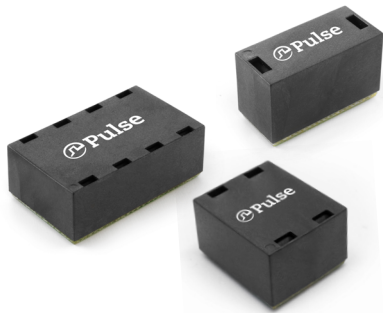


# High Density 1Gigabit PoE/PoE+ SMD Modules

BGA Quad/Dual/Single port for flexible PCB placement  
HX52xxNL, HX54xxNL, HX5610NL, and HX6xxxHL



- Ⓢ Compact SMT 1Gigabit PoE modules offering less than 140mm<sup>2</sup> /port density
- Ⓢ Reliable surface mount ball grid array
- Ⓢ Standard and Industrial Temperature range
- Ⓢ Modular construction exceeds IEEE802.3u/ab
- Ⓢ Options support 4pair PoE+ (70W) of DC power
- Ⓢ Designed to fit behind 2xN connectors
- Ⓢ RoHS-6, peak reflow temperature rating 245°C
- Ⓢ Supplied in Trays or Tape and Reel

## Standard Range Electrical Specifications @ 25°C - Operating Temperature 0°C to +70°C

RoHS-6 Compliant Part Number	Number of Ports	Insertion Loss (dB Max)	Return Loss (dB Min)					Common Mode Rejection [CMMR] (dB Min)			Crosstalk (dB Min)			4P PoE Rating (Watts)
			1-100MHz	1-30MHz	40MHz	50MHz	60-80MHz	100MHz	30-60MHz	80-100MHz	125MHz	30MHz	60MHz	
H5610NL	1	1.5	-18	-16	-14	-11	-10	-32	-25	-19	-44	-37	-33	35max
H5200NL	2	1.5	-18	-16	-14	-11	-10	-32	-25	-19	-44	-37	-33	35max
H5201NL	2	1.5	-18	-16	-14	-11	-10	-32	-25	-19	-44	-37	-33	30max
H5400NL	4	1.5	-18	-16	-14	-11	-10	-32	-25	-19	-44	-37	-33	35max
H5401NL	4	1.5	-18	-16	-14	-11	-10	-32	-25	-19	-44	-37	-33	30max

## Industrial Range Electrical Specifications @ 25°C - Operating Temperature -40°C to +80°C

HX5610NL	1	1.5	-18	-16	-14	-10	-10	-32	-25	-19	-44	-37	-33	35max
HX5200NL	2	1.5	-18	-16	-14	-10	-10	-32	-25	-19	-44	-37	-33	35max
HX5201NL	2	1.5	-18	-16	-14	-10	-10	-32	-25	-19	-44	-37	-33	30max
HX5400NL	4	1.5	-18	-16	-14	-10	-10	-32	-25	-19	-44	-37	-33	35max
HX5401NL	4	1.5	-18	-16	-14	-10	-10	-32	-25	-19	-44	-37	-33	30max

## Power over Ethernet<sup>6</sup> Electrical Specifications @ 25°C - Operating Temperature 0°C to +70°C / -40°C to +80°C

H6600NL	1	1.5	-18	-16	-14	-11	-10	-32	-25	-19	-44	-37	-33	70max
HX6621NL	1	1.5	-18	-16	-14	-10	-10	-32	-25	-19	-44	-37	-33	70max
H6200NL	2	1.5	-18	-16	-14	-11	-10	-32	-25	-19	-44	-37	-33	70max
HX6221NL	2	1.5	-18	-16	-14	-10	-10	-32	-25	-19	-44	-37	-33	70max
H6400NL	4	1.5	-18	-16	-14	-11	-10	-32	-25	-19	-44	-37	-33	70max
HX6400NL	4	1.5	-18	-16	-14	-10	-10	-32	-25	-19	-44	-37	-33	70max

**Notes:**

1. Header DAP with flammability Rating UL-94V-0
2. MSL = Moisture Sensitivity Level: 1 per J-STD-020
3. J-STD-075 R7m 235°C maximum
4. Compliance to J-STD-002 Solderable at 245°C
5. Reflow Profile, J-STD-020: LEVEL 1
6. **RoHS-6:** Product does not contain 5 out of the 6 banned substances specified in the RoHS directive.  
Some internal connections may contain lead in high-temperature solder (solder alloys containing more than 85% lead)
7. Operating Temperature:  
Standard "H" parts 0°C to +70°C  
Industrial "HX" products -40°C to +85°C
8. Storage Temperature:  
Standard "H" parts -20°C to +125°C  
Industrial "HX" parts -50°C to +125°C
9. Contact Pulse for other connector option via the "Resources" link on the Pulse Electronics website.
10. To order parts in Tape and Reel Packaging add a "T" suffix to the part number (\*ie. HX6221NL becomes HX6221NLT).

