pin. Open drain output, requires a pull-up resistor.
VCC	1	16	5	Supply voltage pin. It is recommended to add a 10uF decoupling capacitor.

Absolute Maximum Ratings

	MIN	MAX	UNIT
Power Supply Voltage V+		6	V
Pin Voltage	- 0.5	6	V
Operating Temperature	- 55	15 0	°C
Junction Temperature		1 50	°C
Storage Temperature	- 60	1 50	°C

Unless otherwise noted, the specifications in the above table apply within the atmospheric temperature range.

Stresses beyond the range may cause permanent damage to the device.

Electrostatic Protection

		Value	UNIT
Electrostatic Discharge, V_{ESD}	Human Body Mode (HBM), per ANSI/ESDA/JEDEC JS-001	±5000	V
	Machine Mode (MM), per JEDEC-STD Classification	3 00	V

Recommended Operating Conditions

	MIN	TYP	MAX	UNIT
Supply Voltage V+	1.4	3.3	5.5	V
Operating Temperature T_A	- 4 0		8 5	°C

Unless otherwise noted, the specifications in the above table apply within the atmospheric temperature range.

Electrical Characteristics

Unless otherwise noted, the following data apply within the operating temperature range. (Typical operating conditions are + 25℃ and 3.3V)

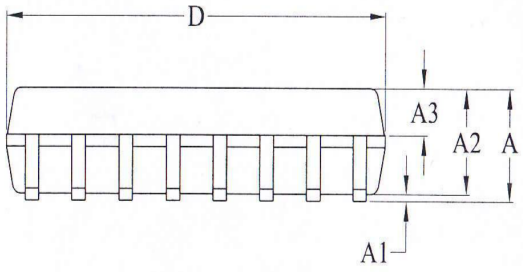
PARAMETER	SYM	TEST CONDITIONS	VCC	MIN	TYP	MAX	UNIT
I²C communication frequency	f_{scl}	-	2.5~5.5		0.4	1	MHz
I²C communication frequency (high speed mode)	$f_{scl,hs}$	-	2.5~5.5			2.4	MHz
Power-on reset voltage	V_{POR}	-	5		1	1.2	V
GPIO pull-up current	I_{OH}	V_O=GND	2.5~5.5	30	50	300	uA
GPIO pull-up current (fully driven state)	I_{OHT}	High during acknowledge, VOH = GND	2.5		1		mA
GPIO sink current	I_{OL}	V_O = 1V	5	10	25		mA
SDA sink current	$I_{OL,SDA}$	V_O = 0.4 V	2.5~5.5	3			mA
INT sink current	$I_{OL,INT}$	V_O = 0.4 V	2.5~5.5	3			mA
Source current (operating mode)	I_{work}	I2C communication frequency 100kHz	5		40	100	uA
Source current (standby mode)	I_{idle}	I2C does not communicate	5		1	10	uA

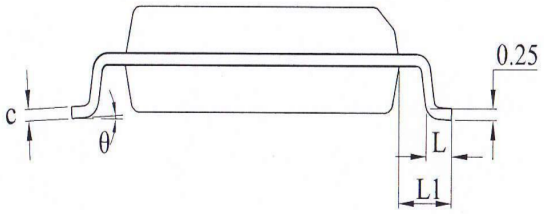
Switching Sequence

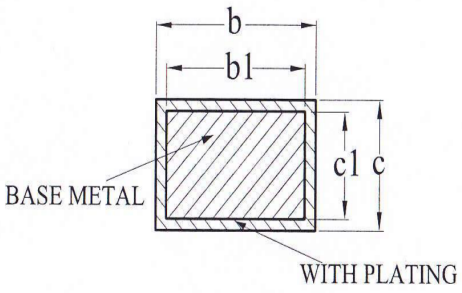
Unless otherwise specified, the following data apply within the operating temperature range with the GPIO port load capacitance <100pF. (Typical operating conditions are + 25℃ and 3.3V)

PARAMETER	SYMBOL	FROM	TO	MIN	TYP	MAX	UNIT
Output data valid	t_{pv}	SCL	GPIO			4	us
Input data setup time	t_{su}	GPIO	SCL		0		us
Input data hold time	t_h	GPIO	SCL		4		us
Interrupt valid time	t_{iv}	GPIO	INT			4	us
Interrupt reset delay time	t_{ir}	SCL	INT			4	us

