

Systems for MIMO Testing

50PA-556
Programmable
Attenuator Assembly
Specifications



50BR-112
Benchtop Rotary
Attenuator
Specifications



50BA-002-95
Benchtop Programmable
Attenuator Assembly
Specifications



50P-1901
Solid-state
Programmable Attenuator
Specifications



50DR-125
Dual Rotary
Attenuator
Specifications



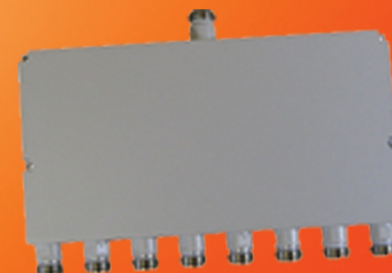
50PD-727 N
2-way Reactive
Power Divider
Specifications



50PD-728 N
4-way Reactive
Power Divider
Specifications



50PD-742 N
8-way Reactive
Power Divider
Specifications



LTE Systems & Components

JFW Industries



317-887-1340

877-887-4539

www.jfwindustries.com

sales@jfwindustries.com

jfwengr@jfwindustries.com

SPECIFICATION SHEET**JFW MODEL 50PA-556****PROGRAMMABLE ATTENUATOR ASSEMBLY**

JFW Industries, Inc.
Phone: 317-887-1340
sales@jfwindustries.com
www.jfwindustries.com

Frequency Range	700-3000 MHz
Configuration	Four individually controlled solid-state programmable attenuators
Impedance	50 Ohms nominal
Attenuation Range	0-127 dB in 1 dB steps
VSWR	1.6:1 maximum
Attenuation Accuracy (guaranteed monotonic)	± 0.5 dB or 2% (whichever is greater)
Insertion Loss	6.0 dB maximum
RF Input Power	+20 dBm average
Switching Speed	5 microseconds typical (after command is received and processed) (3 milliseconds typical processing time)
AC Supply	100-240 VAC @ 47-63 Hz
Manual Control	20-Button Keypad and LCD display
Remote Control	RS-232 (9600, 19200, or 38400 Baud) Ethernet (TCP, 10/100, up to 4 users)
Remote Commands	Attenuator Control Commands: Set Attenuator, Set Attenuator with Response, Read Attenuator, Set All Attenuators, Read All Attenuators, Set Multiple Attenuator, Fade Attenuator, Variable Handover, Store, Recall System Commands: Identification, Pause -RS-232 Only: Change Baud -Ethernet Only: Disconnect, Close, Message, Clear
RF Connector	SMA or N female
Operating Temperature Range	0°C to +50°C

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SPECIFICATION SHEET

JFW MODEL 50PA-556

PROGRAMMABLE ATTENUATOR ASSEMBLY

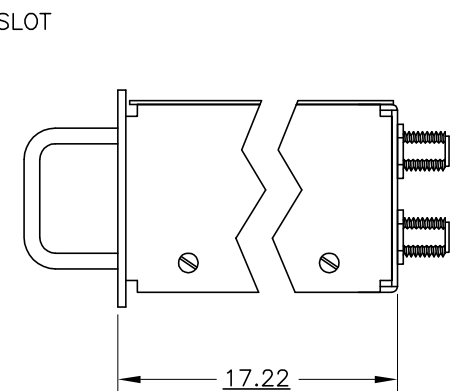
JFW Industries, Inc.
Phone: 317-887-1340
sales@jfwindustries.com
www.jfwindustries.com

Physical Size

See outline drawing 092-6249 (SMA)
092-6293 (N)



ECR/ECN #	DATE	REV	APPR / DATE	ECR/ECN #	DATE	REV	APPR / DATE
	12/09/2009		CLK 12/09/2009				



PIN	FUNCTION
1	CHASSIS GROUND
2	RECEIVED DATA
3	TRANSMITTED DATA
4	NO CONNECTION
5	SIGNAL GROUND
6	NO CONNECTION
7	NO CONNECTION
8	NO CONNECTION
9	NO CONNECTION

REAR VIEW

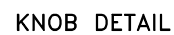
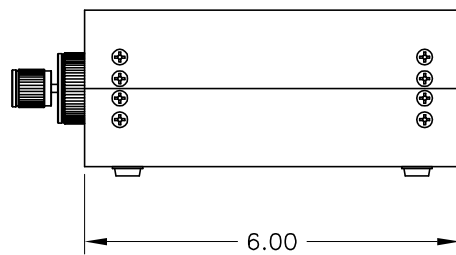
REV	ECN	DATE	BY	APPR		JFW INDUSTRIES, INC.	<i>www.jfwindustries.com</i>	PH: 317-887-1340
-	ISSUED	9-14-09	BZ	CLK				
A	17765	10-9-09	BZ	TEZ				
					MATERIAL	ALUMINUM ALLOY		PROPRIETARY INFORMATION
					FINISH	CHEMFILM TCP / FRONT: BLACK		ALL SURFACES ARE TO BE FREE OF BURRS, PITS, & SCRATCHES
					MODEL	50PA-XXX	SCALE 1/2	TOLERANCES .XX±.010 .XXX±.005 .XX'±.5'
					DESCRIPTION	PROGRAMMABLE ASSEMBLY	DWG #	092-6293

