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- Technical support
- Catalogs
- Technical Documents
- Product Samples
- Tyco Electronics Authorized Distributor Locations

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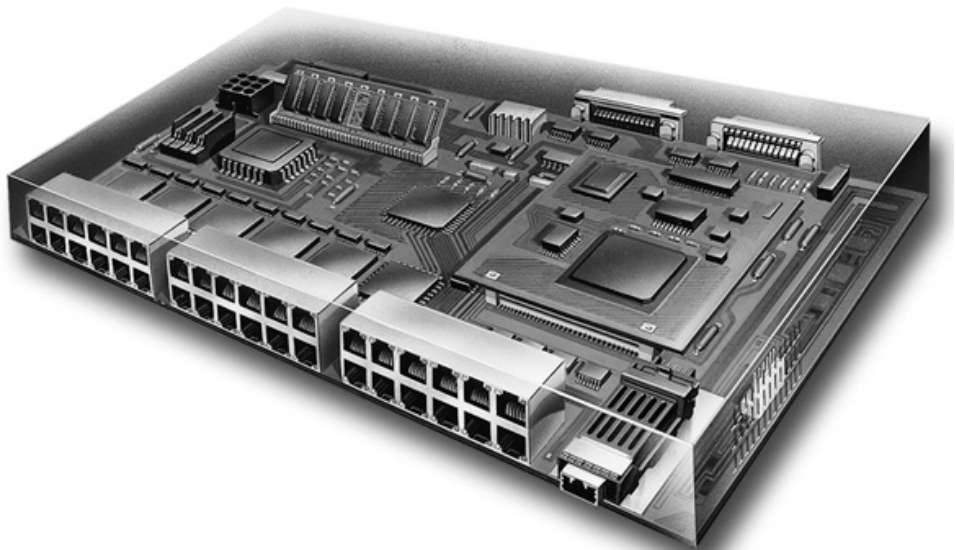


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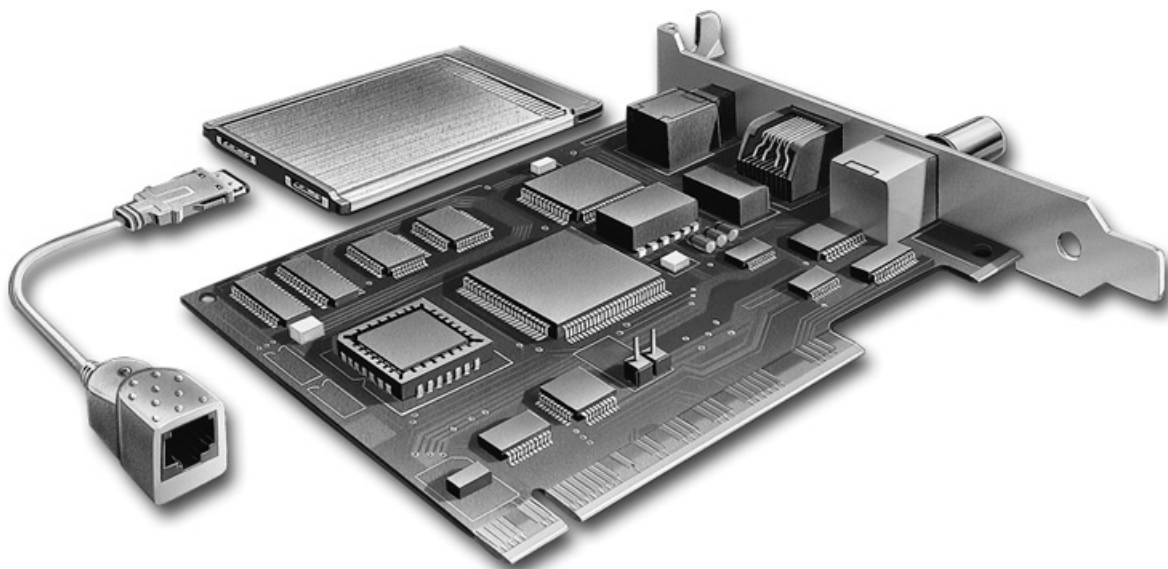
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Modular Jacks consist of single or multi-port, stacked, high performance, jacks with LEDs, surface or pc board mount, and shielded or unshielded varieties. They offer compact size, high reliability and meet FCC Rules and Regulations, Part 68. The high performance category 5 jacks conform to TIA/EIA-568A requirements. The housing materials are available in polyester for wave solder applications and high temperature Nylon, PCT or SPS for IR reflow applications. All housing materials are UL 94V-0 flame retardant. All shields consist of copper alloy base metal with tin-lead plating over copper underplate. All contacts are overall nickel plated phosphor bronze, with selectively plated gold in the contact area, and tin-lead in the solder area.

Single Port Modular Jacks

are available in both side or top entry and shielded or unshielded. The side entry additionally comes in a variety of heights from 17.4mm to 11.5mm. They are designed for direct mounting on pc boards and ease of soldering and board cleaning. The shielded mod jacks are available with and without panel grounds.

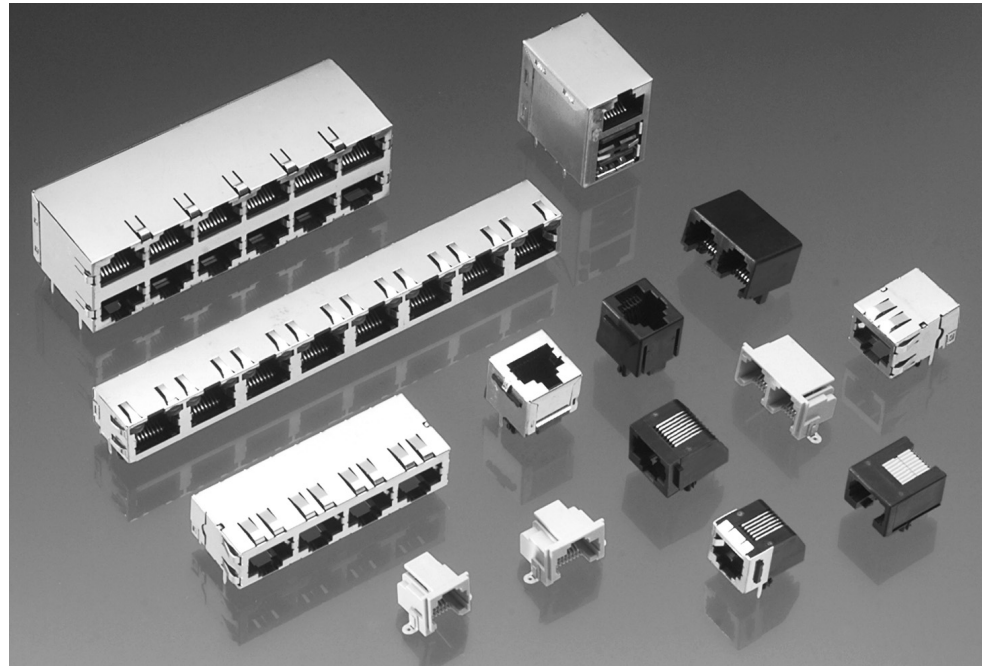
Multi-Port Modular Jacks

are for applications requiring printed circuit board mounted, shielded and unshielded, ganged modular jacks. With industry pc board footprints, these 8-position right-angle jacks can be designed into various networking devices.

Stacked Modular Jacks

low profile and narrow width allow more ports to be packed into less space, while the accurately positioned solder tails reduce assembly labor. Low profile stacked modular jacks exceed Near End Crosstalk (NEXT) requirements of

Introduction



40db at 100 MHz, on all 4-pair combinations. They are available in both unshielded and shielded versions. Shielded modular jacks are available with and without panel grounds.

High Density CAT 5e

MRJ 21 is a fully shielded, high density I/O interconnect providing density/space savings for current 10/100 or GbE RJ45/RJ21 applications. The cable assembly requires 1/3 the space of standard telecom configurations using Mod Plugs, MRJ 21, or RJ21 telecom connectors.

High Performance Modular Jacks

exceed Near End Crosstalk (NEXT) requirements of -40dB at 100 MHz, on all 4-pair combinations and meet requirements of FCC, Part 68. They are available in single or multi-port configurations, shielded or unshielded. The need for customized printed circuit boards to achieve high performance is eliminated.

LEDs integrated into the modular jack eliminates the need for additional system space for indicators. The

modular jack now functions as transmit/receive; line status and collisions can be identified by viewing LEDs directly in each port. This product is available in single, ganged, and stacked versions in a variety of LED color combinations.

Surface Mount Modular Jacks

are available in unshielded single and dual-port varieties along with a special invertible jack. These jacks are tape and reel packaged for automatic pick and place applications.

MAG45

In December 2001, Tyco Electronics acquired Transpower Technologies, a manufacturer of datacom, telecom, and power magnetic components. As a result, Tyco Electronics now offers a broad range of RJ45 modular jacks with integrated magnetics for 10 Base-T, 10/100 Base-T, 10/100/1000 Base-T, and VOIP/Powered Ethernet applications.

Configurations include single port, multiport (1x2, 1x4, 1x5, 1x6, 1x8),

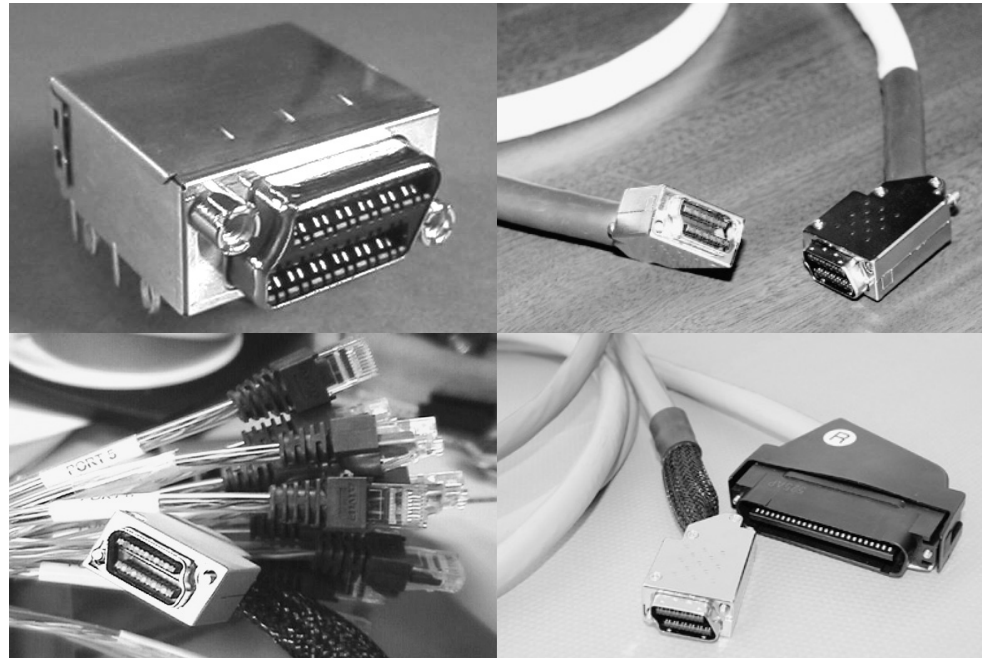
stacked (2x1, 2x3, 2x4, 2x6, 2x8), and stacked USB/RJ45. Integrated LEDs are optional.

- When specifying a MAG45 connector, the following information will assist in determining the correct part number for the application:
 - What is the transmission rate (10/100 Base-T, 10/100/1000 Base-T)?
 - Will the application require power over Ethernet capability?
 - What is the PHY (Physical Layer) Transceiver Chip? Is it Auto-MDIX enhanced? (Auto-sensing Media Dependent Interface Crossover)
 - Is an integrated 2 kV de-coupling capacitor desired?
 - Has a preferred electrical pin-out (signal path) been derived?
 - What is the connector configuration (single port, 1xN, 2xN, USB/RJ45)?
 - Are integrated LEDs required? If so, define color

Product Facts

- Designed to meet or exceed CAT 5e crosstalk. Contact layout and footprint for differential pairs creates reduced crosstalk and built in compensation.
- 1.5 to 4 times the port density of 2x6 stacked Mod Jack (RJ45)
- 3 times port density of an RJ21
- Height of dual receptacle meets requirements of Compact PCI component standard
- Fully shielded system to control EMI
- Robust die cast cable covers provide 45° left or right cable exit for ease of routing
- 1mm pair spacing, 1.5 pair to pair spacing
- Listed by Underwriters Laboratories Inc., File No. E81956
- Produced under a Quality Management System Certified to ISO 9001
A copy of the certificate is available upon request

High Density, CAT 5e MRJ 21



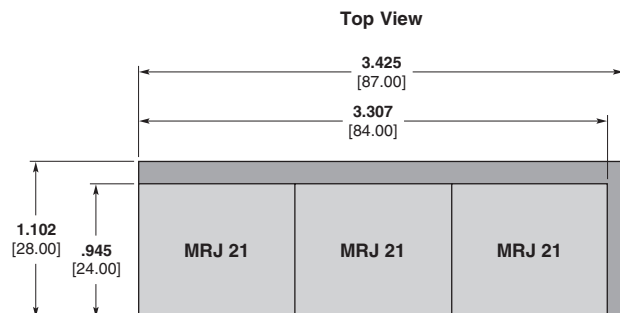
MRJ 21 is the next generation of I/O interconnect providing density/space savings for current 10/100 or GbE RJ45 applications or RJ21 applications. MRJ 21 provides a complete solution set for the customer including:

- PCB connectors in a variety of configurations
- Option for integrated magnetics
- Increases I/O port density over RJ45 connectors
- Cleaner cabling solutions than RJ45 cabling schemes
- Improved Wiring closet management
- Lower end user maintenance costs

Application



- Modular Data Center/SAN Connectivity
- Switches
- Core & Edge Routers
- Digital Cross Connects
- Gigabit Ethernet, 10/100 BaseT
- DSLAM
- Almost any place Mod Plugs are used today

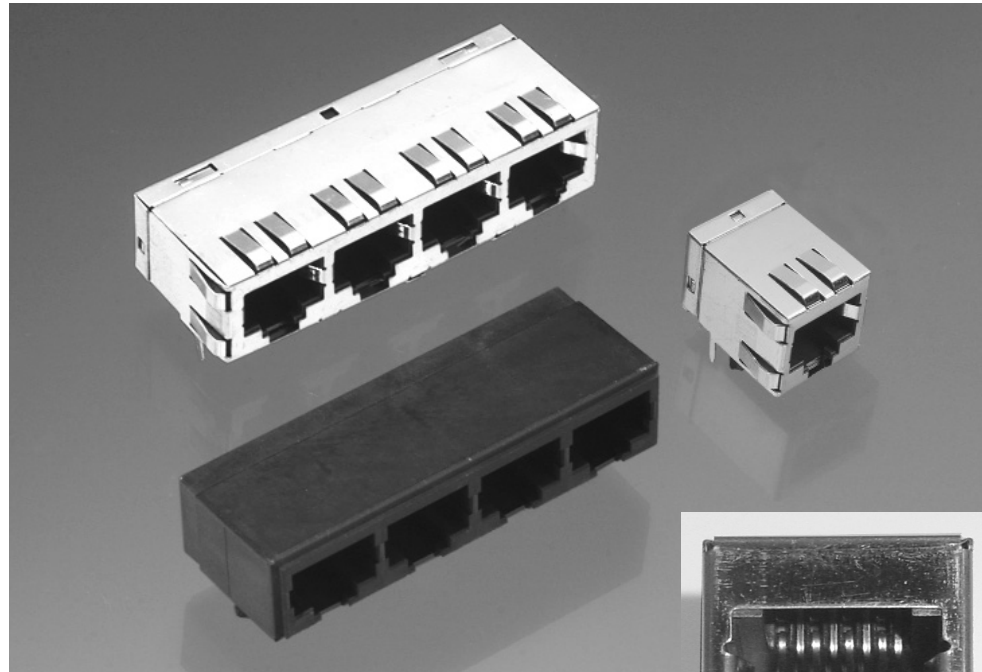
MRJ 21 vs. 2x6 Stacked Jack Density Comparison



Stacked Jack (2x6) = 12 ports	Port Increase
MRJ 21 @ 10/100 = 36 ports	3X
MRJ 21 @ GbE = 18 ports	1.5X

Product Facts

- Performance exceeds Near End Crosstalk (NEXT) requirements of -40dB on all pair combinations at 100 MHz per EIA/TIA 568A
- Meets all dimensional, tolerance and metallic plating requirements of FCC Part 68
- Available in single port or multiple port configurations, shielded or unshielded
- Accurately positioned solder tails reduce assembly labor while selectively deposited gold plating results in lower cost
- Eliminate need for customized printed circuit board compensation to achieve high performance
- Listed by Underwriters Laboratories Inc., File No. E81956 
- Certified by Canadian Standards Association, File No. LR 7189A 
- Produced under a Quality Management System Certified to ISO 9001
A copy of the certificate is available upon request

High Performance Modular Jacks

Top Entry

Specifications**Electrical**

Current — 1.5 amp maximum
@ 25°C

Voltage — 150 VAC maximum

Operating Temperature —
-40°C to 70°C

Insulation Resistance —
500 megaohms min.