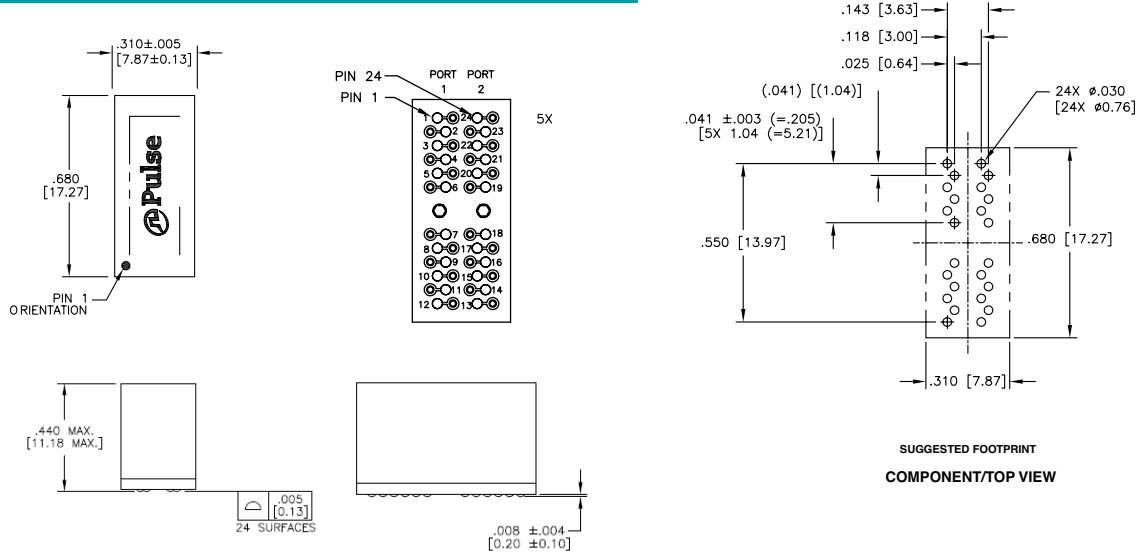
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## Mechanical