SPECIFICATION SHEET**JFW MODEL 50BR-112****BENCH TOP ROTARY ATTENUATOR**

JFW Industries, Inc.
Phone: 317-887-1340
sales@jfwindustries.com
www.jfwindustries.com

Frequency Range	DC-2700 MHz
Impedance	50 Ohms nominal
Attenuation Range	0-110 dB in 1 dB steps
VSWR	1.5:1 maximum DC-700 MHz 1.8:1 maximum 700-2700 MHz < 1.3:1 typical @ 700 MHz < 1.6:1 typical @ 2700 MHz
Attenuation Accuracy	1 dB steps ± 0.5 dB 10 dB steps ± 0.7 dB or 3%
Insertion Loss	2.0 dB maximum 0.7 dB typical @ 700 MHz 1.7 dB typical @ 2700 MHz
RF Input Power	2 Watts average 1000 Watts Peak
Direction of Rotation	Attenuation increases in a Clockwise direction
Indexing	30 degrees with stops at Minimum and maximum
RF Connector	BNC, N, SMA or TNC female
Operating Temperature Range	-20° to +85° C
Physical Size	See outline drawing 092-6147

ECR/ECN #	DATE	REV	APPR / DATE	ECR/ECN #	DATE	REV	APPR / DATE
	04/28/2009		TRS 04/28/2009				



REV	ECN	DATE	BY	APPR	 JFW INDUSTRIES, INC. www.jfwindustries.com PH: 317-887-1340															
-	ISSUED	3-25-09	BZ	TRS																
<table><tr><td>MATERIAL</td><td colspan="2">ALUMINUM ALLOY</td><td>PROPRIETARY INFORMATION</td></tr><tr><td>FINISH</td><td colspan="2">CASE: BLACK PAINT / FRONT & REAR: GRAY PAINT</td><td>ALL SURFACES ARE TO BE FREE OF BURRS, PITS, & SCRATCHES</td></tr><tr><td>MODEL</td><td>50BR-112</td><td>SCALE 1/2</td><td>TOLERANCES .XX±.010 .XXX±.005 .XX'±.5'</td></tr><tr><td>DESCRIPTION</td><td colspan="2">0-110 dB BENCH MOUNT ATTEN.</td><td>DWG # 092-6147</td></tr></table>					MATERIAL	ALUMINUM ALLOY		PROPRIETARY INFORMATION	FINISH	CASE: BLACK PAINT / FRONT & REAR: GRAY PAINT		ALL SURFACES ARE TO BE FREE OF BURRS, PITS, & SCRATCHES	MODEL	50BR-112	SCALE 1/2	TOLERANCES .XX±.010 .XXX±.005 .XX'±.5'	DESCRIPTION	0-110 dB BENCH MOUNT ATTEN.		DWG # 092-6147
MATERIAL	ALUMINUM ALLOY		PROPRIETARY INFORMATION																	
FINISH	CASE: BLACK PAINT / FRONT & REAR: GRAY PAINT		ALL SURFACES ARE TO BE FREE OF BURRS, PITS, & SCRATCHES																	
MODEL	50BR-112	SCALE 1/2	TOLERANCES .XX±.010 .XXX±.005 .XX'±.5'																	
DESCRIPTION	0-110 dB BENCH MOUNT ATTEN.		DWG # 092-6147																	

SPECIFICATION SHEET**JFW MODEL 50BA-002-95****BENCHTOP PROGRAMMABLE ATTENUATOR ASSEMBLY**

JFW Industries, Inc.
Phone: 317-887-1340
sales@jfwindustries.com
www.jfwindustries.com

Frequency Range	200-6000 MHz										
Configuration	Two individually controlled solid-state programmable attenuators in a mini benchtop enclosure										
Impedance	50 Ohms nominal										
Attenuation Range	0-95 dB in 1 dB steps										
VSWR	2.0:1 maximum										
Attenuation Accuracy (guaranteed monotonic)	<table><tr><td>± 0.50 dB</td><td>1-3 dB</td></tr><tr><td>± 0.75 dB</td><td>4-7 dB</td></tr><tr><td>± 1.00 dB</td><td>8-11 dB</td></tr><tr><td>± 1.25 dB or 4%</td><td>12-95 dB</td></tr><tr><td colspan="2">(whichever is greater)</td></tr></table>	± 0.50 dB	1-3 dB	± 0.75 dB	4-7 dB	± 1.00 dB	8-11 dB	± 1.25 dB or 4%	12-95 dB	(whichever is greater)	
± 0.50 dB	1-3 dB										
± 0.75 dB	4-7 dB										
± 1.00 dB	8-11 dB										
± 1.25 dB or 4%	12-95 dB										
(whichever is greater)											
Insertion Loss	8.0 dB typical										
RF Input Power	+20 dBm average +25 dBm (no damage)										
Switching Speed	1 microsecond typical (after command is received and processed) (3 milliseconds typical processing time)										
DC Supply	+12 Vdc (100-240 VAC AC/DC transformer included)										
Manual Control	Two Momentary Lever Actuator Switches w/ 7-Segment LED Displays (tap to step, hold to jog)										
Remote Control	RS-232 (9600, 19200, or 38400 Baud) Ethernet (TCP, 10/100, up to 4 users)										