Dielectric Withstanding Voltage —
1000 VAC, RMS

Mating/Unmating Forces —
5 pounds maximum

Durability (Mating Cycles) —
750 minimum

Material and Finish

Housing — High temperature Nylon, Black, UL 94V-0 rated, IR reflow compatible

Contact — Phosphor bronze, gold over nickel in contact area, tin-lead over nickel in solder area

Shield — Brass, bright tin-lead plated

Technical Documents



Application Specifications
114-02048

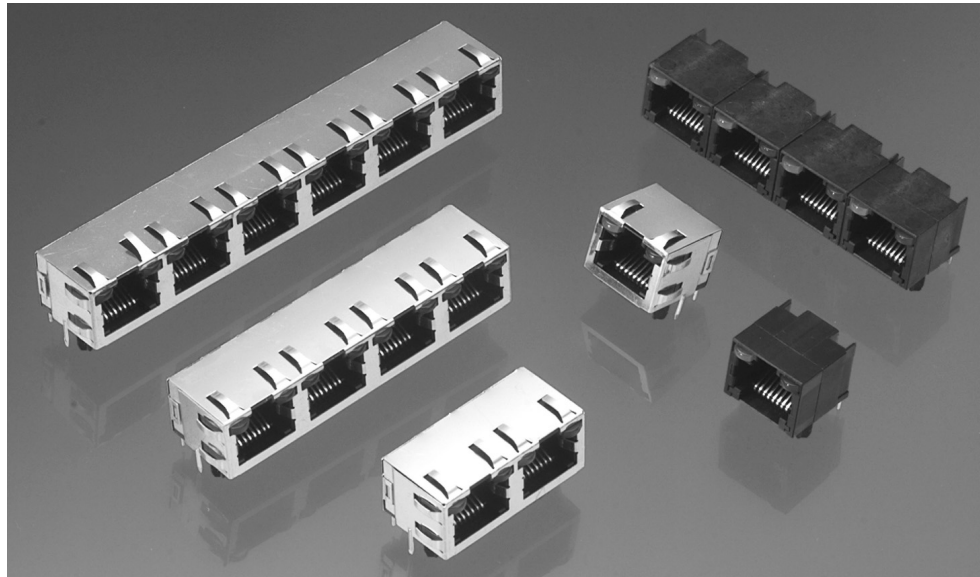
Product Specification
108-01163-2

High Performance Modular Jacks are typically Cat 5 performance or higher.
Category Performance Summary:

CAT 3: Up to 16 MHz at -34dB.	Typically used for voice and transmission rates up to and including 16 Mbps.
CAT 4: Up to 20 MHz at -44dB.	Typically used for improved Token Ring up to and including 20 Mbps.
CAT 5: Up to 100 MHz at -40dB.	Typically used for voice and transmission rates up to and including 100 Mbps.
CAT 5e: Up to 100 MHz at -43dB.	Typically used for voice and transmission rates up to and including 100 Mbps.

Product Facts

- Meets or exceeds FCC Part 68 rules and regulations with standard pc board footprints
- LEDs integrated directly into jack, yet maintains compact form
- Unshielded and shielded versions in popular size configurations
- Shielded jacks provide grounding through panel and pc board
- LEDs located at top of jack for effective visibility
- Accurately positioned solder tails reduce assembly labor while selectively deposited gold plating results in lower cost
- Listed by Underwriters Laboratories Inc., File No. E81956 
- Certified by Canadian Standards Association, File No. LR 7189A 
- Produced under a Quality Management System Certified to ISO 9001
A copy of the certificate is available upon request

LED Modular Jacks**Specifications****Electrical**

Current Rating — 1.5 amp max.
@ 25°C

Voltage Rating — 150 VAC max.
Dielectric Withstanding Voltage — 1000 VAC

Insulation Resistance —
500 megaohms min.

Shielding Effectiveness —
20dB min., 10 to 200 MHz

Mechanical

Durability — 750 mating cycles

Mating/Unmating Forces —
41½ lbs. max.

Operating Temperature —
40°C to 70°C

Material and Finish

Housing — High temperature Nylon
UL 94V-0 rated

Contact — .013 [0.33] Phosphor
bronze; plated .000050 [0.00127] gold
in localized area and .000150 [0.00381]
tin-lead on solder tails, over .000050
[0.00127] nickel underplate



Shield — .010 [0.25] copper alloy
tin-lead plated

Technical Documents

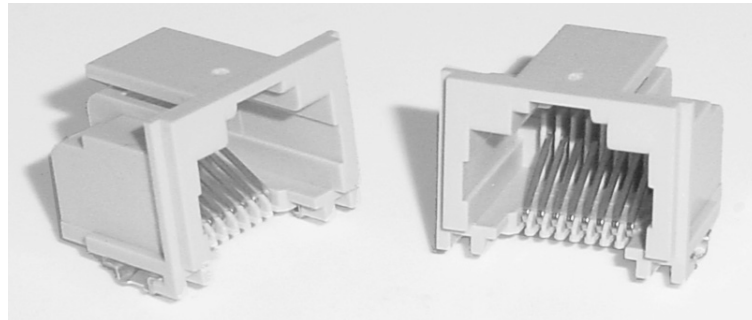
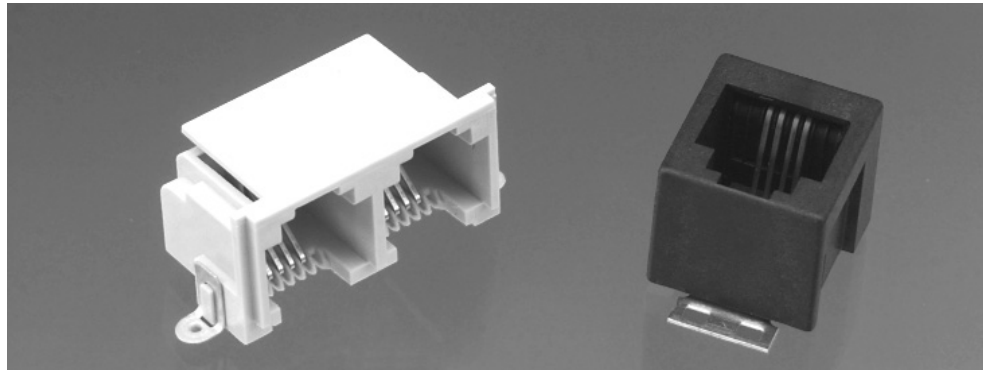
Application Specifications
114-2154

Product Specifications
108-01163-4

Product Facts

- Meets or exceeds FCC Part 68 rules and regulations; REA PE-76; and UL 1863, Communication Circuit Accessories
- Meets 1000 volt dielectric requirement
- Available in both single and multi-port
- Designed for direct mounting on pc boards
- Designed for ease of soldering and board cleaning
- Selectively gold plated contacts for lower cost
- Compatible with vapor phase & IR reflow soldering
- All jacks are flame retardant polyester
- Listed by Underwriters Laboratories Inc., File No. E81956 
- Certified by Canadian Standards Association, File No. LR 7189A 
- Produced under a Quality Management System Certified to ISO 9001

A copy of the certificate is available upon request

Surface Mount Modular Jacks**Specifications****Electrical**

Current Rating — 1.5 amp max. @ 25°C, derated to 0.2 amp max. @ 70°C ambient

Voltage Rating — 150 volts ac max.
Dielectric Withstanding Voltage — 1000 VAC, RMS, 60 Hz, 1 min.

Insulation Resistance — 500 megaohms min.

Surge Test — to 1000 volts

Mechanical

PC Board Retention — will not dislodge from pc board when subjected to 1 lb. [4.4N] pull before soldering and 10 lb. [44N] pull after soldering

Durability — 750 mating cycles

Material and Finish

Housing — Polyphenylene Sulfide, UL 94V-0 rated

Contact — .014 [0.36] thk. Phosphor bronze; plated .000050 [0.00127] gold in contact area and .000150 [0.00381] tin-lead on solder tails, over .000050 [0.00127] nickel underplate

Technical Documents

Application Specifications
114-02048



Product Specifications
108-01163

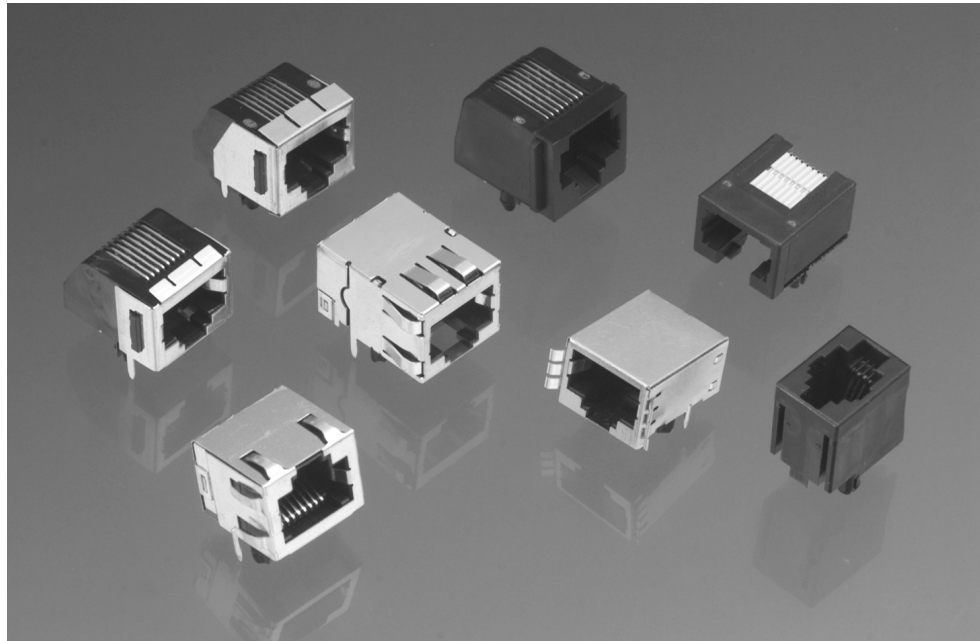
Product Offering Matrix

Family	Termination	Perf	Single Port (RJ11)					Multi-Port (RJ11)					Multi-Port 8 Position (RJ45)					Stackjack 8 Position (RJ45)				
			4	6	8	10	1x2	1x2	1x3	1x4	1x4	1x5	1x6	1x8	2x1	2x2	2x3	2x4	2x6	2x8		
Side Entry (RA)	Thru-Hole	3																				
Side Entry (RA)	Surface Mt	3																				
Side Entry (RA) Cat 4 Low Cost	Thru-Hole	4																				
Side Entry (RA) Cat 4 Low Cost Shielded	Thru-Hole	4																				
Side Entry (RA) Cat 5	Thru-Hole	5																				
Side Entry (RA) Cat 5 Shielded	Thru-Hole	5																				
Side Entry (RA) Cat 5 Shielded LEDs	Thru-Hole	5																				
Side Entry (RA) Cat 5 Shielded Offset	Thru-Hole	5																				
Side Entry (RA) Cat 5 Shielded Offset	Compliant Lead	5																				
Side Entry (RA) Cat 5 Shielded Offset	Compliant Lead	5																				
Side Entry (RA) Inverted	Thru-Hole	3																				
Side Entry (RA) Inverted	Surface Mt	3																				
Side Entry (RA) Inverted Shielded	Thru-Hole	5 on 2 pair																				
Side Entry (RA) Inverted Shielded	Surface Mt	5 on 2 pair																				
Side Entry (RA) Inverted Shielded LEDs	Thru-Hole	5 on 2 pair																				
Side Entry (RA) Inverted Shielded LEDs	Surface Mt	3																				
Side Entry (RA) Shielded	Thru-Hole	3																				
Side Entry (RA) Shielded LEDs	Thru-Hole	3																				
Top Entry	Thru-Hole	3																				
Top Entry	Surface Mt	3																				
Top Entry Cat 5	Thru-Hole	5																				
Top Entry Cat 5	Compliant Lead	5																				
Top Entry Cat 5 Shielded	Thru-Hole	5																				
Top Entry Cat 5 Shielded	Surface Mt	5																				
Top Entry Cat 5 Shielded	Compliant Lead	5																				
Top Entry Shielded	Thru-Hole	3																				
Top Entry Shielded	Surface Mt	3																				
Top Entry Shielded LEDs	Thru-Hole	3																				
Bottom Entry	Thru-Hole	3																				
Bottom Entry	Surface Mt	3																				

Key: = Toolled
 = Review in progress

Product Facts

- Meets or exceeds FCC Part 68 rules and regulations; REA PE-76; and UL 1863, Communication Circuit Accessories
- Meets 1000 volt dielectric requirement Contact to Contact
- Available in both top and side entry (Right-Angle)
- Designed for direct mounting on pc boards
- Designed for ease of soldering and board cleaning
- Available in both shielded and unshielded versions
- Shielded jack available with two grounding paths - pc board and panel
- 20 dB shielding effectiveness from 30 MHz to 400 MHz
- Selectively gold plated contacts for lower cost
- All jacks are UL 94V-0 flame retardant polyester, standard color black, unless specified otherwise
- Listed by Underwriters Laboratories Inc., File No. E81956 
- Certified by Canadian Standards Association, File No. LR 7189A 
- Produced under a Quality Management System Certified to ISO 9001
A copy of the certificate is available upon request

Single Port Modular Jacks**Specifications****Electrical**

Current Rating — 1.5 amp max. @ 25°C, derated to 0.2 amp max. @ 70°C ambient

Voltage Rating — 150 volts AC max.

Dielectric Withstanding Voltage — 1000 VAC, RMS, 60 Hz, 1 min. Contact to Contact

Mechanical

PC Board Retention — will not dislodge from pc board when subjected to 1 lb. [4.4N] pull before soldering and 10 lb. [44N] pull after soldering

Durability — 750 mating cycles

Material and Finish

Housing — Through-hole: Polyester (wave solder compatible), UL 94V-0 rated; Surface Mount: Polyphenylene Sulfide, or High Temp Nylon, UL 94V-0 rated

Contact — .014 [0.36] thk. Phosphor bronze; plated .000050 [0.00127] gold in contact area and .000150 [0.00381] tin-lead on solder tails, over .000050 [0.00127] nickel underplate

Technical Documents**Application Specifications**

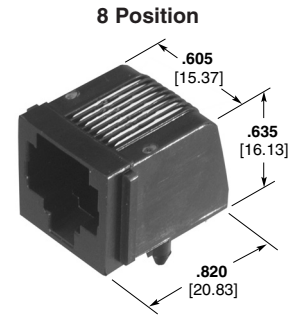
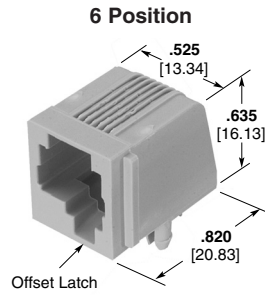
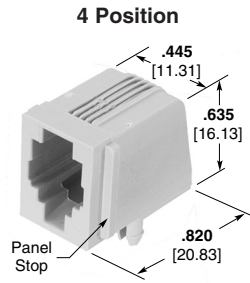
114-02048
114-6040

Product Specifications

108-01163
108-01163-1
108-01163-3
108-01163-4
108-01163-7

Single Port Modular Jacks (Continued)

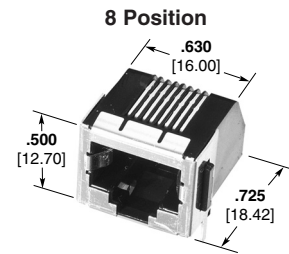
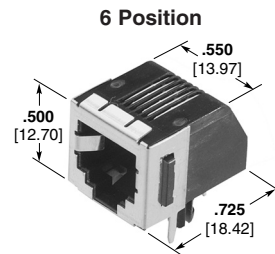
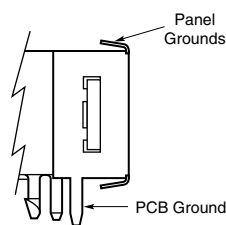
Side Entry (RA), Thru-Hole



Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
215875-1	4/4	Without	No	Cat 3	Without	No	Without
2-215875-1	4/4	Without	No	Cat 3	Without	No	Without
520249-2	4/4	Without	No	Cat 3	With	No	Without
1-440050-1	6/4	Without	No	Cat 3	Without	No	Without
215876-2	6/4	Without	No	Cat 3	Without	No	Without
555140-2	6/4	Without	Yes	Cat 3	With	No	Panel and PCB
555163-2	6/4	Without	No	Cat 3	With	No	Without
1-215876-3	6/6	Without	No	Cat 3	Without	No	Without
215876-1	6/6	Without	No	Cat 3	N/A	No	Without
520250-3	6/6	Without	No	Cat 3	With	No	Without
555003-1	6/6	Without	No	Cat 3	With	No	Without
555140-1	6/6	Without	Yes	Cat 3	With	No	Panel and PCB
555154-1	6/6	Without	Yes	Cat 3	With	No	PCB Ground
555163-1	6/6	Without	No	Cat 3	With	No	Without
555165-1	6/6	Without	No	Cat 3	Without	No	Without
106066-2	8/8	Without	Yes	Cat 3	Without	No	Panel and PCB
1116062-1	8/8	Without	Yes	Cat 5	Without	No	Panel and PCB
1116503-1	8/8	Without	Yes	Cat 5	Without	No	PCB Ground
1116526-1	8/8	Without	Yes	Cat 5	Without	No	PCB Ground
1-215877-3	8/8	Without	No	Cat 3	Without	No	Without

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Low Profile, Face Shield



Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
555162-1	8/8	Without	No	Cat 3	With	No	Without
555164-1	8/8	Without	No	Cat 3	Without	No	Without
1-406299-1	8/8	Without	Yes	Cat 5	Without	No	Panel and PCB
1-440376-1	8/8	Without	Yes	Cat 3	Without	No	Panel and PCB
1470340-1	8/8	Without	Yes	Cat 3	Without	No	PCB Ground
215877-1	8/8	Without	No	Cat 3	Without	No	Without
2-215877-1	8/8	Without	No	Cat 3	Without	No	Without
2-215878-1	8/8	Without	No	Cat 3	Without	No	Without
2-338556-1	8/8	Without	Yes	Cat 3	Without	No	Panel and PCB
3-338556-1	8/8	Without	Yes	Cat 3	Without	No	Panel and PCB
406217-1	8/8	Without	Yes	Cat 5	Without	No	Panel and PCB
406296-1	8/8	Without	Yes	Cat 5	Without	No	Panel and PCB

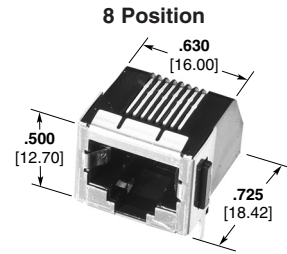
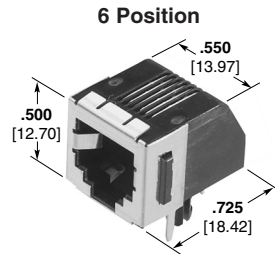
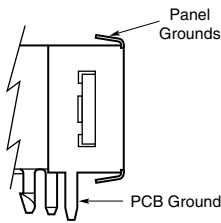
Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Single Port Modular Jacks (Continued)

Side Entry (RA), Thru-Hole

Low Profile, Face Shield
(Continued)

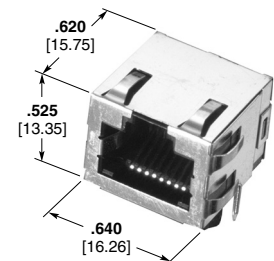
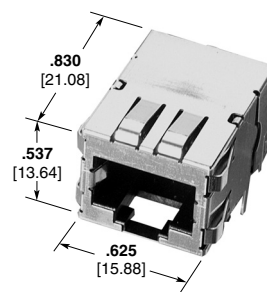
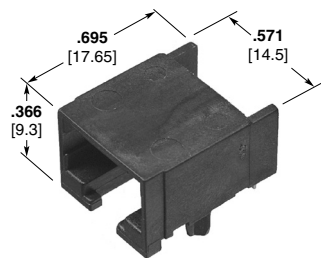
Single Port
Modular Jacks



Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
406299-1	8/8	Without	Yes	Cat 5	Without	No	Panel and PCB
406525-1	8/8	Without	No	Cat 5	Without	Yes	Without
406541-1	8/8	Without	Yes	Cat 5	Without	Yes	Panel and PCB
520243-4	8/8	Without	No	Cat 3	Without	No	Without
520251-4	8/8	Without	No	Cat 3	With	No	Without
520426-4	8/8	Without	No	Cat 3	Without	No	Without
555141-1	8/8	Without	Yes	Cat 3	Without	No	Panel and PCB
555153-1	8/8	Without	Yes	Cat 3	With	No	PCB Ground
555153-3	8/8	Without	Yes	Cat 3	With	No	PCB Ground

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Side Entry (RA), Thru-Hole



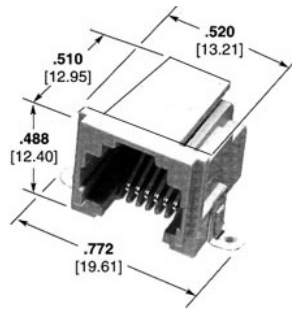
Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
555166-1	8/8	Without	No	Cat 3	With	No	Without
555167-1	8/8	Without	No	Cat 3	Without	No	Without
557785-1	8/8	Without	No	Cat 3	Without	No	Without
557789-1	8/8	Without	Yes	Cat 3	Without	No	PCB Ground
557791-1	8/8	Without	Yes	Cat 3	Without	No	Panel and PCB
558341-1	8/8	Without	No	Cat 5	Without	No	Without
558342-1	8/8	Without	Yes	Cat 5	Without	No	PCB Ground
558344-1	8/8	Without	Yes	Cat 5	Without	No	Panel and PCB
569115-1	8/8	Without	Yes	Cat 3	With	No	Panel and PCB
569118-1	8/8	Without	No	Cat 3	Without	No	Without
1116075-1	8/8	With	Yes	Cat 5	Without	Yes	PCB Ground
1116173-1	8/8	With	Yes	Cat 5	Without	Yes	Panel and PCB
1364139-5	8/8	With	No	Cat 5	Without	Yes	Without
1470215-2	8/8	With	Yes	Cat 3	Without	No	PCB Ground
406533-1	8/8	With	No	Cat 5	Without	Yes	Without
406549-1	8/8	With	Yes	Cat 5	Without	Yes	Panel and PCB
406549-4	8/8	With	Yes	Cat 5	Without	Yes	Panel and PCB
569564-1	8/8	With	Yes	Cat 3	Without	No	Panel and PCB
1470272-5	10/10	Without	No	Cat 3	Without	No	Without
558065-1	10/10	Without	No	Cat 3	Without	No	Without
558067-1	10/10	Without	Yes	Cat 3	Without	No	PCB Ground
558070-1	10/10	Without	Yes	Cat 3	Without	No	Panel and PCB

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

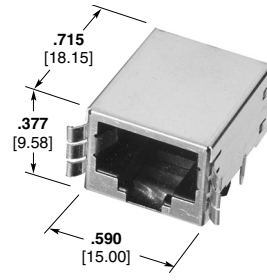
Side Entry (RA),
Surface Mount

Modular Jacks and MRJ 21

Single Port Modular Jacks (Continued)



1339212-1

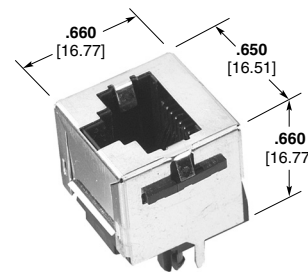


1339212-1

Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
406545-2	6/4	Without	No	Cat 3	Without	Yes	Without
1339212-1	6/6	Without	Yes	Cat 3	Without	Yes	Panel and PCB
406514-2	6/6	Without	No	Cat 3	Without	Yes	Without
555077-1	6/6	Without	No	Cat 3	With	No	Without
1339160-1	8/8	Without	Yes	Cat 3	Without	Yes	Panel and PCB
406721-1	8/8	Without	No	Cat 3	With	Yes	Without
406721-2	8/8	Without	No	Cat 3	With	Yes	Without
406721-4	8/8	Without	No	Cat 3	With	Yes	Without
558178-1	8/8	Without	Yes	Cat 3	With	No	PCB Ground

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Top Entry, Thru-Hole



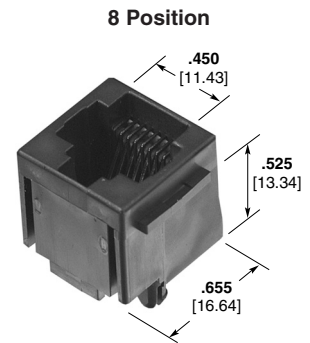
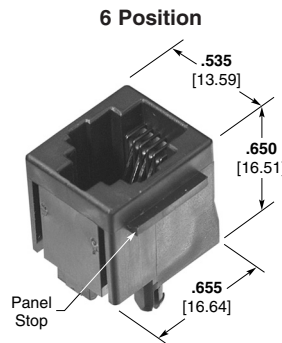
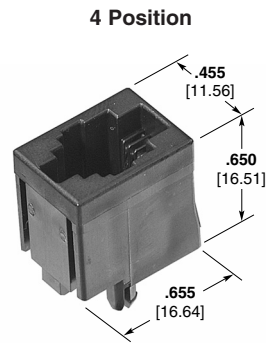
Shielded 557484-1

Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
520257-2	4/4	Without	No	Cat 3	With	No	Without
406010-2	6/2	Without	No	Cat 3	Without	No	Without
520258-2	6/4	Without	No	Cat 3	With	No	Without

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Single Port Modular Jacks (Continued)

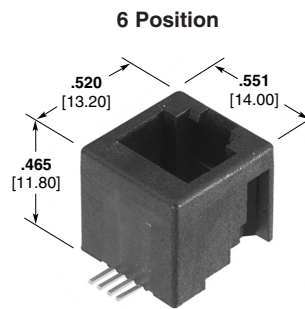
Top Entry, Thru-Hole



Part Number	Positions/ Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
520425-2	6/4	Without	No	Cat 3	Without	No	Without
216548-1	6/6	Without	No	Cat 3	With	No	Without
216564-1	6/6	Without	No	Cat 3	With	No	Without
520258-3	6/6	Without	No	Cat 3	With	No	Without
520425-3	6/6	Without	No	Cat 3	Without	No	Without
554990-1	6/6	Without	No	Cat 3	With	No	Without
100616-1	8/8	Without	Yes	Cat 3	With	No	PCB Ground
100616-2	8/8	Without	Yes	Cat 3	With	No	PCB Ground
1116202-1	8/8	Without	Yes	Cat 5	Without	No	PCB Ground
216550-1	8/8	Without	No	Cat 3	With	No	Without
216566-1	8/8	Without	No	Cat 3	With	No	Without
520259-4	8/8	Without	No	Cat 3	With	No	Without
555799-1	8/8	Without	No	Cat 3	Without	No	Without
556416-1	8/8	Without	No	Cat 3	Without	No	Without
557484-1	8/8	Without	Yes	Cat 3	With	No	Panel and PCB
557730-1	8/8	Without	Yes	Cat 3	With	No	Panel and PCB
557969-1	8/8	Without	Yes	Cat 3	With	No	Panel and PCB
557969-2	8/8	Without	Yes	Cat 3	With	No	Panel and PCB

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Top Entry, Surface Mount



**Top or Bottom Entry
Part Number 1-338088-3**

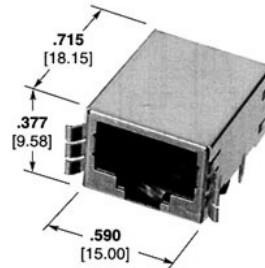
Part Number	Positions/ Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
1-338084-3	4/4	Without	No	Cat 3	Without	No	Without
1-338086-3	6/6	Without	No	Cat 3	Without	No	Without
2-338086-3	6/6	Without	No	Cat 3	Without	No	Without
1-338088-3	8/8	Without	No	Cat 3	Without	No	Without
2-338088-3	8/8	Without	No	Cat 3	Without	No	Without

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Single Port
Modular Jacks

Single Port Modular Jacks (Continued)

Top Entry, Press Fit

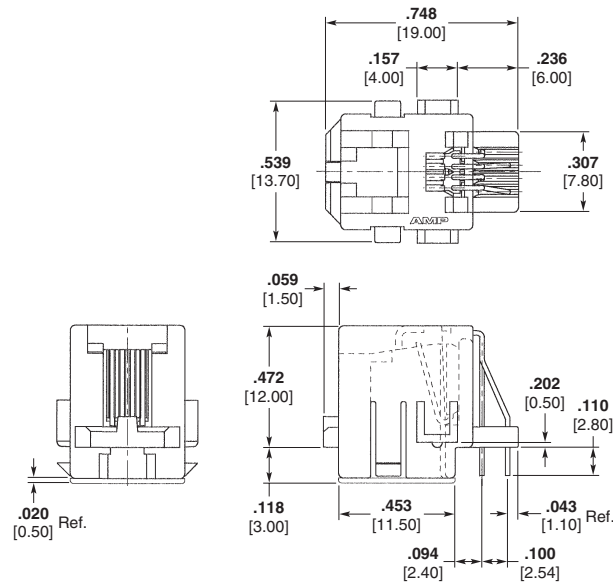


Part Number 1116201-1

Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
1116201-1	8/8	Without	No	Cat 5	Without	No	Without
1116201-2	8/8	Without	No	Cat 5	Without	No	Without
1116202-1	8/8	Without	Yes	Cat 5	Without	No	PCB
1116418-1	8/8	Without	Yes	Cat 5	Without	No	Panel and PCB

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Bottom Entry, Thru-Hole



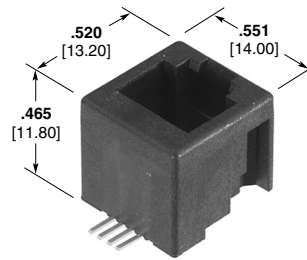
Part Number 216444

Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
216444-1	4/4	Without	No	Cat 3	Without	No	Without
216446-1	6/6	Without	No	Cat 3	Without	No	Without

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Bottom Entry, Surface Mount

6 Position

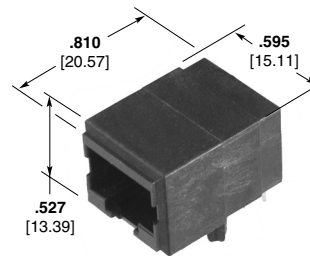


Top or Bottom Entry
Part Number 1-338088-3

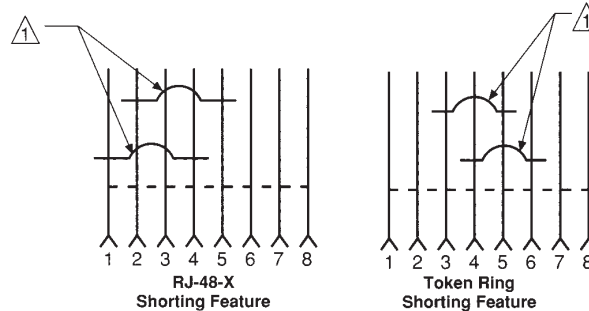
Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
100860-1	6/6	Without	No	Cat 3	Without	No	Without
1-338088-5	8/8	Without	No	Cat 3	Without	No	Without
2-100860-1	6/6	Without	No	Cat 3	Without	No	Without

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Shorting
Unshielded

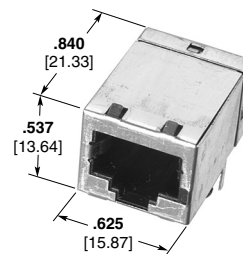


Positions/Contacts	Shorting Configuration	Tray Packaging Part No.
8/8	1-4 & 2-5 RJ 48X	557788-1
8/8	3-5 & 4-6 IBM Token Ring Emulation	557812-1



⚠ Short is removed by insertion of modular plug.