### SINGLE PORT - H5610NL, HX5610NL, H6600NL and HX6621NL

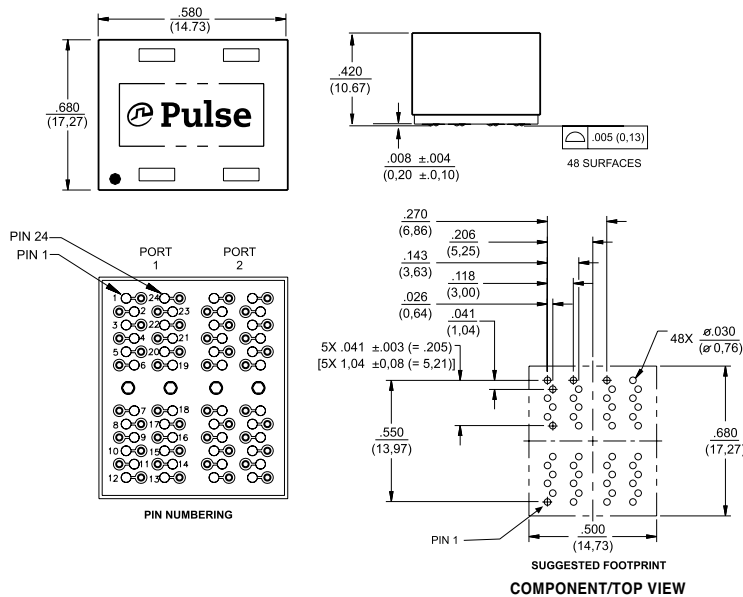


Weight ..... 2.5 grams  
 Tray/Box ..... 60/600  
 Reel/Box ..... 300/1500

Dimensions:  $\frac{\text{Inches}}{\text{mm}}$

Unless otherwise specified,  
 all tolerances are ±  $\frac{0.10}{0.25}$

### DUAL PORT - H520xNL, HX520xNL, H6200NL and HX6221NL



Weight ..... 5 grams  
 Tray/Box ..... 84/420  
 Reel/Box ..... 170/850

Dimensions:  $\frac{\text{Inches}}{\text{mm}}$

Unless otherwise specified,  
 all tolerances are ±  $\frac{0.10}{0.25}$

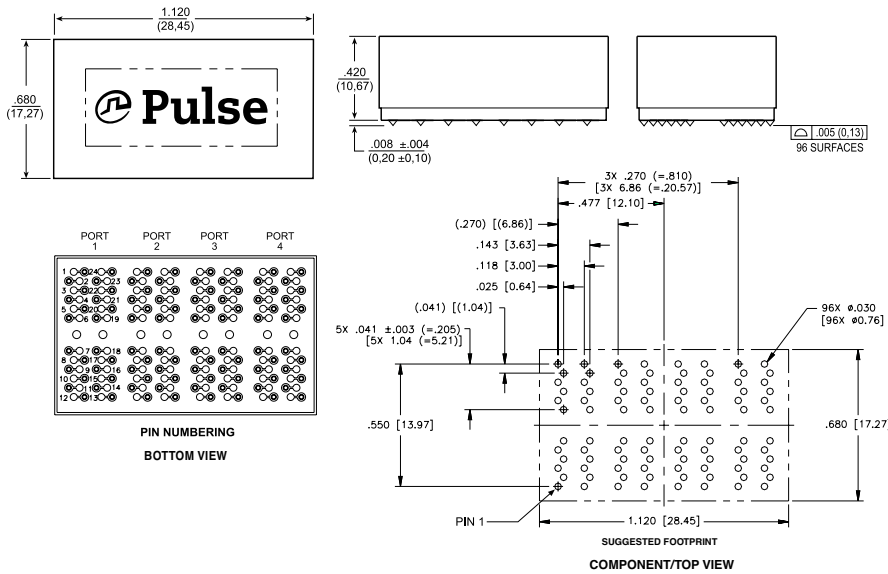
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## Mechanical

### QUAD PORT - H540xNL, HX540xNL, H6400NL and HX6400NL



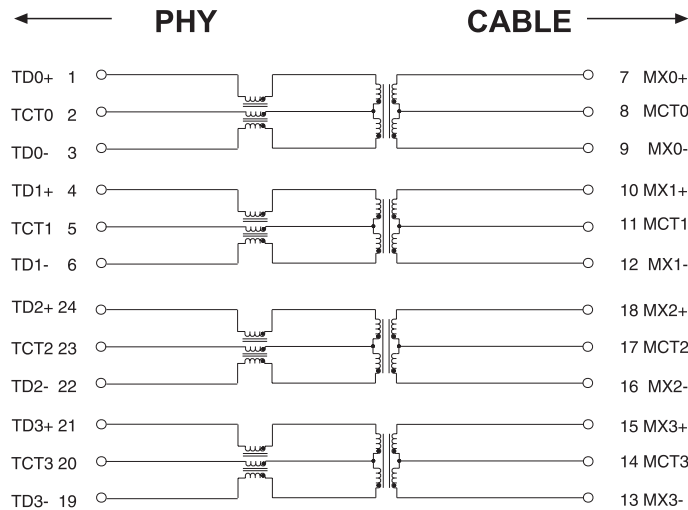
Weight ..... 11 grams  
 Tray/Box ..... 60/300  
 Reel/Box ..... 170/850

