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Four power divider-combiner models from \$39.99.  
(qty 10)



2-Way, 0.7-2.7 GHz, 40 Watts, N and SMA-Jack Connectors

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# POWER DIVIDER/POWER COMBINER

## Glossary of Terms



**Amplitude Balance:** The attribute of the output signals of an equal power divider having the same magnitude.

**Characteristic Impedance:** For a microwave signal in a transmission line, the ratio of the electric field to the magnetic field. Characteristic impedance is related to free-space impedance (377 ohms) and can be calculated based on the physical dimensions and dielectric properties of the transmission line. Most RF and microwave systems are designed to operate with a characteristic impedance of 50 ohms. An advantage of coaxial cable and microstrip is that its characteristic impedance is not frequency dependent.

**Coherent Signals:** RF or microwave signals exhibiting attributes such that, when input to a power combiner, their wave forms add constructively or subtract destructively. For RF and microwave signals, the attributes of frequency, shape and transmitted information (if present) must be identical for signal coherence to exist.

**Combining Loss:** Loss of signal due to the vector summing, in a power combiner, of coherent input signals that differ in phase and/or amplitude. The combining loss of coherent signals is proportional to the phase and amplitude unbalance of the signals. Identical coherent signals summed through a power combiner exhibit no combining loss. Coherent signals 180° out-of-phase exhibit total combining loss (zero sum or transmitted power). Non-Coherent signals exhibit a loss equal to  $10 \log(1/n)$ , where  $n$  = number of combined signals. All combining loss is dissipated through the isolation resistors.

**Frequency Range:** The span of frequency over which the power divider, power combiner maintains all specified performance values.

**In-Line Housing:** A power divider, power combiner housing having input and output connectors parallel or "in-line" with each other.

**Input VSWR:** Voltage standing wave ratio measured at the power divider input port with all output ports terminated in 50 ohm loads.

**Insertion Loss:** In a power divider or power combiner, the total signal reduction within the device from input to output including such factors as theoretical power split, combining loss, mismatch loss and dissipation loss (including conductor and dielectric losses). Insertion loss (in dB) is expressed by the formula:

$$\text{Insertion Loss} = 10 \log(P_i/P_o), \text{ where:}$$

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$P_T$  = Transmitted Power,  
 $P_i$  = Incident Power

**Isolation:** In a power divider, the ability to keep signals at the output ports separate from one another; to prevent cross-talk between ports. In a power combiner, the ability to prevent signals at any input from appearing at any other. Achieved through the placement of resistors of precisely calculated values at the ends of transformer sections between port pairs.

**Microstrip Circuit:** A circuit constructed of thin strip-like transmission lines separated from a ground plane by a dielectric substrate. Commonly used for constructing RF and microwave devices utilizing discrete components attached to the top of the circuit board.

**Mismatch Loss:** A measure of power loss due to reflections within a device, usually of very small magnitude, and caused by design and manufacturing limitations.

**N Connector:** A threaded coaxial connector with an air interface suitable for carrying medium power RF & microwave signals. Original design attributed to Paul Neill of Bell Labs in the 1940's. Available in mating jack and plug configurations. Connect finger tight or to 12 in-lb (136 N-cm) if a torque wrench is used.

**Non-Coherent Signals:** RF or microwave signals differing in frequency, shape or transmitted information such that, when input to a power combiner, their wave forms do not add constructively or subtract destructively but exhibit a loss equal to  $10 \log(1/n)$ , where  $n$  = number of combined signals.

**Output VSWR:** Voltage standing wave ratio measured at the power divider output port with all other ports terminated in 50 ohm loads.

**Phase Balance:** The attribute of the output signals of a zero degree power divider being in phase (having no phase difference).

**PIM (Passive Intermodulation):** The production of unwanted signals in a wireless receive path from the non-linear mixing of two or more high power transmit signals in a passive component. PIM problems may be minimized by careful contact and current path junction design (including connector mating interfaces), use of linear materials such as brass and copper alloys, avoidance of or shielding from ferromagnetic materials, and cleanliness in the manufacturing process.