Shielded





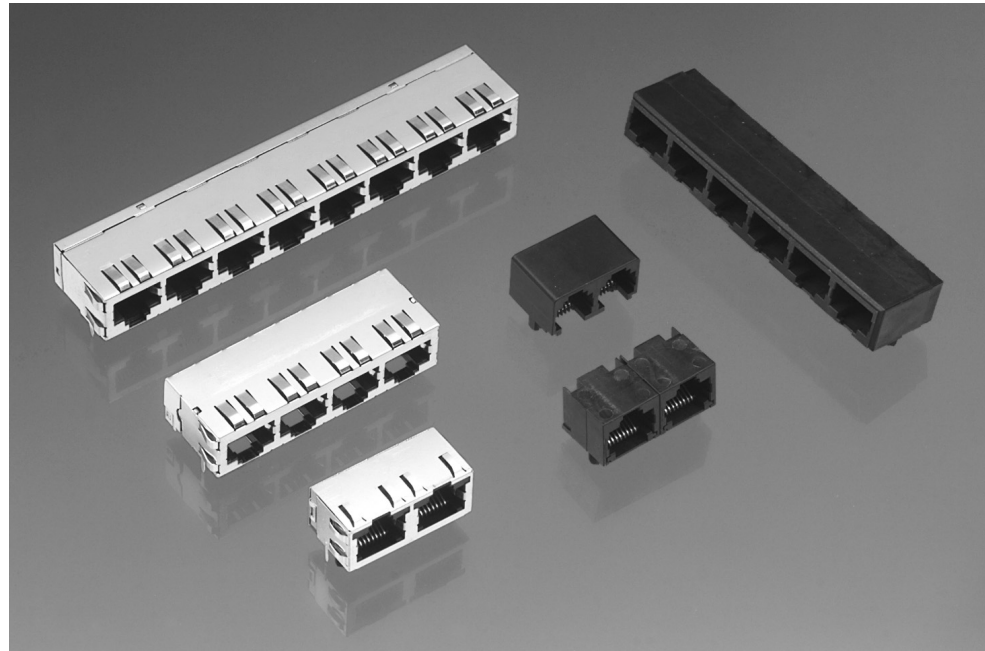
Positions/Contacts	Shorting Configuration	Panel Grounds	Tray Packaging Part Numbers
8/8	1-4 & 2-5 RJ 48X	—	557789-1
8/8	1-4 & 2-5 RJ 48X	Y	557791-1
8/8	3-5 & 4-6 IBM Token Ring Emulation	—	557813-1

NOTE: SHIELDED PRODUCT WITH PANEL GROUNDS ALWAYS CONTAINS PCB GROUNDS

IBM is a trademark of International Business Machine Corporation.

Multi-Port Modular Jacks**Product Facts**

- Meets or exceeds FCC Part 68 rules and regulations with standard pc board footprints
- Low profile and narrow width allow more ports to be packed into less space
- Unshielded and shielded versions in popular size configurations
- Positive connection throughout life of equipment with insert molded contacts
- Accurately positioned solder tails reduce assembly labor while selectively deposited gold plating results in lower cost
- Center mounting leg available on 8 port shielded and unshielded versions
- Available with two grounding paths; pc board & panel
- Listed by Underwriters Laboratories Inc., File No. E81956 
- Certified by Canadian Standards Association, File No. LR 7189A 
- Produced under a Quality Management System Certified to ISO 9001
A copy of the certificate is available upon request

**Specifications****Electrical**

Current Rating — 1.5 amp max. @ 25°C

Voltage Rating — 150 VAC max. Contact to Contact

Dielectric Withstanding Voltage — 1000 VAC

Insulation Resistance — 500 megaohms min.

Shielding Effectiveness — 20dB min., 10 to 200 MHz

Mechanical

Durability — 750 mating cycles

Mating/Unmating Forces — 5 lbs. max.

Operating Temperature — 40°C to 70°C

Material and Finish

Housing — High temperature nylon, black UL 94V-0 rated

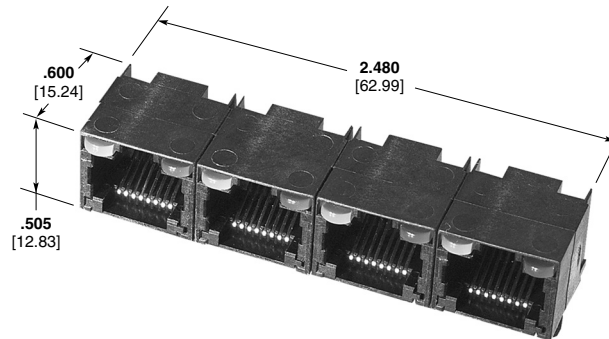
Contact — .013 [0.33] Phosphor bronze; plated .000050 [0.00127] gold in localized area and .000150 [0.00381] tin-lead on solder tails, over .000050 [0.00127] nickel underplate

Shield — .010 [0.25] or .0077 [0.20] copper alloy tin-lead plated

Technical Documents

Application Specifications
114-02048

Product Specifications
108-01163

Multi-Port Modular Jacks (Continued)**Side Entry (RA), Thru-Hole****Multi-Port
Unshielded**

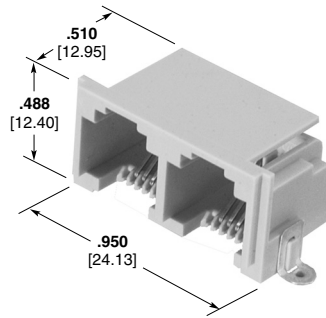
No. of Ports	Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
1 x 2	3-1470157-3	6/6	Without	No	Cat 3	Without	Yes	Without
1 x 2	406542-1	6/6	Without	No	Cat 3	Without	Yes	Without
1 x 2	406443-1	8/8	Without	Yes	Cat 5	Without	No	PCB Ground
1 x 2	557560-1	8/8	Without	No	Cat 4	Without	No	Without
1 x 2	1116353-1	8/8	With	Yes	Cat 5	Without	Yes	Panel and PCB
1 x 2	1368419-1	8/8	With	Yes	Cat 5	Without	Yes	Panel and PCB
1 x 4	1470668-2	8/8	Without	Yes	Cat 3	Without	No	Panel and PCB
1 x 4	406203-3	8/8	Without	Yes	Cat 5	Without	No	Panel and PCB
1 x 4	406281-3	8/8	Without	Yes	Cat 5	Without	No	Panel and PCB
1 x 4	557562-1	8/8	Without	No	Cat 4	Without	No	Without
1 x 4	558503-1	8/8	Without	Yes	Cat 5	Without	No	PCB Ground
1 x 4	406536-4	8/8	With	No	Cat 5	Without	Yes	Without
1 x 4	406552-1	8/8	With	Yes	Cat 5	Without	Yes	Panel and PCB
1 x 4	406552-4	8/8	With	Yes	Cat 5	Without	Yes	Panel and PCB
1 x 6	406206-1	8/8	Without	Yes	Cat 5	Without	No	Panel and PCB
1 x 8	558505-1	8/8	Without	Yes	Cat 5	Without	No	PCB Ground

**Side Entry (RA), Thru-Hole
(Combination RJ11/RJ45)**

No. of Ports	Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
1 x 2	2-1470660-2	6/2	With	Yes	Cat 3	Without	Yes	PCB Ground
1 x 2	1470120-1	6/2	Without	Yes	Cat 3	Without	Yes	PCB Ground

Multi-Port Modular Jacks (Continued)

Side Entry (RA), Surface Mount



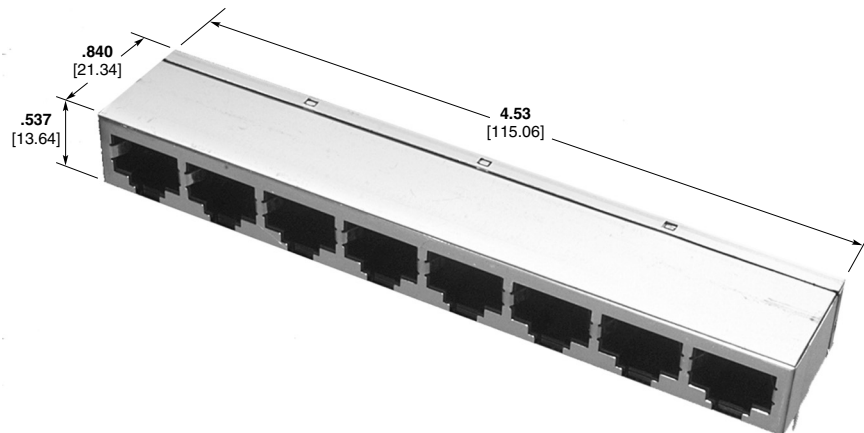
Part Number 406903-1

No. of Ports	Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
1 x 2	406903-1	6/6	Without	No	Cat 3	Without	Yes	Without
1 x 2	406903-2	6/6	Without	No	Cat 3	Without	Yes	Without

Top Entry, Thru-Hole

No. of Ports	Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
1 x 6	569748-1	8/8	Without	No	Cat 5	Without	No	Without



Shorting

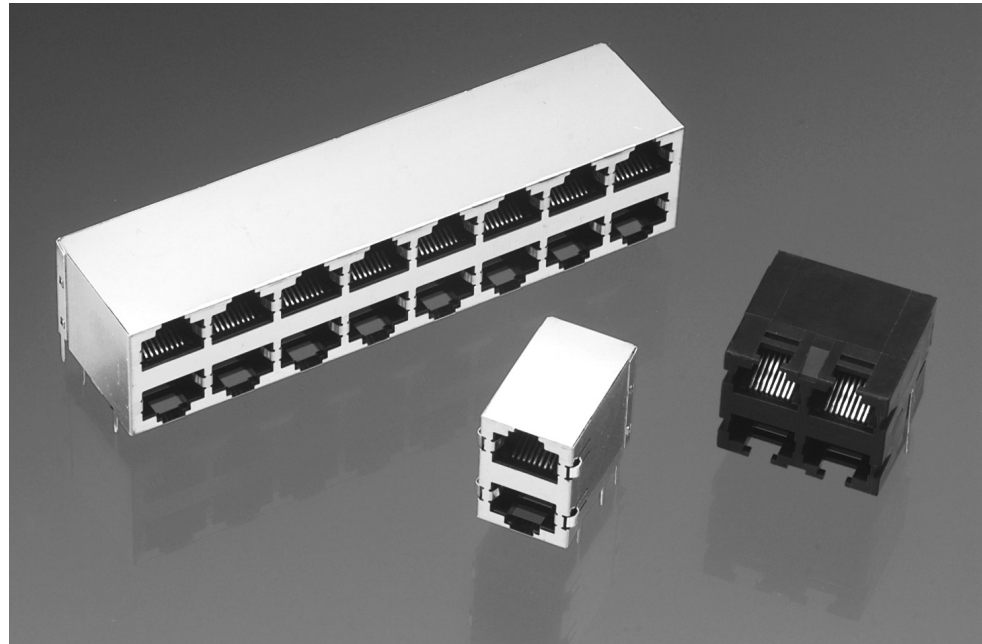


No. of Ports	Positions/Contacts	Shorting Configuration	Panel Grounds	Tray Packaging Part Numbers
1 x 8	8/8	1-4 & 2-5 RJ 48X	—	558846-1

NOTE: SHIELDED PRODUCT WITH PANEL GROUNDS ALWAYS CONTAINS PCB GROUNDS

Stacked Modular Jacks**Product Facts**

- Performance exceeds Near End Crosstalk (NEXT) requirements of -40dB on all pair combinations at 100 MHz per EIA/TIA 568A
- All Stacked Jacks have Category 5 performance.
- Meets or exceeds FCC Part 68 rules and regulations with standard pc board foot-prints
- Low profile and narrow width allow more ports to be packed into less space
- Unshielded and shielded versions in popular size configurations
- Positive connection through-out life of equipment with insert molded contacts
- Accurately positioned solder tails reduce assembly labor while selectively deposited gold plating results in lower cost
- Center mounting leg standard on 8 port shielded and unshielded versions
- Available with two ground-ing paths; pc board & panel
- Listed by Underwriters Laboratories Inc., File No. E81956 
- Certified by Canadian Standards Association, File No. LR 7189A 
- Produced under a Quality Management System Certified to ISO 9001
A copy of the certificate is available upon request

**Specifications****Electrical**

- Current Rating** — 1.5 amp max. @ 25°C
- Voltage Rating** — 150 VAC max.
- Dielectric Withstanding Voltage** — 1000 VAC
- Insulation Resistance** — 500 megaohms min.
- Shielding Effectiveness** — 20dB min., 10 to 200 MHz

Mechanical

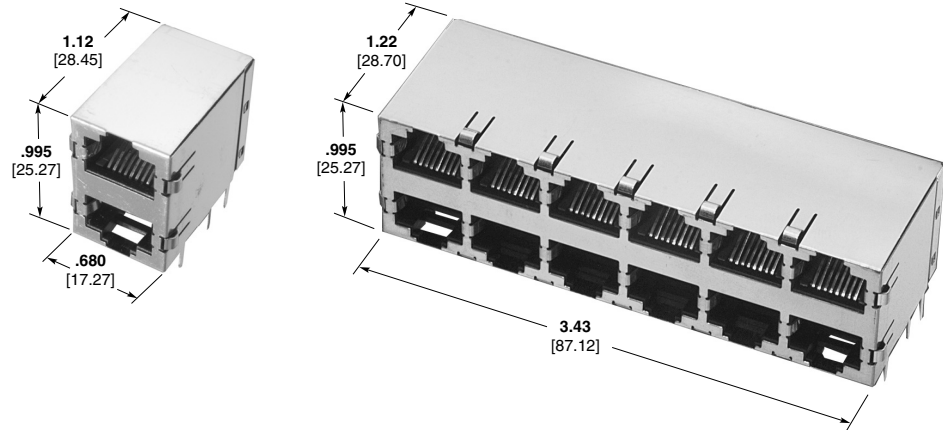
- Durability** — 750 mating cycles
- Mating/Unmating Forces** — 5 lbs. max.
- Operating Temperature** — -40°C to 70°C

Material and Finish

- Housing** — High temperature Nylon, black UL 94V-0 rated, IR reflow compatible
- Contact** — .013 [0.33] Phosphor bronze; plated .000050 [0.00127] gold in localized area and .000150 [0.00381] tin-lead on solder tails, over .000050 [0.00127] nickel underplate
- Shield** — .010 [0.25] copper alloy tin-lead plated

Technical Documents

- Application Specifications**
114-02048
- Product Specifications**
108-1163-2

Stacked Modular Jacks (Continued)**Side Entry (RA), Thru-Hole**

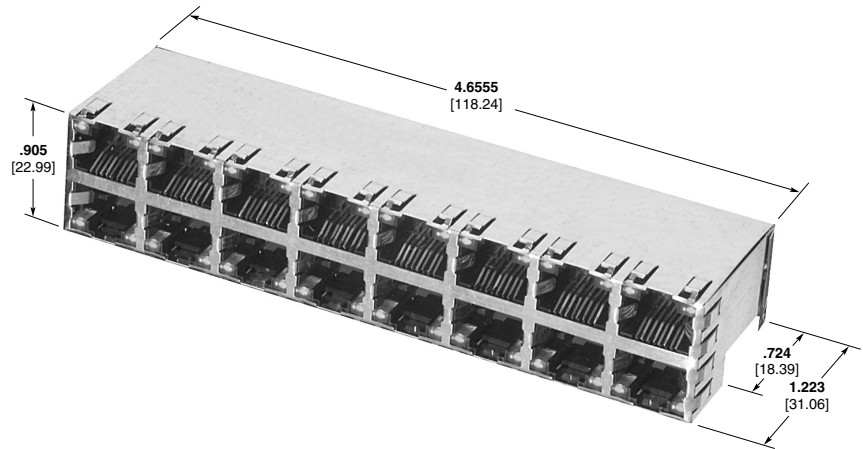
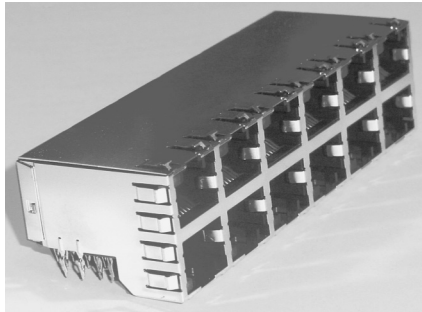
No. of Ports	Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
2 x 1	569381-1	8/8	Without	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 2	569260-1	8/8	Without	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 3	569256-1	8/8	Without	Yes	Cat 5	Without	N/A	PCB Ground
2 x 4	1470669-2	8/8	Without	Yes	Cat 3	Without	N/A	Panel and PCB
2 x 4	569257-1	8/8	Without	Yes	Cat 5	Without	N/A	PCB Ground
2 x 4	569262-1	8/8	Without	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 6	406494-1	8/8	Without	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 6	569263-1	8/8	Without	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 8	569254-1	8/8	Without	Yes	Cat 5	Without	N/A	PCB Ground
2 x 8	569259-1	8/8	Without	Yes	Cat 5	Without	N/A	PCB Ground
2 x 8	569264-1	8/8	Without	Yes	Cat 5	Without	N/A	Panel and PCB

Note: Consult Tyco Electronics Sales Representative for additional Part Numbers and features differences (tail length, LED color, IRR, etc.)

Hole location varies among modular jack assemblies and is determined by the dimension from the center of the boardlock or guide pin mounting legs to the center of the shield tab solder tine.