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SPECIFICATION SHEET**JFW MODEL 50BA-002-95****BENCHTOP PROGRAMMABLE ATTENUATOR ASSEMBLY**

JFW Industries, Inc.
Phone: 317-887-1340
sales@jfwindustries.com
www.jfwindustries.com

Remote Commands

Attenuator Control Commands:

Set Attenuator, Set Attenuator with
Response, Read Attenuator, Set All
Attenuators, Read All Attenuators, Set
Multiple Attenuator, Fade Attenuator,
Variable Handover, Store, Recall

System Commands:

Identification, Pause
-RS-232 Only: Change Baud
-Ethernet Only: Disconnect, Close,
Message, Clear

RF Connector

SMA female

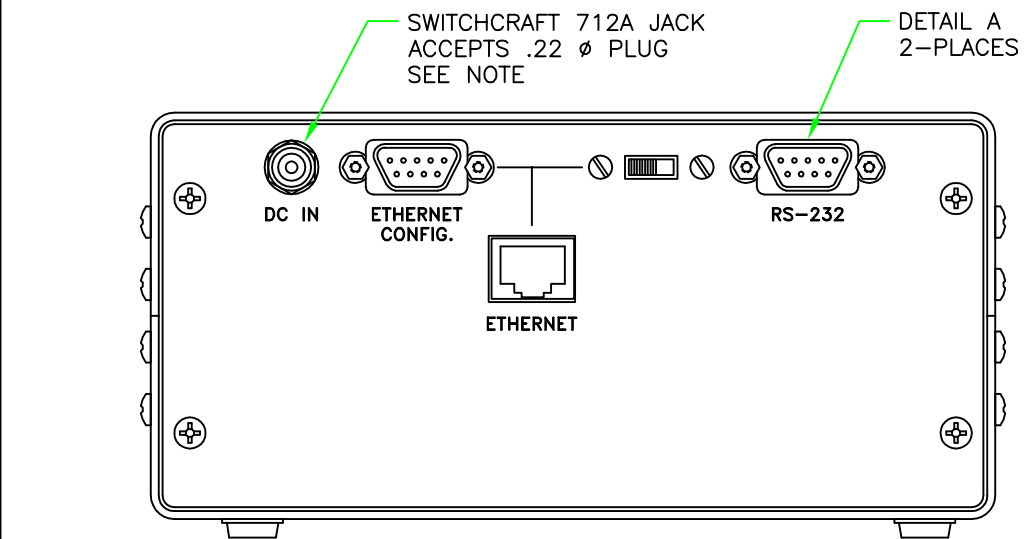
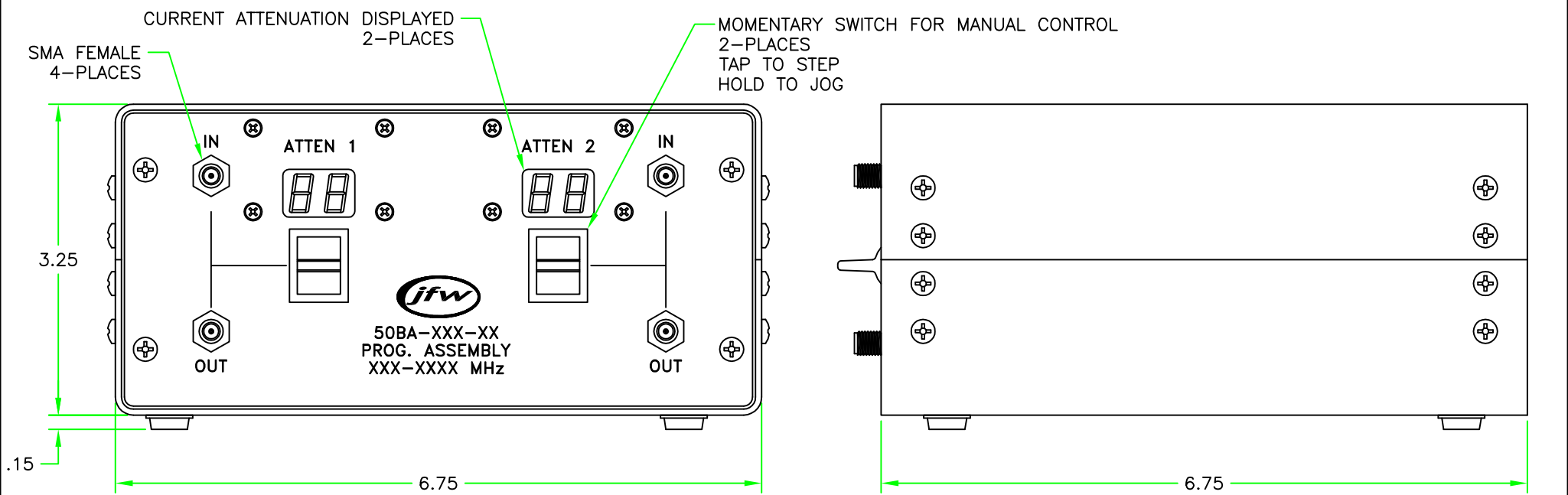
Operating Temperature Range