# POWER DIVIDER/POWER COMBINER



**Power Combiner:** A device that combines or sums “N” number of input signals to a common output.

**Power Divider:** A device that divides or splits an input signal into “N” number of output signals.

**Power Rating:** The maximum amount of continuous input power (in watts) a power divider or power combiner can safely handle without permanent performance degradation. For a power divider, max input power is dependent on the VSWR and phase of loads connected to the outputs. For a power combiner, max input power is dependent on the properties of the input signals and the magnitude of any combining loss they suffer. Ultimately, power rating is directly related to the power handling capability of the isolation resistors, as it is through these resistors that most power is dissipated.

**Power Split:** The theoretical power ratio from input to output of a power divider (in dB) expressed by the formula:

Power Split =  $10 \log (1/N)$ , where:

N = number of outputs of an equal power divider.

Often referred to as insertion loss, although not a true loss as this power is recoverable.

**PTFE (PolyTetraFluoroEthylene):** A thermoplastic member of the fluoropolymer family of plastics. PTFE is commonly used as a support insulator in RF and microwave coaxial connectors because of its low & stable dielectric constant and loss factor over a wide temperature and frequency range. The original PTFE resin was invented by Dupont in 1938 and called Teflon®.

**SMA Connector (SubMiniature version A):** A threaded coaxial connector with a dielectric loaded interface providing excellent electrical performance from DC to 18 GHz. Precursor designs first appeared in 1958; current designation established in 1968. Available in mating jack and plug configurations. Recommended mating torque is 7-10 in-lb (80-110 N-cm).

**T-Housing:** A power divider, power combiner housing having input and output connectors perpendicular to one another in the configuration of a “T”.

**Tri-Alloy Plating:** An alloy of copper, tin and zinc providing good electrical performance and tarnish resistance. Being non-magnetic, it provides passive intermodulation performance comparable to silver. Appearance resembles

stainless steel. Similar in composition and characteristics to proprietary processes such as albaloy, white bronze, sucoplate, etc.

**True Insertion Loss:** For a power divider or power combiner, the non-recoverable power loss due to internal mismatch and dissipation losses. Does not include power split or combining losses. This is the value specified for insertion loss of INSTOCK Wireless Power Divider, Power Combiners.

**True 3-Way:** A non-binary, modified, Wilkinson power divider, power combiner constructed of three transformers joined at a common node. Differs from 3-Way divider/combiners constructed from a 4-Way with one terminated port. Theoretical insertion loss due to power split is 4.77 dB.

**True 6-Way:** A non-binary, modified, Wilkinson power divider, power combiner constructed by cascading 2-Way and true 3-Way power divider/combiners. Differs from 6-Way divider/combiners constructed from an 8-Way with two terminated ports. Theoretical insertion loss due to power split is 7.78 dB.

**VSWR:** Voltage Standing Wave Ratio. An expression of the voltage standing wave pattern in a device caused by the phase addition and subtraction of incident and reflected waves. VSWR is the ratio of maximum to minimum voltage of this standing wave pattern and is expressed by the formula:

$$VSWR = E_{max}/E_{min} = (E_I + E_R)/(E_I - E_R), \text{ where:}$$

$E_I$  = incident voltage wave amplitude,

$E_R$  = reflected voltage wave amplitude, and

the sign of voltage wave amplitudes is positive

**Wilkinson Power Divider:** A device capable of splitting an input signal into equal phase, equal amplitude output signals or combining like signals to a common port. A unique feature of the Wilkinson divider is output port isolation. Constructed of one or more quarter-wave length transformer sections matching input and output impedances with a resistor placed between the ends of each transformer section. First demonstrated by Ernest Wilkinson with the 1960 publication of his paper, “An N-Way Hybrid Power Divider.”

**Zero Degree (0°) Power Divider:** A power divider whose output signals are in-phase (having no phase difference, subject to specified design and manufacturing limitations). All INSTOCK Wireless Power Divider, Power Combiners are zero degree (in-phase).

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# Power Divider / Power Combiner

## Quote Request Form

Online >> Enter qty of items desired, complete contact info and click send.  
 Fax >> Print PDF Quote Form. Fax completed form to 973-335-6770.  
 Phone >> Speak with a sales engineer at 973-335-6550.