Stacked Modular Jacks (Continued)

Side Entry (RA),
Press Fit/Offset

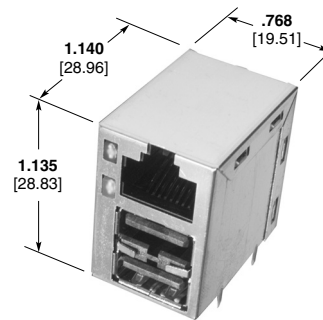


Stacked
Modular Jacks

No. of Ports	Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
2 x 4	1368077-2	8/8	Without	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 4	1368062-1	8/8	With	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 4	1368077-1	8/8	Without	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 6	1368035-1	8/8	With	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 6	1368116-2	8/8	With	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 8	1116689-1	8/8	Without	Yes	Cat 5	Without	N/A	Panel and PCB
2 x 8	1116317-2	8/8	With	Yes	Cat 5	Without	N/A	Panel and PCB

Note: Consult Tyco Electronics Customer Drawing for additional Part Numbers.

RJ45, Dual USB




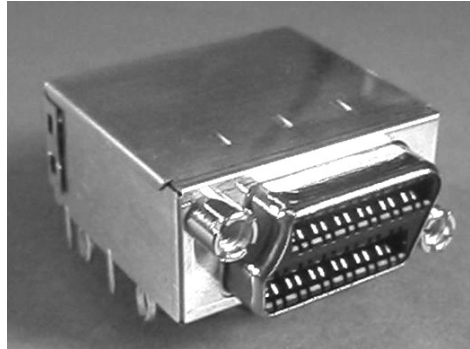
No. of Ports	Part Number	Positions/Contacts	LEDs	Shielded	Performance	Panel Stops	Inverted	Ground Options
2 x 1	1116151-2	8/8	With	Yes	Cat 5	Without	No	PCB
2 x 1	1116151-3	8/8	Without	Yes	Cat 5	Without	No	PCB
2 x 1	1116640-2	8/8	With	Yes	Cat 5	Without	No	PCB

Note: Consult Tyco Electronics Customer Drawing for additional Part Numbers.

High Density, CAT 5e MRJ 21 Connector & Cable Assemblies

Product Facts

- Designed to meet or exceed CAT 5e crosstalk. Contact layout and footprint for differential pairs creates reduced crosstalk and built in compensation.
- 1.5 to 4 times the port density of 2x6 stacked Mod Jack (RJ45)
- 3 times port density of an RJ21
- Height of dual receptacle meets requirements of Compact PCI component standard
- Fully shielded system to control EMI
- Robust die cast cable covers provide 45° left or right cable exit for ease of routing
- 1mm pair spacing, 1.5 pair to pair spacing
- Listed by Underwriters Laboratories Inc., File No. E81956 
- Produced under a Quality Management System Certified to ISO 9001
A copy of the certificate is available upon request



PCB Connector Part Numbers

Description	Base Part Number*
MRJ 21 48 Position Receptacle Assembly	1339362

*Dash number indicates specific product features. See customer drawing or call your local Tyco Electronics Sales Representative for more information.

Cable Assembly Part Numbers

Description	Base Part Number**
MRJ 21 to MRJ 21 – Braided Shield	1653346
MRJ 21 to MRJ 21 – Unshielded	1653347
MRJ 21 to RJ21 telecom connector – CAT 5 Braided Shield	1653348
MRJ 21 to RJ21 telecom connector – CAT 5 Unshielded	1653349
MRJ 21 to (12) RJ45 (2 pair/plug) – CAT 5 Braid Shield	1653439
MRJ 21 to (12) RJ45 (2 pair/plug) – GbE 24 Pair UTP	1371664
MRJ 21 to (6) RJ45 (4 pair/plug) – CAT 5 Braid Shield	1434918
MRJ 21 to (6) RJ45 (4 pair/plug) – CAT 5e UTP	1713358

**Lengths are determined by dash number. Call your local Tyco Electronics Sales Representative for the specific Part Number for your required length cable assembly, or for other configurations not listed above.

Electrical Design Objectives

Voltage Rating — 250 Vac
Current Ratings (Signal) — 0.5 Amp
Dielectric Withstanding Voltage —
 1,000 Vac (contact to contact);
 1,500 Vac (contact to ground)
Insulation Resistance — 1,000 M
Crosstalk — CAT 5e minimum

Environmental Design Objectives

Rated Temperature —
 -55°C to +85°C
Thermal Shock —
 5 cycles, -55°C to +85°C
Humidity – Temperature —
 50 cycles, 25°C to +65°C
Temperature Life —
 500 hours, +85°C

Mechanical Design Objectives

Vibration — 5-500 Hz
Physical Shock — 30 G Peak
Durability — 500 cycles

Note: Future enhancements include press fit design and integrated ganged versions. Consult Tyco Electronics Sales Representative for additional information.

MRJ 21 Cassettes and Patch Panels**Product Facts**

- High performance copper cabling solution
- High density, small form factor connectivity
- Factory terminated and tested solution
- Modular, pluggable solution
- Application specific cassettes

System Features and Benefits

- MRJ 21 provides an application independent copper platform for applications today and into the future — including Gigabit, VoIP & powered Ethernet
- The small size of the MRJ 21 connector and cabling reduces cable bulk in pathways and spaces, enabling much higher port counts in a smaller space
- Factory termination and testing of the cassettes and patch panels provide assurance of pluggable performance on site. This enables rapid installation or MACs with pre-tested quality.
- The modularity of this solution significantly reduces time to install or migrate from a 10/100BASE-T 2-pair platform to a Gigabit Ethernet 4-pair platform. Upgrading is as simple as unplugging one cassette and plugging in the new one. The same cable is re-usable.
- Cassettes and patch panels break out high performance 24-pair solutions to the appropriate wiring patterns for standards-based 10/100BASE-T, Gigabit Ethernet, and other applications
- Common cable assembly lengths provide readily available, pluggable solutions, speeding implementation

12-Port Cassette
Front48-Port Angled Patch Panel
Loaded6-Port Cassette
Front6-Port, 12-Port Cassette
Back

Patch Panel



Cable Support Bar

Description	Part Number
Cassette, 6-Port, 10/100/1000BASE-T (4-Pair)	1479459-1
Cassette, 12-Port, 10/100BASE-T (2-Pair)	1479452-1
Patch Panel, 1U, 3-Cassette	1479451-1
Cable Support Bar 5" Deep	557548-1
Angled Patch Panel, 48-Port, 10/100/1000BASE-T	1435866-1
AMPTRAC Angled Patch Panel, 48-Port, 10/100/1000BASE-T	1435866-2*

*I/O Cable sold separately, Part Number 1479858-Y. See AMPTRAC Connectivity Management Data Sheet (1309354) for more information.

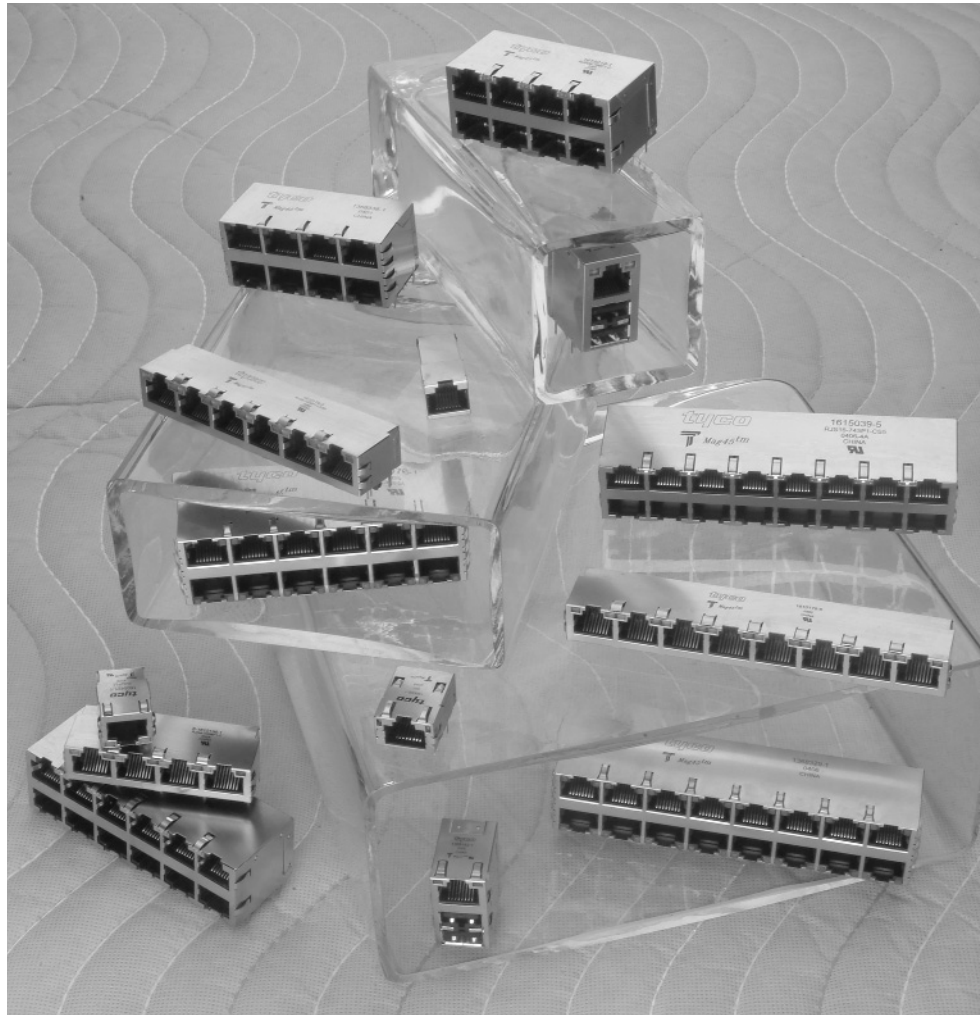
Note: Additional hardware options are available. Contact your Tyco Electronics Sales Engineer or check our website for the latest updates.

MAG45 Modular Jacks with Integrated Magnetics**Product Features**

- PCB space savings
- Improved reliability and EMI performance over discrete magnetics
- Micro-welding of mag wire to PCB versus soldering
- Meets or exceeds FCC Part 68, IEEE 802.3, and ANSI X3.263 requirements
- Supports all appropriate and available PHY Chips and applications
- Extended Temp -40C to +85C available

Product Qualification

- 501 and 108 Qualification Test and Product Specification Reports available
- UL/CSA Recognized component
- For assistance in part selection, please refer to the Tyco Electronics E-Catalog
- Your Tyco Electronics Sales Representative or one of the Product Information Centers listed below are also available to assist



The MAG45 product line offers a broad range of available RJ45 modular jacks with integrated magnetics for 10/100 Base-T, Gigabit and PoE Enabled applications. Multiple configurations are available to include single port, tab up or tab down; single port USB/RJ45; single port low profile; ganged multiport,

1xN; and stacked multiport, 2xN. All available with or without LEDs. There are multiple LED combinations and color options available.

Available soon RJ45 with Integrated Magnetics/ PoE controller and MRJ21.

Available in Spring 2005 Pb Free/RoHS Compliant MAG45 product.

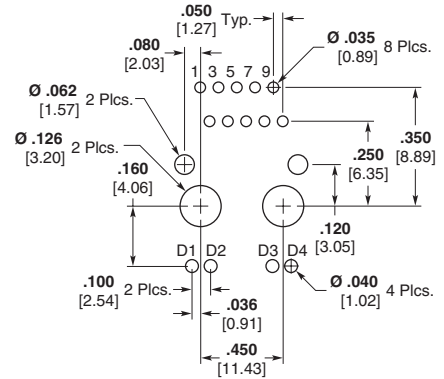
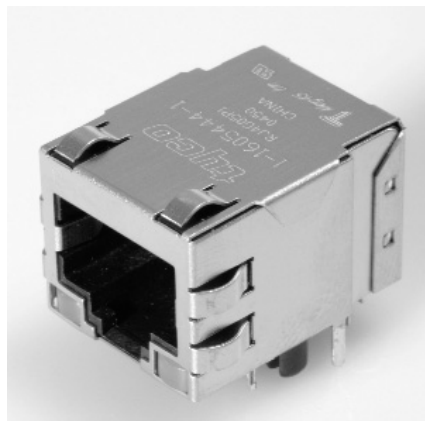
**MAG45 Modular Jacks
with Integrated Magnetics**

MAG45 Modular Jacks with Integrated Magnetics (Continued)

**Single Port
10/100 BASE-T,
Gigabit & PoE, Tab Down**

Product Facts

- Single Port
- Through Hole, Tab Down
- Available with or without LEDs
- UL Recognized
- IEEE 802.3 & ANSI X3.263 Compliant
- Numerous circuit options available
- Supports all appropriate and available PHY Chips and applications
- For assistance in part selection, please refer to the Tyco Electronics E-Catalog
- Your Tyco Electronics Sales Representative or one of the Product Information Centers listed below are also available to assist



PCB Footprint

Single Port Tab Down*

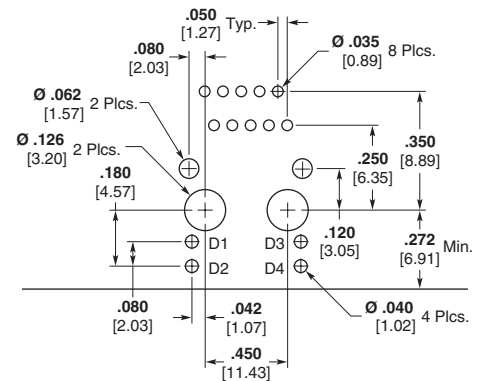
	10/100 Base-T	10/100 PoE	Gigabit	Gigabit PoE
	✓	✓	✓	No

*multiple LED colors with and without resistors available.

10/100	10/100 RoHS Compliant	10/100 POE	10/100 POE RoHS Compliant	Gigabit	Gigabit RoHS Compliant
1605424-1	6605424-1	1605432-2	6605432-2	1-1605444-1	1-6605444-1
6-1605425-1	6-6605425-1	1-1605310-1	1-6605310-1	1605434-1	6605434-1
5-1605308-1	5-6605308-1	6-1605440-1	6-6605440-1	1605445-6	6605445-6

**Single Port
10/100 BASE-T,
Gigabit & PoE, Tab Up**

- Single Port
- Through Hole, Tab Up
- Available with or without LEDs
- UL Recognized Component
- IEEE 802.3 & ANSI X3.263 Compliant
- Numerous circuit options available
- Supports all appropriate and available PHY Chips and applications
- For assistance in part selection, please refer to the Tyco Electronics E-Catalog
- Your Tyco Electronics Sales Representative or one of the Product Information Centers listed below are also available to assist



PCB Footprint

Single Port Tab Up*

	10/100 Base-T	10/100 PoE	Gigabit	Gigabit PoE
	✓	✓	✓	**

*multiple LED colors with and without resistors available.

**under development.

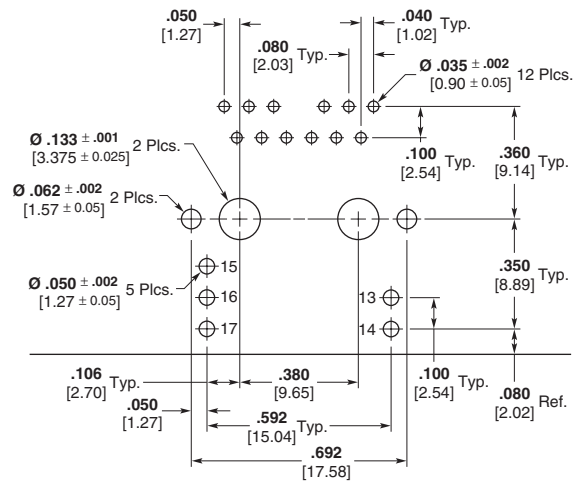
10/100	10/100 RoHS Compliant	10/100 POE	10/100 POE RoHS Compliant	Gigabit	Gigabit RoHS Compliant
1605759-1	6605759-1	1-1605832-1	1-6605832-1	5-1605809-1	5-6605809-1
5-1605763-6	5-6605763-6	1605818-1	6605818-1	1605814-5	6605814-5
5-1605758-9	5-6605758-9	1-1605834-1	1-6605834-1	1605852-2	6605852-2

MAG45 Modular Jacks with Integrated Magnetics

MAG45 Modular Jacks with Integrated Magnetics (Continued)

Single Port Low Profile 10/100 Base-T & Gigabit, Tab Up

- Height is .445" vs std .580"
- UL Recognized
- IEEE 802.3 & ANSI X3.263 Compliant
- With LEDs
- Supports all appropriate and available PHY Chips and applications
- For assistance in part selection, please refer to the Tyco Electronics E-Catalog
- Your Tyco Electronics Sales Representative or one of the Product Information Centers listed below are also available to assist



Low Profile*

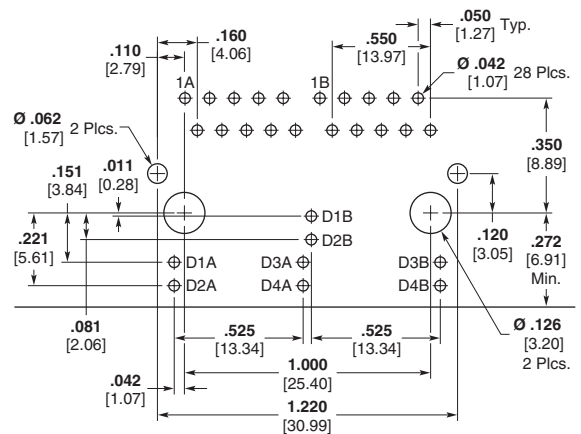
PCB Footprint

	10/100 Base-T	10/100 PoE	Gigabit	Gigabit PoE
	✓	No	✓	No
	10/100 RoHS Compliant		Gigabit RoHS Compliant	
	1368458-1		1368398-1	
	1368458-2		1368398-2	

*multiple LED colors with and without resistors available.