0°C to +50°C

Physical Size

See outline drawing 092-6616

ECR/ECN #	DATE	REV	APPR / DATE	ECR/ECN #	DATE	REV	APPR / DATE
	07/13/2010		CLK 07/13/2010				
18975	08/06/2010	A	CLK 08/06/2010				



REAR VIEW

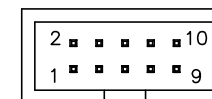
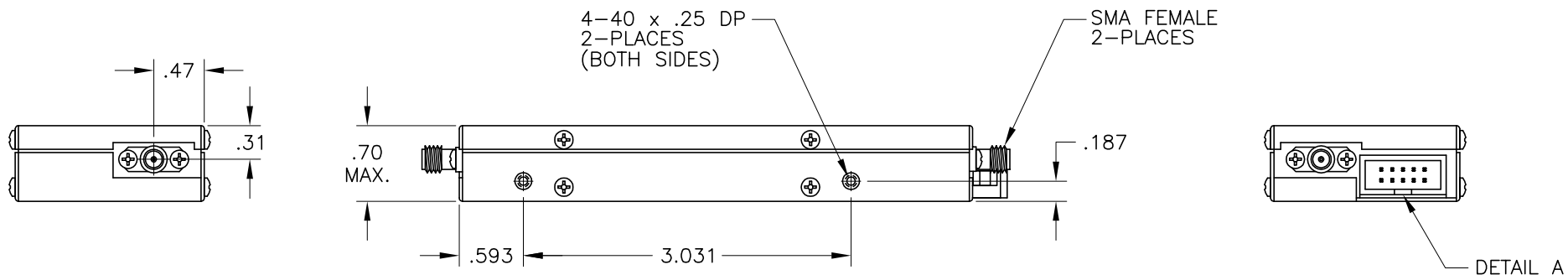
PIN	FUNCTION
1	CHASSIS GROUND
2	RECEIVED DATA
3	TRANSMITTED DATA
4	NO CONNECTION
5	SIGNAL GROUND
6	NO CONNECTION
7	NO CONNECTION
8	NO CONNECTION
9	NO CONNECTION

DETAIL A
DE-9S

NOTE:
THIS UNIT IS SUPPLIED WITH A 12 VOLT TRANSFORMER (100-240VAC)

REV	ECN	DATE	BY	APPR
-	ISSUED	7-1-10	BZ	TEZ
A	18952	8-3-10	BZ	TEZ
B	18972	8-6-10	DTS	TRS
C	19542	12-22-10	DCK	CLK

JFW INDUSTRIES, INC. www.jfwindustries.com PH: 317-887-1340	
MATERIAL ALUMINUM ALLOY FINISH CASE: BLACK PAINT / FRONT & REAR: GRAY PAINT MODEL 50BA-XXX-XX DESCRIPTION MINI BENCHTOP ATTENUATOR	PROPRIETARY INFORMATION ALL SURFACES ARE TO BE FREE OF BURRS, PITS, & SCRATCHES TOLERANCES .XX±.010 .XXX±.005 .XX±.5" DWG # 092-6616



DETAIL A
T&B #609-1057

PIN	FUNCTION
1	1 dB TTL CONT.
2	2 dB TTL CONT.
3	4 dB TTL CONT.
4	8 dB TTL CONT.
5	16 dB TTL CONT.
6	32 dB TTL CONT.
7	64 dB TTL CONT.
8	-5 Vdc
9	+5 Vdc
10	GROUND