2-Way Power Divider,  
N-Jack Connectors,  
0.7-2.7 GHz, 40 Watts  
**PD1020**  
Qty:



2-Way Power Divider,  
SMA-Jack Connectors,  
0.7-2.7 GHz, 40 Watts  
**PD1120**  
Qty:




2-Way Power Divider,  
T-Style, N-Jack,  
0.7-2.7 GHz, 40 Watts  
**PD3020**  
Qty:



2-Way Power Divider,  
T-Style, SMA-Jack,  
0.7-2.7 GHz, 40 Watts  
**PD3120**  
Qty:



3-Way Power Divider,  
N-Jack Connectors,  
0.7-2.7 GHz, 40 Watts  
**PD1030**  
Qty:




3-Way Power Divider,  
SMA-Jack Connectors,  
0.7-2.7 GHz, 40 Watts  
**PD1130**  
Qty:



3-Way Power Divider,  
T-Style, N-Jack,  
0.7-2.7 GHz, 40 Watts  
**PD3030**  
Qty:



3-Way Power Divider,  
T-Style, SMA-Jack,  
0.7-2.7 GHz, 40 Watts  
**PD3130**  
Qty:



4-Way Power Divider,  
N-Jack Connectors,  
0.7-2.7 GHz, 40 Watts  
**PD1040**  
Qty:



4-Way Power Divider,  
SMA-Jack Connectors,  
0.7-2.7 GHz, 40 Watts  
**PD1140**  
Qty:




6-Way Power Divider,  
N-Jack Connectors,  
0.7-2.7 GHz, 40 Watts  
**PD1060**  
Qty:



6-Way Power Divider,  
SMA-Jack Connectors,  
0.7-2.7 GHz, 40 Watts  
**PD1160**  
Qty:



8-Way Power Divider,  
N-Jack Connectors,  
0.7-2.7 GHz, 40 Watts  
**PD1080**  
Qty:



8-Way Power Divider,  
SMA-Jack Connectors,  
0.7-2.7 GHz, 40 Watts  
**PD1180**  
Qty:

Name: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Title/Position: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Fax: \_\_\_\_\_  
 Email: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City: \_\_\_\_\_  
 State: \_\_\_\_\_  
 Postal Code: \_\_\_\_\_  
 Country: \_\_\_\_\_  
 Quote Status:  Estimate  Buy  
 Bid  Other  
 Delivery Date: \_\_\_\_\_  
 Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Mailing List >> Sign up to receive periodic updates of new product releases and other relevant info:

Email updates  Both  
 Regular mail updates  None



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# Power Divider / Power Combiner

## Sample Request Form

**Online** >> Describe your application, complete contact info and click send.  
**Fax** >> Print PDF Sample Form. Fax completed form to 973-335-6770.  
**Phone** >> Speak with a sales engineer at 973-335-6550.

**Tell us about your application:**

Power Divider application  Power Combiner application  Both

For Divider, indicate number of outputs.   
 For Combiner, indicate number of inputs.

Connector Style:

Frequency Range:

Input Power:

**Tell us about your buying preferences:**

One-time purchase  Recurring purchase

Estimated Annual Usage:  Target Price:

Current Vendor:

Current Model No:

**Please select your sample for evaluation**



2-Way Power Divider  
N-Jack Connectors  
0.7-2.7 GHz, 40 Watts

PD1020



2-Way Power Divider  
SMA-Jack Connectors  
0.7-2.7 GHz, 40 Watts

PD1120




3-Way Power Divider  
N-Jack Connectors  
0.7-2.7 GHz, 40 Watts

PD1030



3-Way Power Divider  
SMA-Jack Connectors  
0.7-2.7 GHz, 40 Watts

PD1130



4-Way Power Divider  
N-Jack Connectors  
0.7-2.7 GHz, 40 Watts

PD1040



4-Way Power Divider  
SMA-Jack Connectors  
0.7-2.7 GHz, 40 Watts

PD1140

Name: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Title/Position: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Fax: \_\_\_\_\_  
 Email: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 \_\_\_\_\_  
 City: \_\_\_\_\_  
 State: \_\_\_\_\_  
 Postal Code: \_\_\_\_\_  
 Country: \_\_\_\_\_  
 Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Mailing List >> Sign up to receive periodic updates of new product releases and other relevant info:

- Email updates  Both  
 Regular mail updates  None



# Power Divider / Power Combiner Credit Approval Form

## Company Information

Business Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Business Type:  Corporation  LLC  Partnership  Proprietorship Federal ID#: \_\_\_\_\_

## Accounts Payable Info (if different)

A/P Contact Person: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

## Owner or Responsible Officer Information

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Name: \_\_\_\_\_ Title: \_\_\_\_\_