Dimensions:  $\frac{\text{Inches}}{\text{mm}}$

Unless otherwise specified,  
 all tolerances are  $\pm \frac{0.10}{0.25}$

## Schematic

### H/HX5200NL, H/HX5400NL, H6600NL, HX6621NL, H6200NL, HX6221NL, H/HX6400NL



Schematic shown for one port

DUAL and QUAD designs use the same pad numbering for the 2 and 4 ports

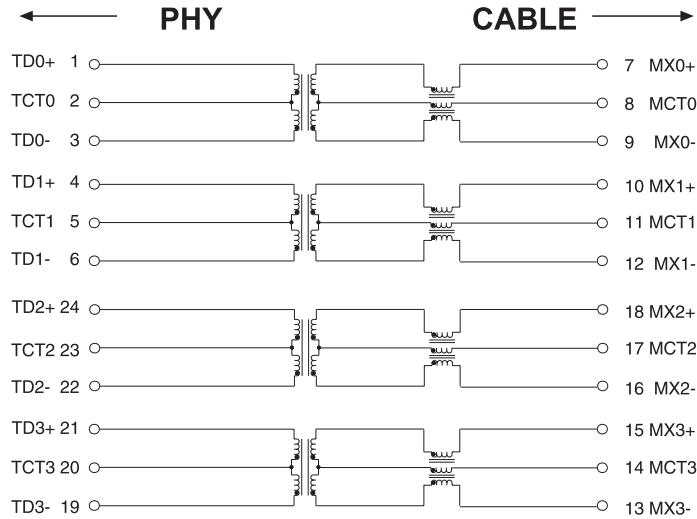
# High Density 1Gigabit PoE/PoE+ SMD Modules

BGA Quad/Dual/Single port for flexible PCB placement  
HX52xxNL, HX54xxNL, HX5610NL, and HX6xxxHL



## Schematic

H/HX5201NL, H/HX5401NL



Schematic shown for one port

DUAL and QUAD designs use the same pad numbering for the 2 and 4 ports

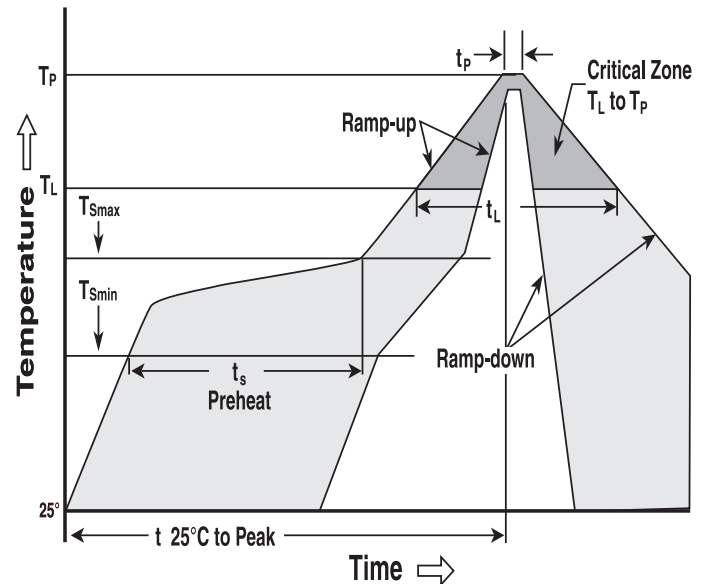
## Soldering Information

### Solder reflow profile conditions

Profile Feature		Lead-free Solder*
Pre-heat	Temperature Min ( $T_{Smin}$ )	150°C
	Temperature Max ( $T_{Smax}$ )	200°C
	Time ( $t_{Smin}$ to $t_{Smax}$ )	60-180 seconds
Reflow	Liquidus Temperature ( $T_L$ )	217°C
	Time ( $t_L$ )	60-150 seconds
Peak Temperature ( $T_P$ )		245°C ( $\pm 5^\circ\text{C}$ )
Time within 5°C of peak ( $T_P$ )		20-30 seconds
Average Ramp Up Rate ( $T_{Smax}$ to $T_P$ )		3°C/second max
Ramp Down Rate		6°C/second max
Time 25°C to Peak Temperature ( $T_P$ )		8 minutes max
Parts should not exceed...		245°C