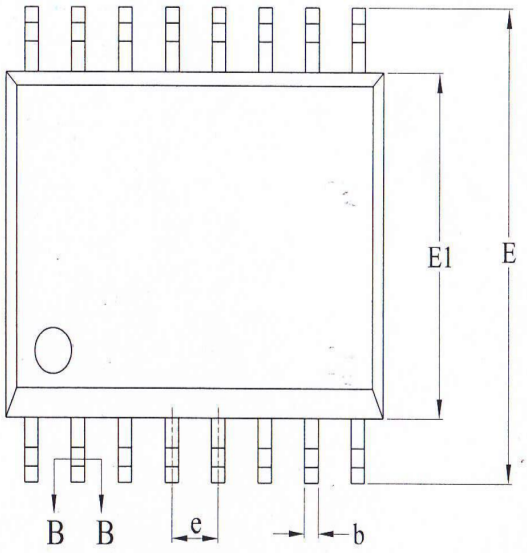
SOIC-16-300mil





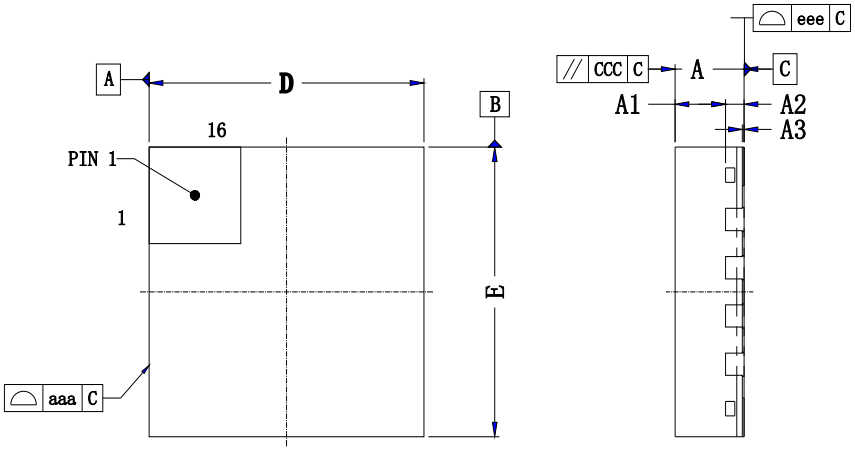


SECTION B-B

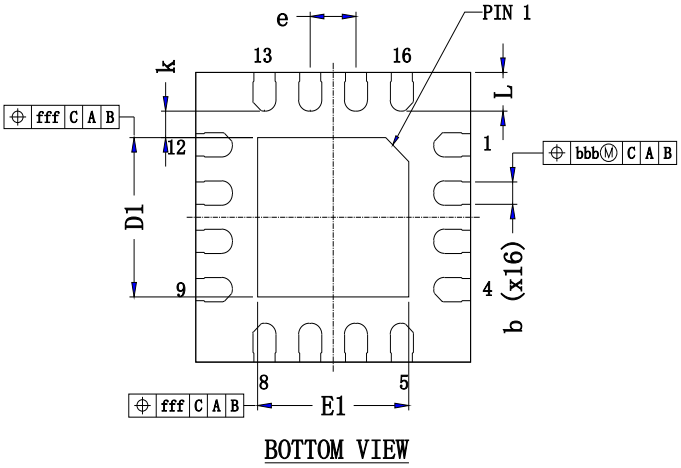


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	2.65
A1	0.10	—	0.30
A2	2.25	2.30	2.35
A3	0.97	1.02	1.07
b	0.35	—	0.43
b1	0.34	0.37	0.40
c	0.25	—	0.29
c1	0.24	0.25	0.26
D	10.20	10.30	10.40
E	10.10	10.30	10.50
E1	7.40	7.50	7.60
e	1.27BSC		
L	0.55	—	0.85
L1	1.40REF		
θ	0	—	8°

WQFN-16-EP(3x3)