## Bank Reference

Bank Name: \_\_\_\_\_

Account#: \_\_\_\_\_

Address: \_\_\_\_\_

Banking Officer: \_\_\_\_\_

City: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

## Trade References

(1) Company Name: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

(2) Company Name: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

(3) Company Name: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

## Authorization

I hereby certify that the information contained herein is complete and accurate. This information has been furnished with the understanding that it is to be used to determine the amount and conditions of the credit to be extended. Furthermore, I hereby authorize the financial institutions listed in this credit application to release necessary information to INSTOCK Wireless Components in order to verify the information contained herein.

Authorized Signature: \_\_\_\_\_ Title: \_\_\_\_\_

Name (Please Print): \_\_\_\_\_ Date: \_\_\_\_\_

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### Placing Orders

**Telephone Orders:** Telephone orders may be placed between 8:00 AM and 8:00 PM Eastern Time, Monday through Friday. Call 973-335-6550. Orders placed by 6:30 PM will be shipped the same day (established accounts and credit card payments).

**Fax Orders:** Submit orders by fax to 973-335-6770.

**Email Orders:** Submit orders via email to:  
sales@instockwireless.com

**Credit Card Orders:** We accept VISA, MasterCard and American Express. Credit card billing occurs when your order ships.

**Written Orders:** Submit written orders to our mailing address:

INSTOCK Wireless Components, Inc.  
50 Intervale Road  
Boonton, NJ 07005 USA

**Blanket Orders:** For customers routinely purchasing specific products, a blanket order may be established. This provides for the automatic shipment of the item(s) on a regular basis, greatly benefits the customer with better unit pricing at a higher volume discount level, eliminates issuance of additional purchase orders and assures uninterrupted customer operation through prompt deliveries. Contact us for additional details.

**Acceptance of Terms and Conditions:** By placing an order the purchaser acknowledges having read the terms and conditions herein and accepts them fully unless specific exception has been requested and agreed to by INSTOCK Wireless Components, Inc.

### Shipping Terms

**Shipping Method:** You may specify a carrier, and we will use this carrier when possible. When no carrier is specified, we will ship via UPS to most domestic locations.

**FOB Point:** All shipments are FOB shipping point (Boonton, NJ 07005 USA).

**Shipping Charges:** Prepaid and separately added to the invoice.

**Insurance:** Available by carrier at current rates and by specific request when placing your order. Insurance costs are assumed by the buyer.

**Title and Ownership:** Title and ownership of all merchandise is transferred to consignee upon delivery to a commercial carrier. Acknowledgement of receipt of merchandise in good condition is made by the commercial carrier.

### Payment Terms

**Established Accounts:** Net 30 days from date of invoice to firms in good credit standing.

**Non-Established Accounts:** You may apply for a new account, with or without a new order, by simply completing our Credit Approval Form and faxing or mailing it to us. We will do our utmost to expedite the process, however, allow up to two weeks for processing. In the interim, payment for orders may be made by credit card, C.O.D., electronic wire transfer, certified check, irrevocable letter of credit, or payment in advance.

### Merchandise Return and/or Exchange

Material will be accepted for return or exchange within 90 days from the date of invoice provided the returned goods are unused, undamaged and in a resalable condition as determined by our inspection. Please contact us to obtain a **Return Material Authorization (RMA)**. Packaging and all transportation expenses are assumed by the customer. All returned material is subject to a 15% restocking charge except for the return of items covered by the standard terms of warranty.

### Damaged Goods

Inspect carton upon receipt for visible signs of damage. If carton is received conspicuously damaged, refuse acceptance and/or alert carrier to the condition.

### Warranty

All products manufactured by INSTOCK Wireless Components, Inc. are guaranteed to be free from defects in material and workmanship, under normal use, for a period of 2 years from date of invoice. This warranty is limited to repair or replacement of defective components as determined by our inspection and discretion.

### Export Orders

Normal shipping terms are Ex-Works. Depending upon destination, export orders may be subject to additional charges for Customs Documentation, Letters of Credit, Sight Drafts, Certifications, Insurance, etc. These charges are assumed by the purchaser. Please request a ProForma Invoice prior to placement of orders to avoid any delays.



**INSTOCK Wireless Components designed & manufactured in the USA**