Ganged 10/100 BASE-T, Gigabit & PoE, Tab Up

- Multi-Port Single Layer Connector
- Through Hole, Tab Up
- Available with or without LEDs
- UL Recognized Component
- IEEE 802.3 & ANSI X3.263 Compliant
- Numerous circuit options available
- Supports all appropriate and available PHY Chips and applications
- For assistance in part selection, please refer to the Tyco Electronics E-Catalog
- Your Tyco Electronics Sales Representative or one of the Product Information Centers listed below are also available to assist



Ganged Multi-Port Tab Up*

PCB Footprint

Port Configuration	10/100 Base-T	10/100 PoE	Gigabit	Gigabit PoE
1x2	✓	✓	✓	**
1x4	✓	✓	✓	**
1x5	✓	✓	✓	**
1x6	✓	✓	✓	**
1x8	✓	✓	✓	**

*multiple LED colors with and without resistors available.
** Under development.

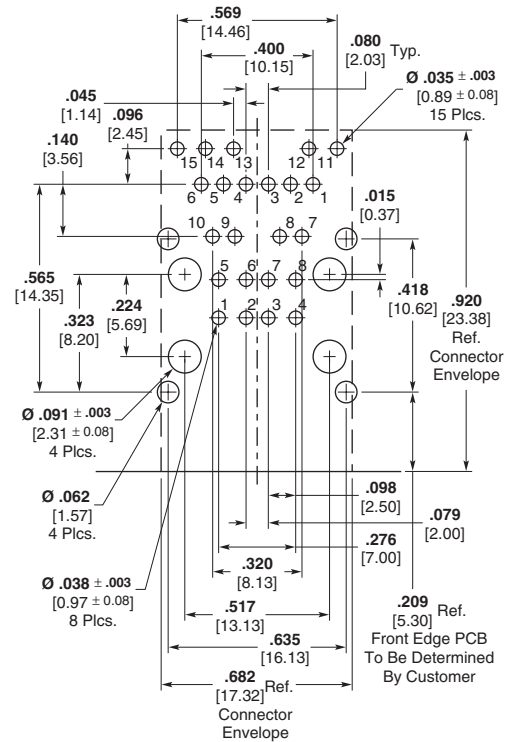
Note: 1x4 Tab Down currently under development

	10/100	10/100 RoHS Compliant	10/100 POE	10/100 POE RoHS Compliant	Gigabit	Gigabit RoHS Compliant
1x2	5-1610000-1	5-6610000-1	1-1610128-1	1-6610128-1	1-1610005-1	1-6610005-1
1x4	5-1610049-1	5-6610049-1			1610068-6	6610068-6
1x4 (tab down)	1610211-1	6610211-1			1610204-1	6610204-1
1x5	1610078-2	6610078-2	1610182-2	6610182-2	1-1610132-1	1-6610132-1
1x6	1-1610084-1	1-6610084-1	5-1610168-8	5-6610168-8	1610157-1	6610157-1
1x8	1610112-1	6610112-1	1-1610122-1	1-6610122-1	1610160-6	6610160-6

MAG45 Modular Jacks with Integrated Magnetics (Continued)

Stacked USB/RJ45 (10/100 Base-T or Gigabit)

- USB/RJ45 with integrated magnetics
- 10/100 or Gigabit applications
- Stacked USB type A included
- UL Recognized
- Available with LEDs
- IEEE 802.3 & ANSI X3.263 Compliant
- USB 2.0 Compliant
- Numerous circuit options available
- Supports all appropriate and available PHY Chips and applications
- For assistance in part selection, please refer to the Tyco Electronics E-Catalog
- Your Tyco Electronics Sales Representative or one of the Product Information Centers listed below are also available to assist



PCB Footprint

USB/RJ45*

	10/100 Base-T	10/100 PoE	Gigabit	Gigabit PoE
	✓	No	✓	No

*multiple LED colors with and without resistors available.

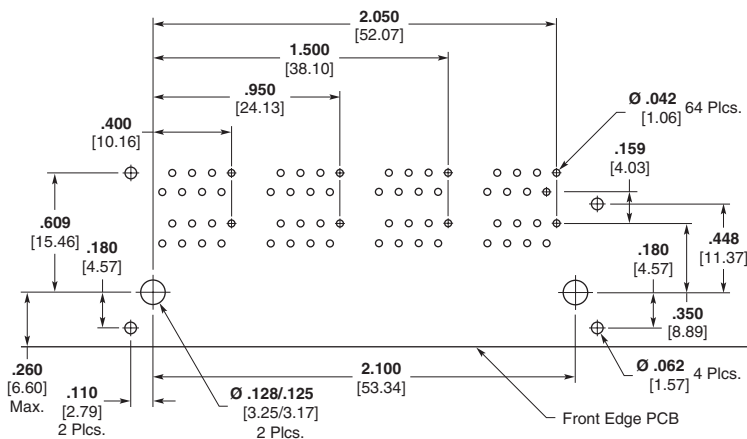
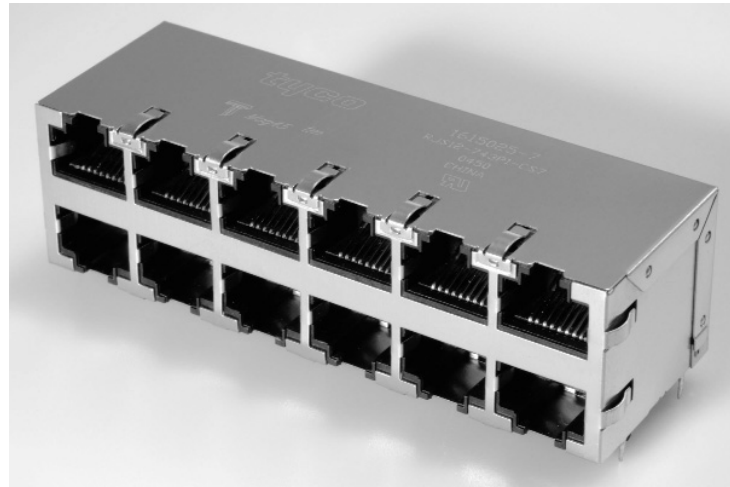
10/100	10/100 RoHS Compliant	Gigabit	Gigabit RoHS Compliant
1620004-1	6620004-1	1368162-1	6368162-1
1620002-1	6620002-1	1368472-1	6368472-1
1368532-1	6368532-1	1620009-1	6620009-1

MAG45 Modular Jacks with Integrated Magnetics

MAG45 Modular Jacks with Integrated Magnetics (Continued)

Stacked (10/100 Base-T)

- Stacked Connector
- UL Recognized
- Without LEDs
- IEEE 802.3 & ANSI X3.263 Compliant
- Numerous circuit options available
- Supports all appropriate and available PHY Chips and applications
- For assistance in part selection, please refer to the Tyco Electronics E-Catalog
- Your Tyco Electronics Sales Representative or one of the Product Information Centers listed below are also available to assist



Stacked

Port Configuration	10/100 Base-T	10/100 PoE
2x1	✓	✓
2x3	✓	✓
2x4	✓	✓
2x6	✓	✓
2x8	✓	✓

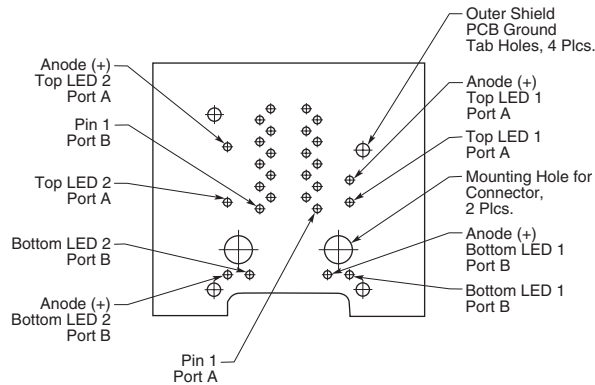
	10/100	10/100 RoHS Compliant
2x4	1615012-1	6615012-1
2x6	1615025-7	6615025-7
2x8	1615039-7	6615039-7

MAG45 Modular Jacks with Integrated Magnetics

MAG45 Modular Jacks with Integrated Magnetics (Continued)

**Stacked
(10/100 Base-T,
Gigabit & PoE)**

- Stacked, Through Hole, Vertical 10-Pin Footprint
- Available with or without LEDs
- UL Recognized
- IEEE 802.3 & ANSI X3.263 Compliant
- Numerous circuit options available
- Supports all appropriate and available PHY Chips and applications
- For assistance in part selection, please refer to the Tyco Electronics E-Catalog
- Your Tyco Electronics Sales Representative or one of the Product Information Centers listed below are also available to assist



PCB Footprint

Stacked*

Port Configuration	10/100 Base-T	10/100 PoE	Gigabit	Gigabit PoE
2x1	✓	✓	✓	✓
2x2	✓	✓	✓	✓
2x3	✓	✓	✓	✓
2x4	✓	✓	✓	✓
2x6	✓	✓	✓	✓
2x7		✓	✓	
2x8	✓	✓	✓	✓

*multiple LED colors with and without resistors available.

	10/100	10/100 RoHS Compliant	10/100 POE	10/100 POE RoHS Compliant	Gigabit	Gigabit RoHS Compliant	Gig POE	Gig POE RoHS Compliant
w/LED								
2x1	1368457-1	6368457-1			1368513-1	6368513-1		
2x2	1368387-1	6368387-1			1368511-1	6368511-1		
2x4	1368400-1	6368400-1			1368507-1	6368507-1		
2x6	1368342-1	6368342-1			1368506-1	6368506-1		
2x7					1368503-1	6368503-1		
2x8	1368536-1	6368536-1			1368510-1	6368510-1		
w/out LED								
2x1						1840003-1		
2x4			1615072-1	6615072-1	1368523-1	6368523-1		
2x6			1615076-1	6615076-1	1368452-1	6368452-1	1368483-1	6368483-1
2x8					1368493-1	6368493-1	1368487-1	6368487-1

MAG45 Modular Jacks with Integrated Magnetics

MAG45 Modular Jacks with Integrated Magnetics (Continued)

**MAG45 with PoE Controller
RJ45 + PoE Magnetics +
Silicon Power Controller
Chip**
PoE Product Features

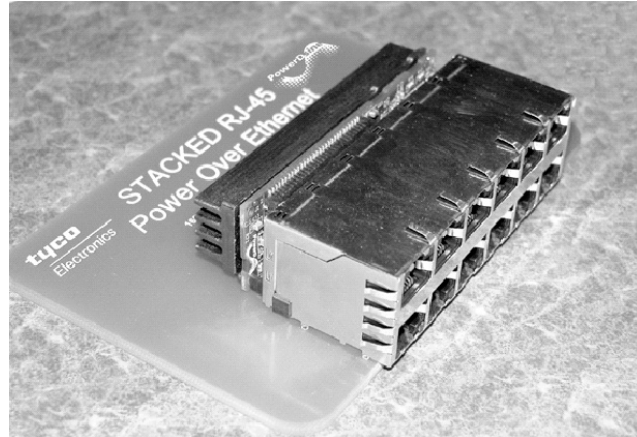
- Integrated Silicon PoE 12-port controller
 - 802.3af compliant
 - Auto and Enhanced mode capable
- Footprint
 - Press-fit configuration
 - Ease of routing on customer PCB
- Pin Assignments
 - Signal integrity benefits vs. standard footprint
- Three options in same footprint:
 - Integrated Magnetics Only
 - Integrated Magnetics, Enabled PoE
 - Integrated Magnetics, Integrated PoE
- 2250Vdc / 1500Vdc electrical isolation per 802.3 requirements

Customer Benefits:

- Simplify implementation of full PoE solution
- Board real estate savings
- Reduce board layout issues
- Integrate new and existing technologies into a single connector unit

Why Integrate the PoE Circuitry into the RJ?

- Single package (PoE, LED's, Magnetics, Heat Sink)
- Identical footprint for both Integrated PoE/Enabled and non-PoE
- Single design, single motherboard can be used for both PoE and non-PoE
- Same design can migrate between switches (including blades and fixed)
- Delivered fully tested and qualified, no need to bother with complicated PoE testing



- Reduced layer count/
Reduces cost of motherboard
- No PoE daughterboards
- Isolated PoE voltage provided directly from the power supply
- All per port components embedded in RJ
- Eliminates issues of voltage isolation on motherboard
- Reduces EMI risks

PoE Controller Features

- Power supplied over data contacts 1 & 2 and 3 & 6
- I2C Capability
- PoE chip provides power and command/control circuitry from motherboard power plane/bus
- Provides isolation between earth/building and signal ground

- Real time control of overload, underload, short circuits and under voltage states
- 0.5A current carrying capacity
- Full AC disconnect and classification
- 80V tolerant, surge protected system
- Registers for MIB 8 support and parameters adjustment
- Single voltage feeding (44 – 57VDC)
- Designed to support legacy capacitor detection

How Does PoE RJ45 Work?

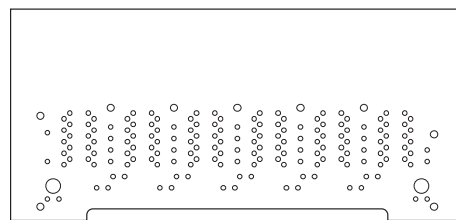
- Embedded inside each RJ45 is the Silicon Power PD64012 chip
- Each RJ45 is a 12 port PoE system, communicating

with each other to create a system of up to 48 ports

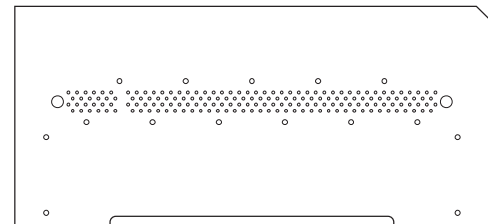
- The Host CPU controls the system via I2C
- Two main operating modes: Automatic/Enhanced Mode to match system customization requirements

For assistance in part selection, please refer to the Tyco Electronics E-Catalog.

Your Tyco Electronics Sales Representative or one of the Product Information Centers listed below are also available to assist.

Legacy vs. Press Fit PoE Footprint


Legacy Footprint
Solder Only



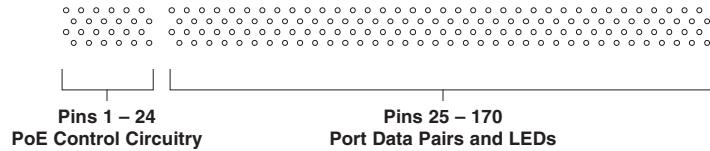
Integrated/Enabled/Non PoE Footprint
Press Fit

MAG45 Modular Jacks with Integrated Magnetics (Continued)

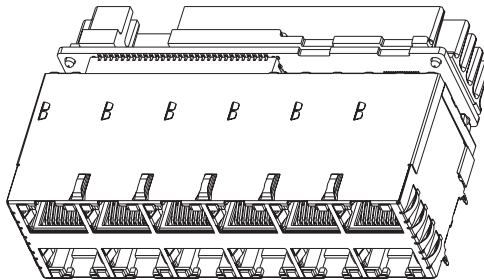
Part Number Matrix

Base Part Number	Integrated Magnetics	Power over Ethernet	PCB Attach Options	LED Options (2 per Port)	Description
1658821	10/100/1000	Integrated	Press Fit	With/Without Yellow/Green	PowerDsine Integrated Chip Set, 802.3af Compliant
1658822	10/100	Integrated	Press Fit	With/Without Yellow/Green	PowerDsine Integrated Chip Set, 802.3af Compliant
1658825	10/100/1000	Enabled	Press Fit	With/Without Yellow/Green	PoE Chip set on Motherboard, 802.3af Compliant
1658826	10/100	Enabled	Press Fit	With/Without Yellow/Green	PoE Chip set on Motherboard, 802.3af Compliant
1658827	10/100/1000	No	Press Fit	With/Without Yellow/Green	
1658828	10/100	No	Press Fit	With/Without Yellow/Green	

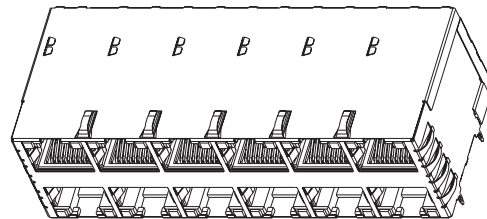
Same Mechanical Footprint, all versions.
Same Electrical Footprint, pins 25 – 170, all versions.