\* See Curve

### Typical reflow profile

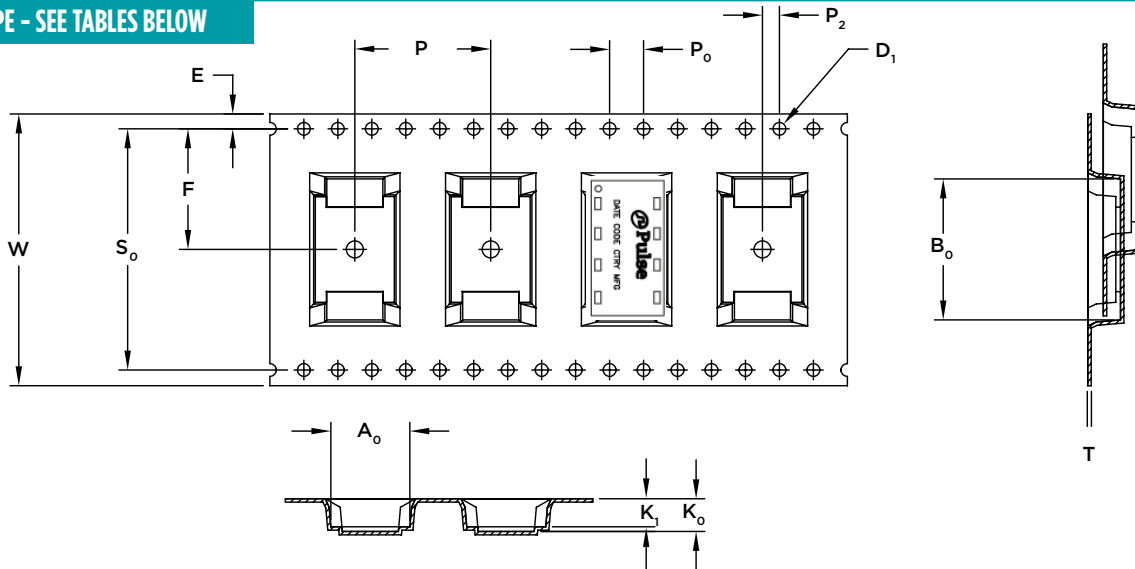


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## Tape & Reel

CARRIER TAPE - SEE TABLES BELOW



### SINGLE PORT MODULES

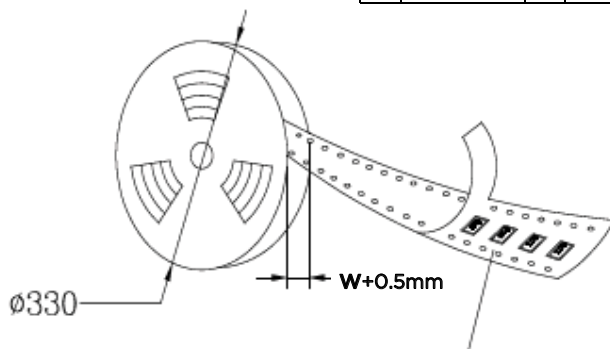
W	32.0±0.30	P	16.00	A <sub>0</sub>	8.20	B <sub>0</sub>	17.60
S <sub>0</sub>	28.40	P <sub>0</sub>	4.00	A <sub>1</sub>	-----	B <sub>1</sub>	-----
E	1.75	P <sub>2</sub>	2.00	A <sub>2</sub>	-----	B <sub>2</sub>	-----
F	14.20	D <sub>0</sub>	-----	K <sub>0</sub>	11.80	K <sub>1</sub>	11.30
T	0.50±0.05	D <sub>1</sub>	1.50 ±0.10 -0.00	QUANTITY PER REEL		300 pieces	

### DUAL PORT MODULES

W	32.0±0.30	P	24.00	A <sub>0</sub>	17.40	B <sub>0</sub>	14.85
S <sub>0</sub>	28.40	P <sub>0</sub>	4.00	A <sub>1</sub>	-----	B <sub>1</sub>	-----
E	1.75	P <sub>2</sub>	2.00	A <sub>2</sub>	-----	B <sub>2</sub>	-----
F	14.20	D <sub>0</sub>	-----	K <sub>0</sub>	11.70	K <sub>1</sub>	11.20
T	0.50±0.05	D <sub>1</sub>	1.50 ±0.10 -0.00	QUANTITY PER REEL		170 pieces	

### QUAD PORT MODULES

W	44.0±0.30	P	24.00	A <sub>0</sub>	17.60	B <sub>0</sub>	28.94
S <sub>0</sub>	40.40	P <sub>0</sub>	4.00	A <sub>1</sub>	-----	B <sub>1</sub>	-----
E	1.75	P <sub>2</sub>	2.00	A <sub>2</sub>	-----	B <sub>2</sub>	-----
F	20.20	D <sub>0</sub>	-----	K <sub>0</sub>	11.70	K <sub>1</sub>	11.20
T	0.50±0.05	D <sub>1</sub>	1.50 ±0.10 -0.00	QUANTITY PER REEL		170 pieces	



All Dimensions meet EIA-481-D requirements.

Component

1. **Material:** Black Conductive Polystyrene
2. **Components per Reel:** see table
3. **Quantity per carton:**

5reels (44mm) x 170 = 850 pcs  
5reels (32mm) X 170 = 850 pcs  
5reels (32mm) x 300 = 1500 pcs

### For More Information:

Americas - prod\_info\_network\_americas@yageo.com | Europe - prod\_info\_network\_emea@yageo.com | Asia - prod\_info\_network\_apac@yageo.com

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