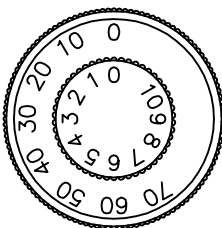
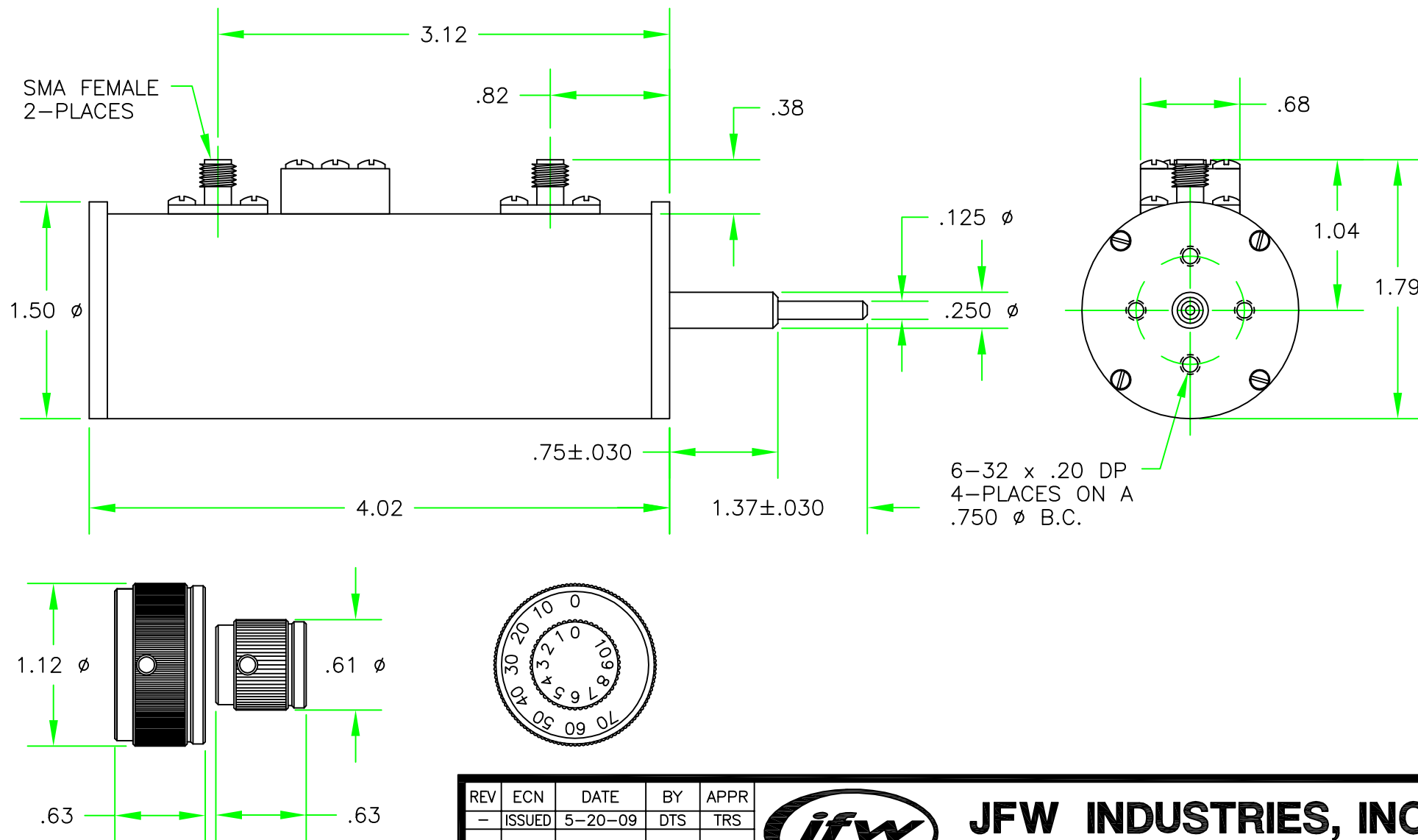
 JFW INDUSTRIES, INC. INDIANAPOLIS, IN						PROPRIETARY INFORMATION
REV	ECN	DATE	BY	DRAWN BY	DATE	ALL SURFACES ARE TO BE FREE OF BURRS, PITS, & SCRATCHES
				T. ZEISS	5-2-08	TOLERANCES
				APP'D BY	SCALE	FRACTIONAL DIM. $\pm 1/64$
				MATERIAL		2 PLACE DECIMAL $\pm .010$
				FINISH		3 PLACE DECIMAL $\pm .005$
				DESCRIPTION		ANGULAR DIM. $\pm 1/2^\circ$
				50P-XXXX: PROG. ATTEN.		DWG NO. 092-5410-02

SPECIFICATION SHEET
JFW MODEL 50DR-125
DUAL ROTARY ATTENUATOR

JFW Industries, Inc.
Phone: 317-887-1340
sales@jfwindustries.com
www.jfwindustries.com