MAG45 Modular Jacks with Integrated Magnetics



Part Number 1658821 – 1658822



Part Number 1658825 – 1658828

Common Terms**A**

Attenuation- A reduction in power. It occurs naturally during signal travel through lines. The amount of attenuation is generally expressed in decibels per unit of length.

B

Bandwidth- The data-carrying capacity of a transmission medium, usually measured in Hz, ex. 100 MHz

C

Cable- Cable can be either flat oval or round containing multiple conductors, either stranded or solid.

Cable assembly- A completed cable and its associated hardware.

Capacitance- The property of an electrical conductor that permits the storage of energy as a result of electrical displacement. Most commonly measured in microfarads (μF) or picofarads (pF).

Category Ratings- Categories are transmission performance criteria defined by the Telecommunications Industry Association for cabling, connectors and installed cabling systems.

Category 3- up to 16 MHz

Category 4- up to 20 MHz

Category 5- up to 100 MHz

Proposed criteria:

Category 6- up to 200 MHz

Category 7- up to 600 MHz

Channel return loss (echo)- The ratio of the reflected signal from the cable to the transmit signal.

Connector- A coupling device employed to connect conductors of one circuit with those of another circuit. Used to provide rapid connect/disconnect with another connector.

Contact durability- The number of insertion and withdrawal cycles that a connector must be capable of withstanding while remaining within the performance levels of the applicable specification.

Contact engaging and separating force- Force required to either engage or separate connectors. Values are generally established for maximum and minimum forces.

Crimp- The final configuration of a connector after the necessary compression forces have been applied to cause a functional union between the contacts and cable conductors.

Crimping dies- A term used to identify the shaping tools that, when moved toward each other, produce a certain desirable deformation to the connector that has been placed between them. Crimping dies are often referred to as die sets or as die inserts.

Crimping head- Tooling containing jaws and linkage for use in pneumatic or hydraulic powered units to crimp connectors onto cable.

Crimping tool- A term commonly used to identify a hand held mechanical device that is used to crimp a connector.

Crosstalk- A magnetic or electrostatic coupling which causes the unwanted transfer of energy from one circuit (disturbing circuit) to another circuit (disturbed circuit). (See Near-end crosstalk [NEXT] and Far-end crosstalk [FEXT])

Current rating- The maximum continuous electrical flow of current recommended for a given situation. It is expressed in amperes.

D

dB- Abbreviation for decibel. See decibel.

decibel- A unit expressing the ratio of two voltages, currents or powers. It is equal to 20 times the common logarithm of the ratio of two voltages across, or two currents through equal loads, or 10 times the common logarithm of the two powers. One decibel is approximately the smallest change in audible power that can be recognized by the human ear.

Dielectric- A material that serves as an insulator. The amount of resistance to voltage in a given insulation.

Dielectric withstanding voltage (DWV)- The maximum potential gradient that a dielectric material can withstand without failure.

Discontinuity- Rated interconnection: a broken connection (open circuit) or the loss of a specified connection characteristic. Transient phenomena: Short term interruption or unacceptable variation in current or voltage.

Distortion- An unwanted change or addition to a signal or waveform when it is amplified. This definition excludes noise which is an extraneous signal superimposed on the desired signal.

E

Electromagnetic compatibility (EMC)- The ability of an electronic device to operate in its intended environment without its performance being affected by EMI and without generating EMI that will affect other equipment.

Electromagnetic interference (EMI)- Unwanted electrical or electromagnetic energy that causes undesirable responses, degrading performance or complete malfunctions in electronic equipment.

F

Far-end crosstalk (FEXT)- The coupling of received signals on adjacent wire pairs onto the received signal.

I

Insulation Displacement Contact (IDC)- A termination technique whereby an insulated wire is forced into a slot on a contact that pierces the insulation and allows electrical contact with the wire conductor.

Interference- An electrical or electromagnetic disturbance that causes undesirable response in electronic equipment.

Insulation crimp- The area of a connector that has been formed around the insulation of the cable.

Insulation grip- The ability of certain crimped connectors to hold firmly in place both the conductor and a small portion of the insulation. This prevents the conductor from being exposed due to insulation receding away from the connector.

Insulation resistance- The electrical resistance between two conductors separated by an insulating material.

Interface- The two surfaces of a multiple-contact connector that face each other when the connector is assembled.

Inverted latch- A modular jack that when mounted to a printed circuit board has its contacts on the bottom and the latch on the top. See also standard latch.

Invertible jack- A jack which can be mounted on the printed circuit board such that entry can be from either the top or bottom.

Common Terms (Continued)**J**

Jack- A connecting device into which a plug can be inserted to make circuit connections.

M

Mate- To join two connectors in a normal engaging mode.

Modified Modular Jack (MMJ)- A six-wire modular jack with the locking tab shifted off to the right side. Used in the DEC wiring system.

N

Near-end crosstalk (NEXT)- The coupling of transmit signals on adjacent wire pairs onto the received signal.

Noise- An extraneous signal in an electrical circuit, capable of interfering with the desired signal. Classes of noise include burst of popcorn noise, intermediate frequency noise at low audio frequencies, white (thermal) noise, etc.

O

Offset latch- See Modified Modular Jack (MMJ).

P

Panel stop- A feature on a connector which prevents the connector from falling through a panel.

PCB- Abbreviation for printed circuit board.

Plug- A connecting device which is normally inserted into the jack. It is usually the movable male portion of an interface and is generally attached to cable.

Printed circuit board- An insulating board serving as a base for a printed circuit. When the printing process is completed, the board may include printed components as well as printed wiring.

Propagation delay- Time required for an electronic digital device or transmission network to transfer information from its input to its output.

Propagation delay time- The time between the application of a digital input waveform and the corresponding change in input waveform. It is measured between reference points on the waveforms. The time is generally different for positive-going and negative-going waveforms.

Prototype- A model suitable for use in the complete evaluation of form, design and performance.

R

Right-angle jack- A jack that when mounted to the printed circuit board has entry from the side.

Registered Jack (RJ)- Represents codes set up by the telephone industry to standardize interconnections across the system. These codes are part of the USOC (see USOC). Examples are RJ11 has become commonly known as a 6-position modular jack or plug with 4 contacts loaded in the center position while the RJ45 has become commonly known as an 8-position modular plug or jack.

S

Screened Twisted Pair (SCTP)- A cable type, usually 120 ohms impedance, used in CAT 5 applications.

Shield/shielding (cable)- A conducting envelope, composed of metal strands or foil, which enclose a wire or groups of wires so constructed that substantially every point on the surface of the underlying insulation is at ground potential or at some predetermined potential with respect to ground.

Shield/shielding (circuit)- The metal sleeving surrounding the connector to prevent interference, interaction or current leakage. Shielding protects a circuit against crosstalk.

Shielded Twisted Pair (STP)- A cable type, usually 150 ohms impedance, used for CAT 5 applications.

Side entry- See right-angle jack.

Side latch- See Modified Modular Jack (MMJ).

Standard latch- A modular jack that when mounted to a printed circuit board has its contacts on the top and the latch on the bottom. See also inverted latch.

T

TIA/EIA-568-A- A commercial building wiring standard for voice and data communications. This specification was jointly developed by the Telecommunications Industry Association and the Electronic Industries Association.

Tensile- The amount of axial load (longitudinal stress) required to break or pull the wire from the crimped connector.

Tensile strength- The greatest longitudinal stress that a substance or union can bear without tearing or pulling apart. In crimped terminations, it is the greatest longitudinal stress that a connector can bear without the wire separating from the crimped connector.

U

Universal Serial Bus (USB)- an external bus standard that supports data transfer rates of 12 Mbps. A single USB port can be used to connect up to 127 peripheral devices, such as mice, modems, and keyboards. USB also supports Plug-and-Play installation and hot plugging.

Universal Service Order Code (USOC)- A set of designations for comer-to-customer interfaces (see RJ).

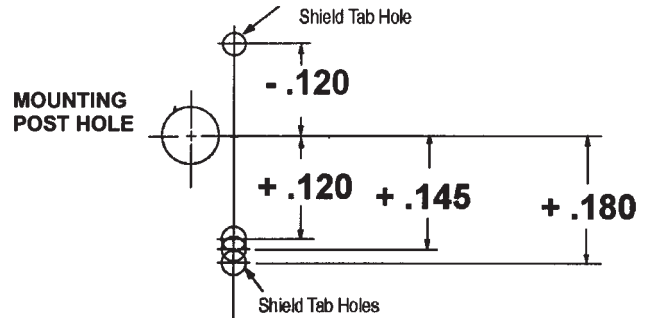
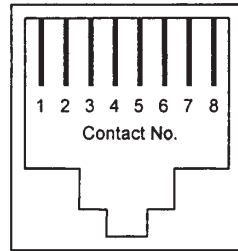
Unshielded Twisted Pair (UTP)- A cable type, usually 100 ohms impedance, used for CAT 5 applications.

V

Vertical jack- A jack that utilizes top entry only.

RJ Designations

Contact Numbering/ Shield PCB Ground Tab Location

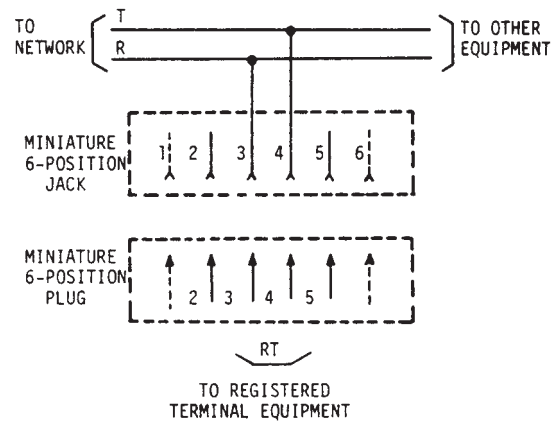


RJ11C
Universal Service Order Code

Mechanical Arrangement —
Surface or flush mounted miniature
6-position jack.

Typical Usage — Single line non-key
telephones and ancillary devices.

Electrical Network Connection —
Single line bridged tip and ring.

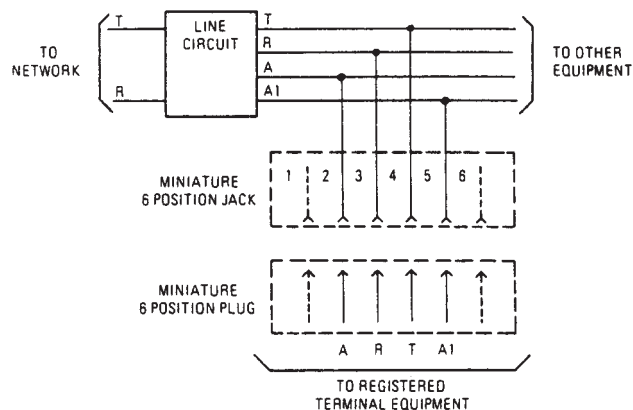


RJ13C
Universal Service Order Code

Mechanical Arrangement —
Surface or flush mounted miniature
6-position jack.

Typical Usage — Single line non-key
telephone sets and ancillary devices
connected to a key system.

Electrical Network Connection —
Single line bridged tip, ring, A and A1
leads behind the line circuit of a key
system.



RJ Designations (Continued)

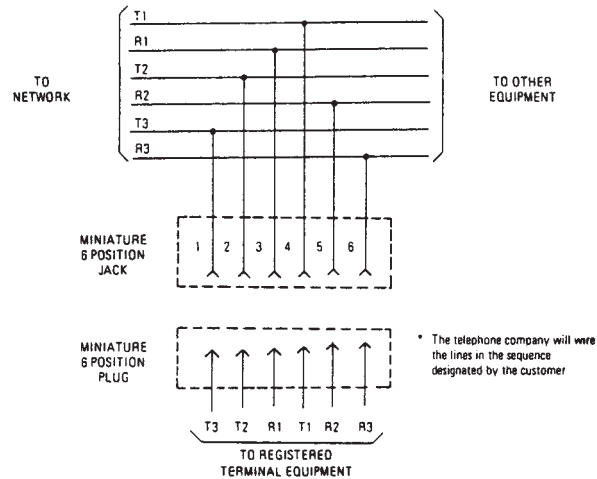
RJ25C

Universal Service Order Code

Mechanical Arrangement — Surface or flush mounted miniature 6-position jack.

Typical Usage — Three line non-key telephone sets, ancillary devices, including message registration, automatic identification, outward dialing, and off-premise station.

Electrical Network Connection — Up to three lines bridged connection.

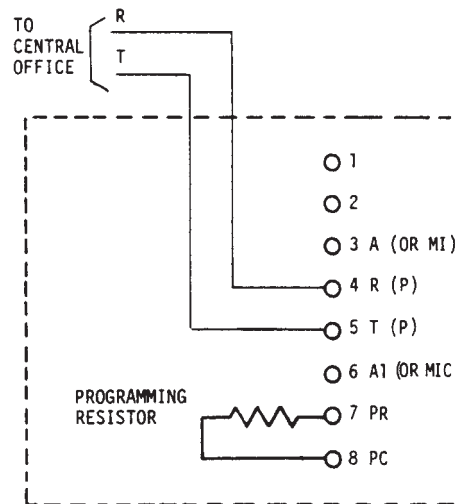


RJ45S

Universal Service Order Code

Mechanical Arrangement — Single miniature 8-position keyed jack.
Typical Usage — Programmed data equipment.

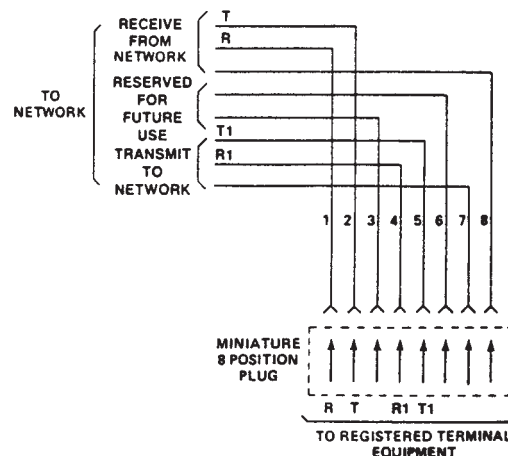
Electrical Network Connection — Single line bridged tip and ring.



RJ48C

Universal Service Order Code

Mechanical Arrangement — Miniature 8-position jack.
Typical Usage — 1.544 Mbps digital services.
Electrical Network Connection — T&R, T1 R1, conductors 7 and 8 provide cable shield integrity. Conductors 3 and 6 are reserved for future use.



RJ Designations (Continued)

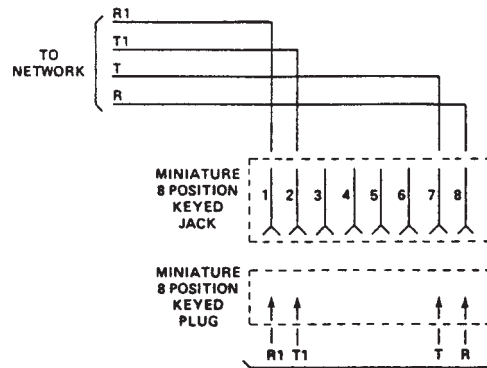
RJ48S

Universal Service Order Code

Mechanical Arrangement — Miniature 8-position keyed jack.

Typical Usage — Local area data channels/subrate digital services.

Electrical Network Connection — One or two line T&R or T&R, T1 R1.



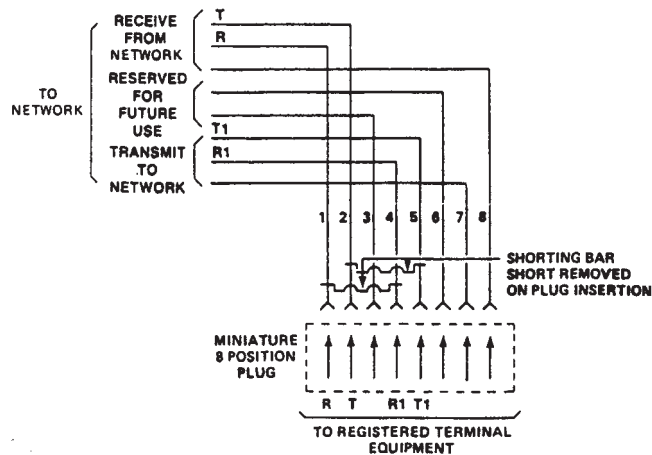
RJ48X

Universal Service Order Code

Mechanical Arrangement — Miniature 8-position jack.