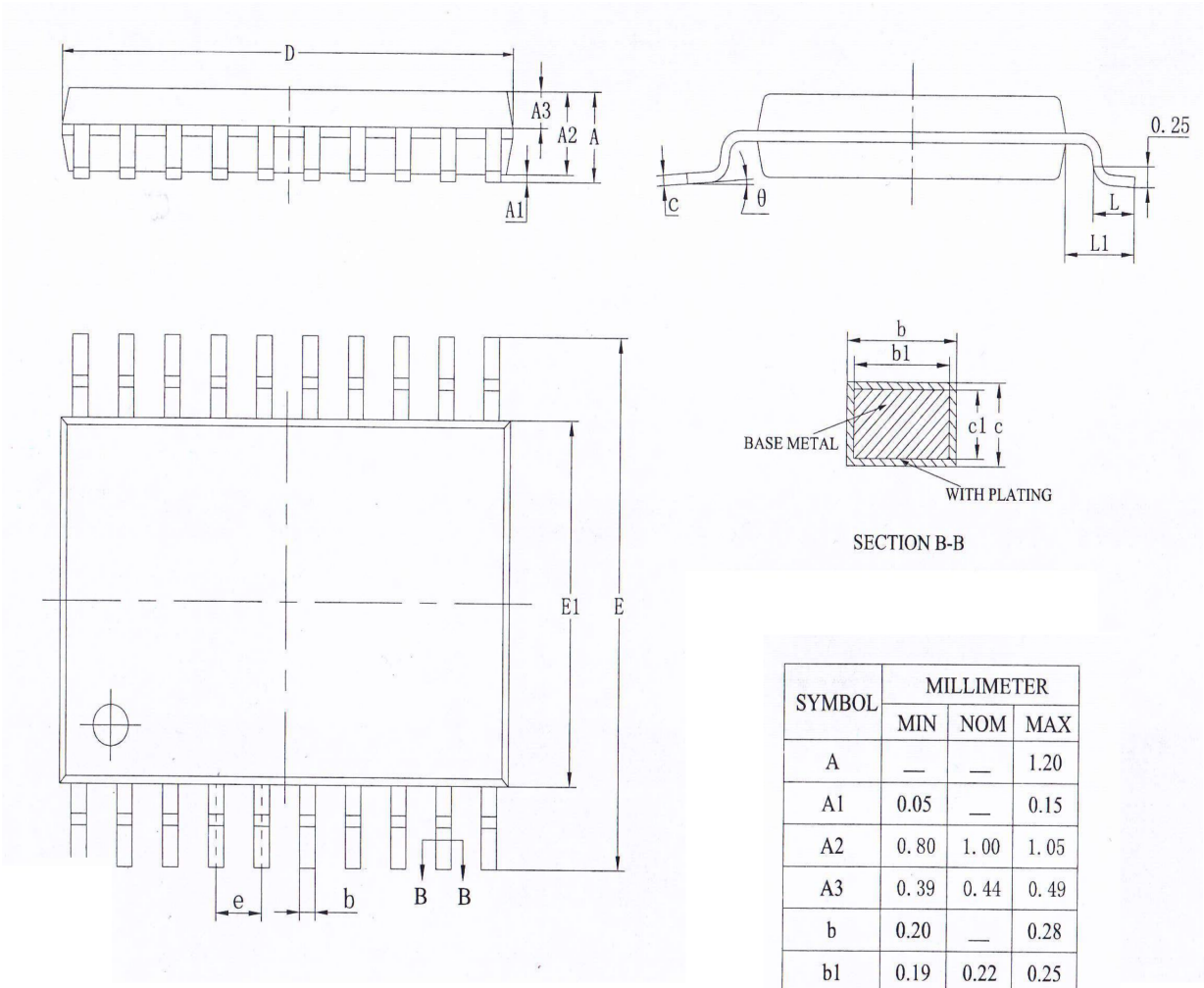
TOP VIEW SIDE VIEW



BOTTOM VIEW

Item		Symbol	Minimum	Normal	Maximum
Body Size	X	D		3.0 BSC	
	Y	E		3.0 BSC	
Exposed Pad Size	X	D1	1.55	1.65	1.75
	Y	E1	1.55	1.65	1.75
Total Thickness		A	0.7	0.75	0.8
Molding Thickness		A1		0.55	
LF Thickness		A2		0.203 REF	
Stand Off		A3	0	0.02	0.05
Lead Width		b	0.20	0.25	0.30
Lead Length		L	0.3	0.4	0.5
Lead Pitch		e		0.5 BSC	
The space from terminals of lead to exposed pad		k		0.2 MIN	
Package Edge Tolerance		aaa		0.1	
Lead Offset		bbb		0.07	
Molding Flatness		ccc		0.1	
Coplanarity		eee		0.08	
Exposed Pad Offset		fff		0.1	

TSSOP-20



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.20
A1	0.05	—	0.15
A2	0.80	1.00	1.05
A3	0.39	0.44	0.49
b	0.20	—	0.28
b1	0.19	0.22	0.25
c	0.13	—	0.17
c1	0.12	0.13	0.14
D	6.40	6.50	6.60
E1	4.30	4.40	4.50
E	6.20	6.40	6.60
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00REF		
θ	0	—	8°

Ordering information

Order code	Package	Baseqty	Deliverymode	Marking
UMW PCF8574DWR	SOIC-16-300mil	2000	Tape and reel	PCF8574
UMW PCF8574RGTR	WQFN-16-EP(3x3)	3000	Tape and reel	8574Q U
UMW PCF8574PW	TSSOP-20	3000	Tape and reel	PCF8574