Frequency Range	DC-2700 MHz
Impedance	50 Ohms nominal
Attenuation Range	0-80 dB in 1 dB steps
VSWR	1.6:1 maximum
Insertion Loss	1.2 dB maximum
Attenuation Accuracy	± 0.5 dB or 3.5%
RF Input Power	2 Watts average 1000 Watts peak
Direction of Rotation	Attenuation increases in a Clockwise direction
Indexing	30 degrees with stops at Minimum and maximum
RF Connector	SMA female
Operating Temperature Range	-20°C to +85°C
Physical Size	See outline drawing 092-440-03

ECR/ECN #	DATE	REV	APPR / DATE	ECR/ECN #	DATE	REV	APPR / DATE
	03/04/2011		TRS 03/04/2011				
19959	03/07/2011	A	TRS 04/07/2011				



REV	ECN	DATE	BY	APPR	 JFW INDUSTRIES, INC. www.jfwindustries.com PH: 317-887-1340	
-	ISSUED	5-20-09	DTS	TRS		
					MATERIAL	ALUMINUM ALLOY
					FINISH	CHEMFILM TCP
					MODEL	50DR-XXX
					DESCRIPTION	0-80dB ROTARY ATTENUATOR
					SCALE	FULL
					TOLERANCES	.XX $\pm$.010 .XXX $\pm$.005 XX $\pm$.5'
					DWG #	092-440-03

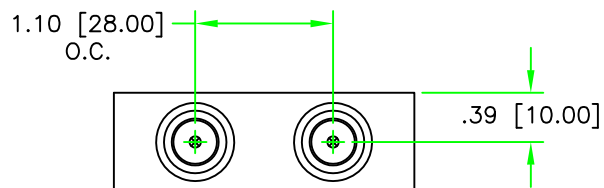
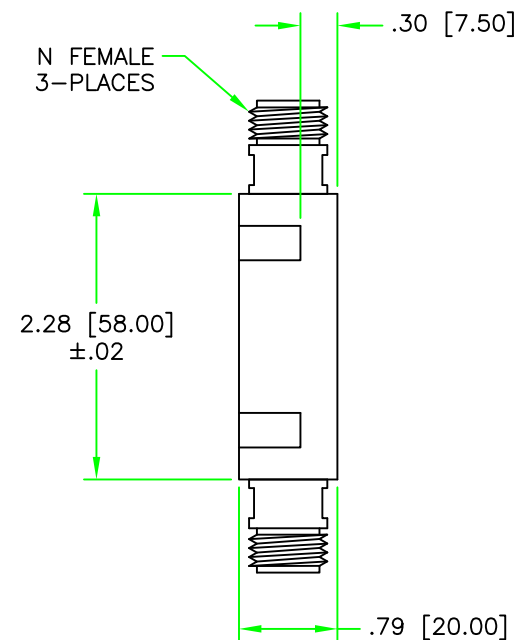
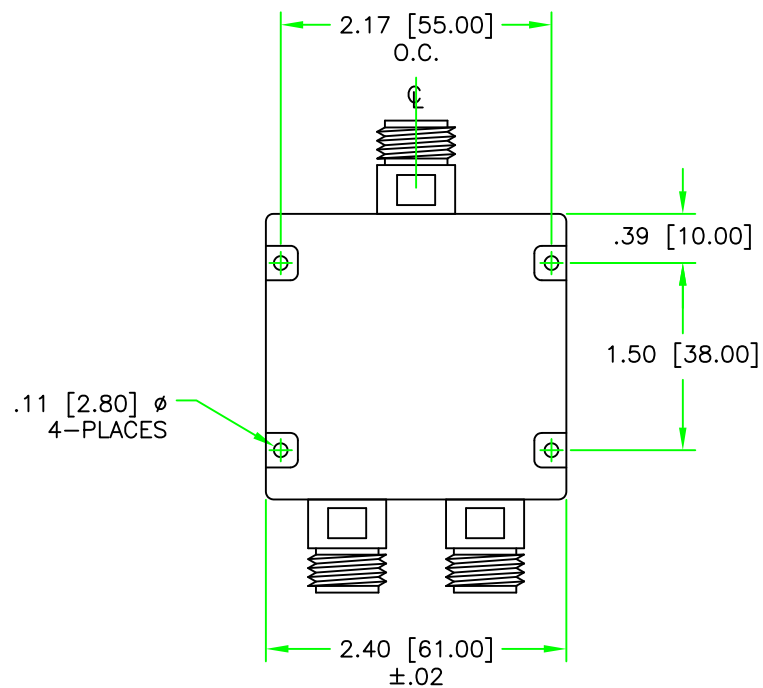
PROPRIETARY INFORMATION
 ALL SURFACES ARE TO BE FREE
 OF BURRS, PITS, & SCRATCHES
 TOLERANCES
 .XX $\pm$.010 .XXX $\pm$.005 XX $\pm$.5'
 DWG #