Typical Usage — 1.544 Mbps digital services.

Electrical Network Connection — T&R, T1 R1, conductors 7 and 8 provide cable shield integrity. Conductors 3 and 6 are reserved for future use.



Note: This index lists all cataloged parts by base no. only. Complete part nos. (with prefixes and/or suffixes) are shown on the page(s) indicated.

Part Number Index

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215875	11	555141	12	1116173	12
215876	11	555153	12	1116201	15
215877	11	555154	11	1116202	14, 15
215878	11	555162	11	1116317	22
216444	15	555163	11	1116353	18
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338084	14	556416	14	1339160	13
338086	14	557484	14	1339212	13
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338556	11	557560	18	1364139	12
406010	13	557562	18	1368035	22
406203	18	557730	14	1368062	22
406206	18	557785	12	1368077	22
406217	11	557788	16	1368116	22
406281	18	557789	12, 16	1368419	18
406296	11	557791	12, 16	1371664	23
406299	11, 12	557812	16	1434918	23
406443	18	557813	16	1435866	24
406494	21	557969	14	1470120	18
406514	13	558065	12	1470157	18
406525	12	558067	12	1470215	12
406533	12	558070	12	1470272	12
406536	18	558178	13	1470340	11
406541	12	558341	12	1470660	18
406542	18	558342	12	1470668	18
406545	13	558344	12	1470669	21
406549	12	558503	18	1479451	24
406552	18	558505	18	1479452	24
406721	13	558846	19	1479459	24
406903	19	569115	12	1479858	24
440050	11	569118	12	1653346	23
440376	11	569254	21	1653347	23
520243	12	569256	21	1653348	23
520249	11	569257	21	1653349	23
520250	11	569259	21	1653439	23
520251	12	569260	21	1658821	31
520257	13	569262	21	1658822	31
520258	13, 14	569263	21	1658825	31
520259	14	569264	21	1658826	31
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554990	14	569748	19	1713358	23

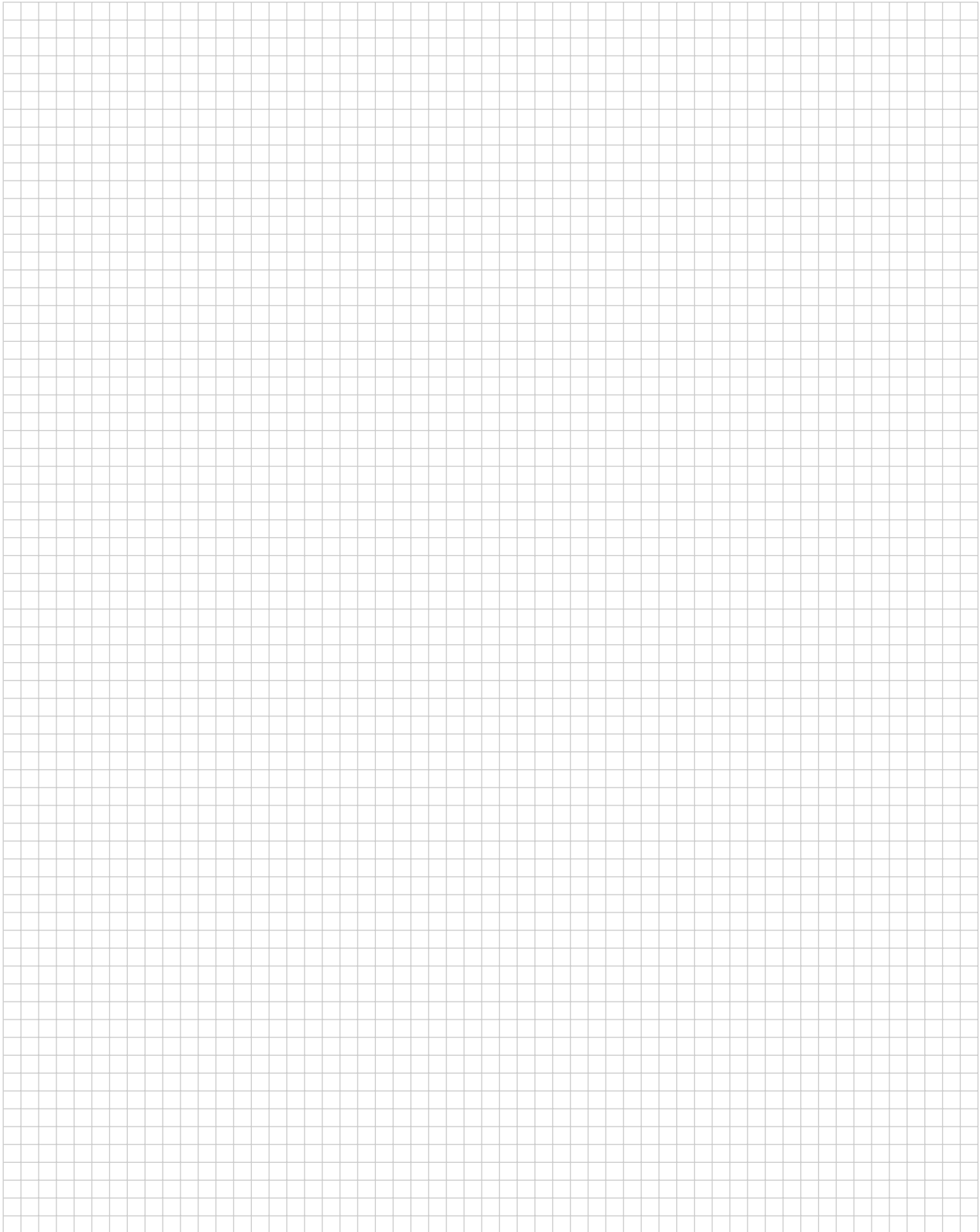
Non-RoHS to RoHS Compliant Part Number Cross Reference

Non-RoHS Part No.	RoHS Compliant Part No.	Non-RoHS Part No.	RoHS Compliant Part No.	Non-RoHS Part No.	RoHS Compliant Part No.
100616-1	5100616-1	1-440376-1	1-5440376-1	569115-1	5569115-1
100616-2	5100616-2	520243-4	5520243-4	569118-1	5569118-1
100860-1	5100860-1	520249-2	5520249-2	569254-1	5569254-1
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1-215876-3	1-5215876-3	520425-2	5520425-2	569264-1	5569264-1
215877-1	5215877-1	520425-3	5520425-3	569381-1	5569381-1
1-215877-3	1-5215877-3	520426-4	5520426-4	569564-1	5569564-1
2-215877-1	2-5215877-1	554990-1	5554990-1	569748-1	5569748-1
2-215878-1	2-5215878-1	555003-1	5555003-1	1116062-1	1116062-2
216444-1	5216444-1	555077-1	5555077-1	1116075-1	6116075-1
216446-1	5216446-1	555140-1	5555140-1	1116151-2	6116151-2
216548-1	5216548-1	555140-2	5555140-2	1116151-3	6116151-3
216550-1	5216550-1	555141-1	5555141-1	1116173-1	6116173-1
216564-1	5216564-1	555153-1	5555153-1	1116201-1	6116201-1
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1-338088-5	1-5338088-5	555164-1	5555164-1	1116418-1	6116418-1
2-338088-3	2-5338088-3	1-555165-1	1-5555165-1	1116503-1	1116503-2
2-338556-1	2-5338556-1	555166-1	5555166-1	1116526-1	6116526-1
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406010-2	5406010-2	555799-1	5555799-1	1116689-1	6116689-1
406203-3	5406203-3	556416-1	5556416-1	1339160-1	6339160-1
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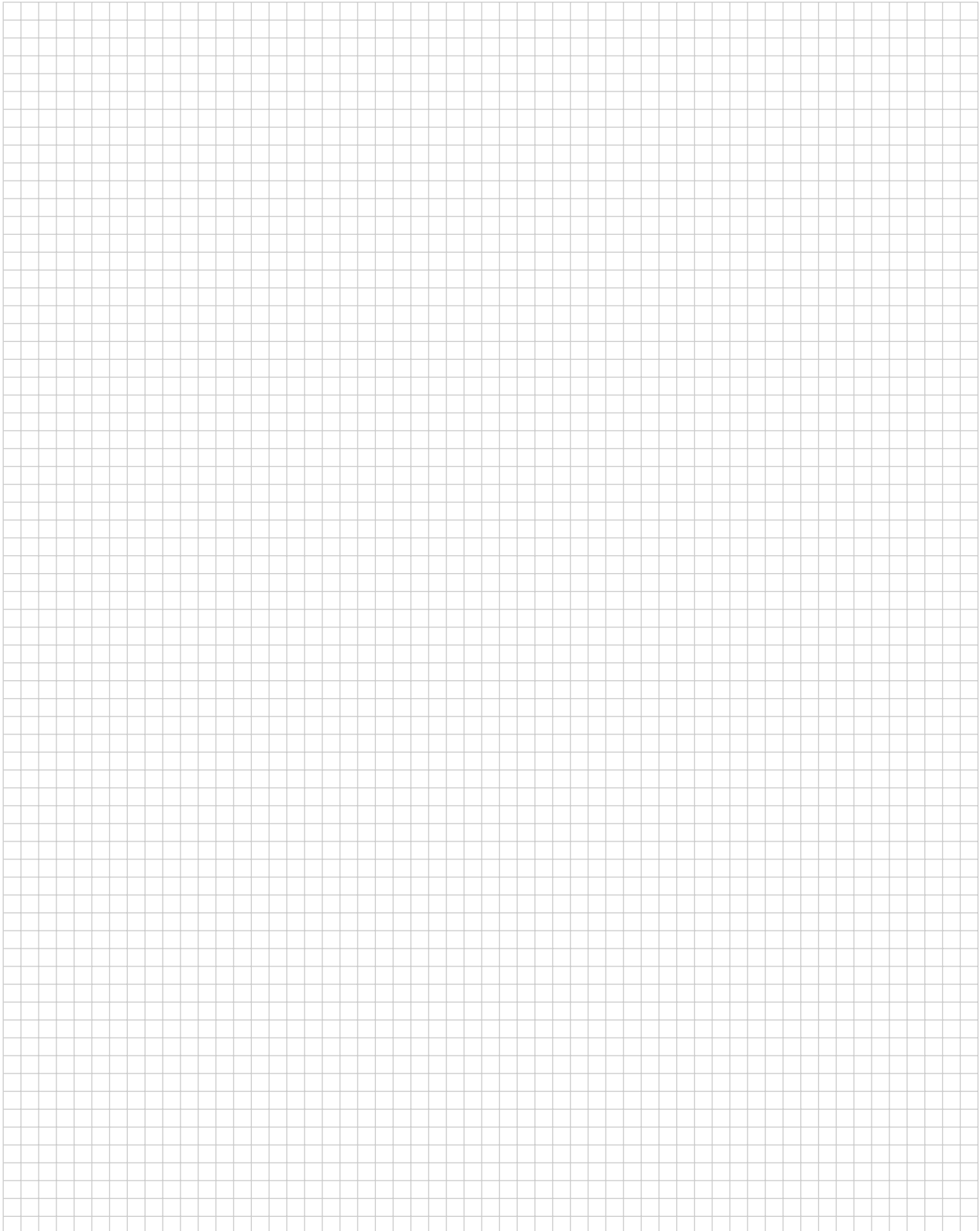
RoHS to Non-RoHS Compliant Part Number Cross Reference

RoHS Compliant Part No.	Non-RoHS Part No.	RoHS Compliant Part No.	Non-RoHS Part No.	RoHS Compliant Part No.	Non-RoHS Part No.
1-406525-1	406525-1	5406721-2	406721-2	5558342-1	558342-1
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Engineering Notes



Engineering Notes



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India – Bangalore
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Fax: +91-80-2854-0820

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Fax: +81-44-812-3207

Korea – Seoul
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Fax: +82-2-3486-3810

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Fax: +86-21-5383-8018

Shunde
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Fax: +86-765-775-2823

Singapore – Singapore
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Fax: +65-482-1012

Taiwan – Taipei
Phone: +886-2-2664-9977
Fax: +886-2-2664-9900

Thailand – Bangkok
Phone: +66-2-955-0500
Fax: +66-2-955-0505

Vietnam – Ho Chi Minh City
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Fax: +84-8-930-3443

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Phone: +43-1-905-60-0
Fax: +43-1-905-60-1333
Product Information Center:
Phone: +43-1-905-60-1249
Fax: +43-1-905-60-1251

Belgium – Kessel-Lo
Phone: +32-16-352-300
Fax: +32-16-352-352

Bulgaria – Sofia
Phone: +359-2-971-2152
Fax: +359-2-971-2153

Czech Republic – Kurim
Phone: +420-5-41-162-111
Fax: +420-5-41-162-223
Product Information Center:
Phone: +420-5-41-162-113
Fax: +420-5-41-162-132

Denmark – Glostrup
Phone: +45-43-480-400
Fax: +45-43-441-414

Egypt – Cairo
Phone: +20-2-417-76-47
Fax: +20-2-419-23-34

Finland – Helsinki
Phone: +358-95-12-34-20
Fax: +358-95-12-34-250

France – Cergy-Pontoise Cedex
Phone: +33-1-3420-8888
Fax: +33-1-3420-8600
Product Information Center:
Phone: +33-1-3420-8686
Fax: +33-1-3420-8623

France Export Divisions –
Cergy-Pontoise Cedex
Phone: +33-1-3420-8888
Fax: +33-1-3420-8600

Germany – Bensheim
Tyco Electronics AMP GmbH
Phone: +49-6251-133-0
Fax: +49-6251-133-1600
Product Information Center:
Phone: +49-6251-133-1999
Fax: +49-6251-133-1988

Germany – Niefern
**Tyco Electronics pretema
GmbH & Co. KG**
Phone: +49-7233-69-0
Fax: +49-7233-69-100

Germany – Ottobrunn
Tyco Electronics Raychem GmbH
Phone: +49-89-6089-0
Fax: +49-89-6096-345

Great Britain –
Stanmore Middlesex
Phone: +44-8706-080-208
Fax: +44-208-954-6234
Product Information Center:
FreePhone GB: 0800-267-666
Phone: +44-208-420-8341
+44-208-420-8343
Fax: +44-208-420-8081

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Phone: +30-210-9370-396/397
Fax: +30-210-9370-655

Hungary – Budapest
Phone: +36-1-289-1000
Fax: +36-1-289-1010
Product Information Center:
Phone: +36-1-289-1016
Fax: +36-1-289-1017

Ireland – Dublin
Phone: +353-1-820-3000
Fax: +353-1-820-9790

Israel – Yokneam
Phone: +972-4-959-0508
Fax: +972-4-959-0506

Italy – Collegno (Torino)
Phone: +39-011-4012-111
Fax: +39-011-4031116
Product Information Center:
Phone: +39-011-4012-360
Fax: +39-011-40287360

Lithuania – Vilnius
Phone: +370-5-2131-402
Fax: +370-5-2131-403

Netherlands – 's-Hertogenbosch
Phone: +31-73-6246-246
Fax: +31-73-6212-365
Product Information Center:
Phone: +31-73-6246-999
Fax: +31-73-6246-998

Norway – Nesbru
Phone: +47-66-77-88-86
Fax: +47-66-77-88-55

Poland – Warsaw
Phone: +48-22-4576-700
Fax: +48-22-4576-720
Product Information Center:
Phone: +48-22-4576-704
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Romania – Bucharest
Phone: +40-21-311-3479 + 3596
Fax: +40-21-312-0574

Russia – Moscow
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Fax: +7-095-926-55-05

Russia – St. Petersburg
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Fax: +7-812-118-8193

Slovenia – Ljubljana
Phone: +386-1561-3270
Fax: +386-1561-3240

South Africa – Port Elizabeth
Phone: +2741-503-4500
Fax: +2741-581-0440

Spain – Barcelona
Phone: +34-93-291-0330
Fax: +34-93-201-7879

Sweden – Upplands Väsby
Phone: +46-8-50-72-50-00
Fax: +46-8-50-72-50-01

Switzerland – Steinach
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Fax: +41-71-447-0444

Turkey – Istanbul
Phone: +90-212-281-8181...3
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Fax: +90-212-281-8184

Ukraine – Kiev
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