SPECIFICATION SHEET**JFW MODEL 50PD-727****2 WAY REACTIVE POWER DIVIDER/COMBINER**

JFW Industries, Inc.
Phone: 317-887-1340
sales@jfwindustries.com
www.jfwindustries.com

Frequency Range	698-3000 MHz
Impedance	50 Ohms nominal
VSWR	1.4:1 maximum
Insertion Loss (above 3 dB split)	0.8 dB maximum
Amplitude Tracking	± 0.5 dB maximum
Phase Tracking	± 5° maximum
Isolation	18 dB minimum > 20 dB typical
RF Input Power	5 Watts average (divider port) 0.5 Watts average (combiner ports)
Operating Temperature Range	-40°C to +85°C
RF Connector	N female
Physical Size	See outline drawing 092-6557

ECR/ECN #	DATE	REV	APPR / DATE	ECR/ECN #	DATE	REV	APPR / DATE
	05/06/2010		TRS 05/06/2010				
19390	11/16/2010	A	TRS 11/16/2010				



REV	ECN	DATE	BY	APPR	 JFW INDUSTRIES, INC. www.jfwindustries.com PH: 317-887-1340	
-	ISSUED	6-8-10	BZ	TEZ		
					MATERIAL	ALUMINUM ALLOY
					FINISH	GRAY PAINT
					MODEL	50PD-XXX
					DESCRIPTION	2-WAY POWER DIVIDER
					SCALE	FULL
					TOLERANCES	.XX $\pm$.010 .XXX $\pm$.005 .XX $\pm$.5"
					DWG #	092-6557

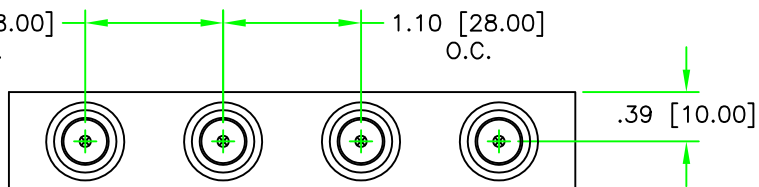
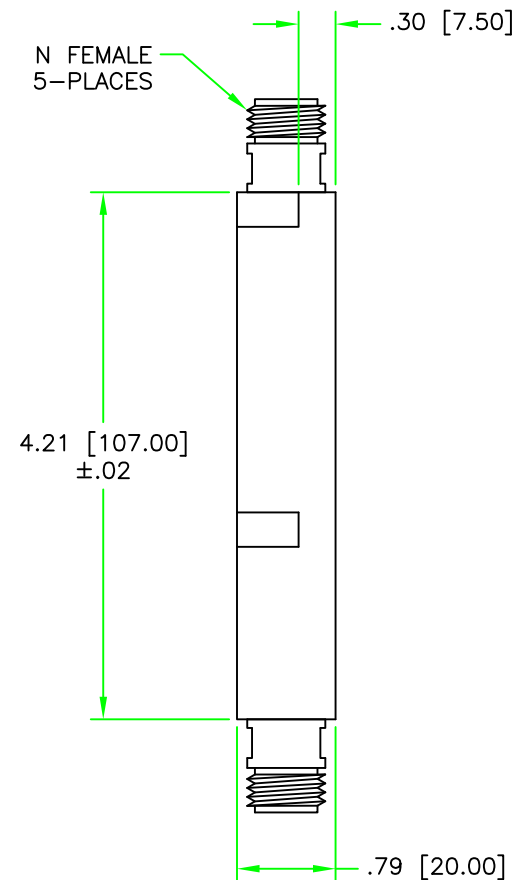
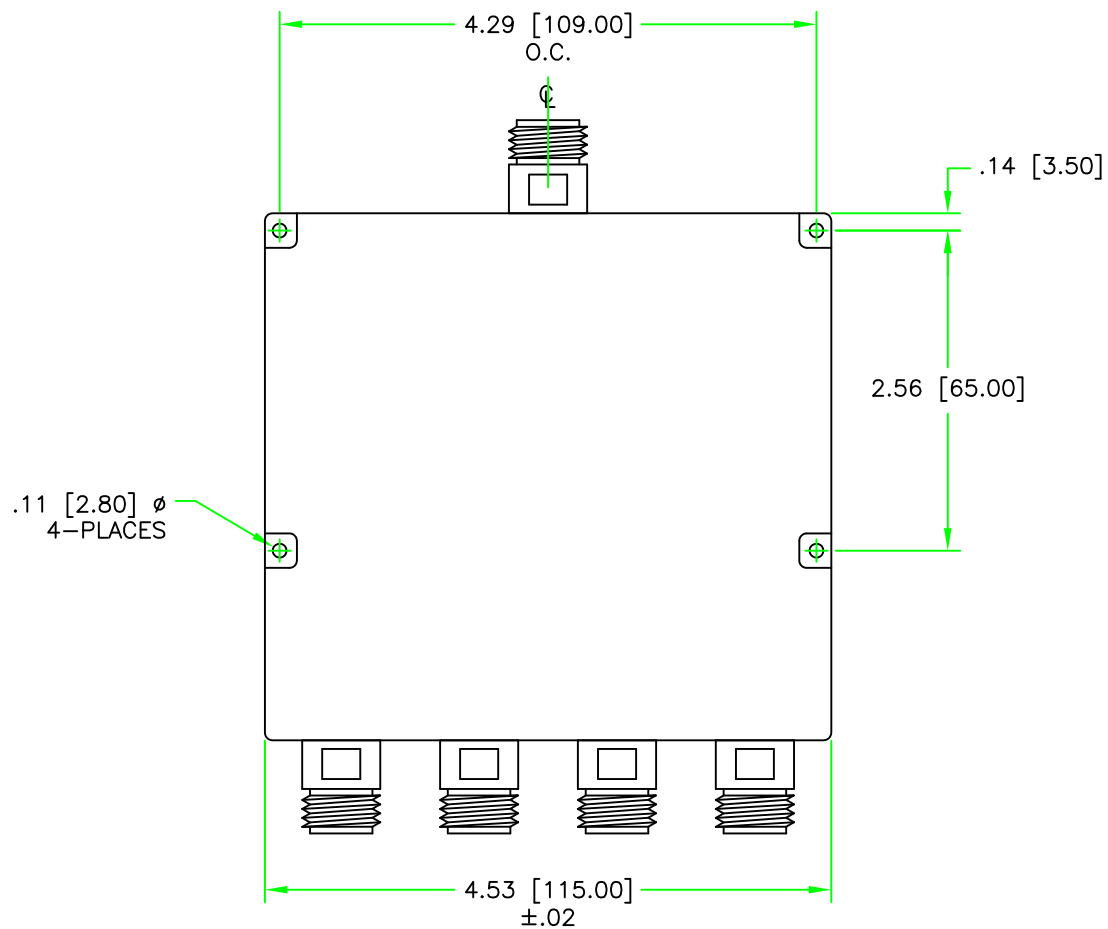
PROPRIETARY INFORMATION
ALL SURFACES ARE TO BE FREE
OF BURRS, PITS, & SCRATCHES

SPECIFICATION SHEET**JFW MODEL 50PD-728****4 WAY REACTIVE POWER DIVIDER/COMBINER**

JFW Industries, Inc.
Phone: 317-887-1340
sales@jfwindustries.com
www.jfwindustries.com

Frequency Range	698-3000 MHz
Impedance	50 Ohms nominal
VSWR	1.5:1 maximum
Insertion Loss (above 6 dB split)	1.2 dB maximum
Amplitude Tracking	± 0.7 dB maximum
Phase Tracking	± 8° maximum
Isolation	18 dB minimum > 20 dB typical
RF Input Power	5 Watts average (divider port) 0.25 Watts average (combiner ports)
Operating Temperature Range	-40°C to +85°C
RF Connector	N female
Physical Size	See outline drawing 092-6558

ECR/ECN #	DATE	REV	APPR / DATE	ECR/ECN #	DATE	REV	APPR / DATE
	05/06/2010		TRS 05/06/2010				
19390	11/16/2010	A	TRS 11/16/2010				



REV	ECN	DATE	BY	APPR
-	ISSUED	6-8-10	BZ	TEZ



JFW INDUSTRIES, INC.

www.jfwindustries.com

PH: 317-887-1340

MATERIAL	ALUMINUM ALLOY	PROPRIETARY INFORMATION
FINISH	GRAY PAINT	ALL SURFACES ARE TO BE FREE OF BURRS, PITS, & SCRATCHES
MODEL	50PD-XXX	TOLERANCES
DESCRIPTION	4-WAY POWER DIVIDER	XX±.010 .XXX±.005 .XX±.5°
SCALE	FULL	DWG #
		092-6558

SPECIFICATION SHEET**JFW MODEL 50PD-742****8 WAY REACTIVE POWER DIVIDER/COMBINER**

JFW Industries, Inc.
Phone: 317-887-1340
sales@jfwindustries.com
www.jfwindustries.com

Frequency Range	698-3000 MHz
Impedance	50 Ohms nominal
VSWR	1.5:1 maximum
Insertion Loss (above 9 dB split)	2 dB maximum
Amplitude Tracking	± 0.5 dB maximum
Isolation	18 dB minimum > 20 dB typical
RF Input Power	5 Watts average (divider port) 0.25 Watts average (combiner ports)
Operating Temperature Range	-40°C to +85°C
RF Connector	N female
Physical Size	See outline drawing 092-6739

ECR/ECN #	DATE	REV	APPR / DATE	ECR/ECN #	DATE	REV	APPR / DATE
	09/30/2010		TRS 09/30/2010				
19390	11/16/2010	A	TRS 11/16/2010				

