

T1 and T2 values for Coupler Power and Isolation

Note: #27 ga Stripease [solder stripable] wire can also be used for secondaries

Primary for all T1 & T2 configurations

One turn of #18 ga wire Insulated
Teflon sleeve or Teflon insulation

RG-6/U Center Conductor is #18 solid.
And it's insulator is a snug fit
inside a FT-50 form, centering the wire.

25 Watt 18.1dB Coupler

T1, T2 FT-50-43 1T:8T #26 [~28uH]

25 Watt 20.0dB Coupler

T1, T2 FT-50-43 1T:10T #26 [~44uH]

250 Watt 18.1dB Coupler

T1, T2 FT-50A-61 1T:8T #26 [~5uH]
T1, T2 FT-82-61 1T:8T #26 [~5.6uH]

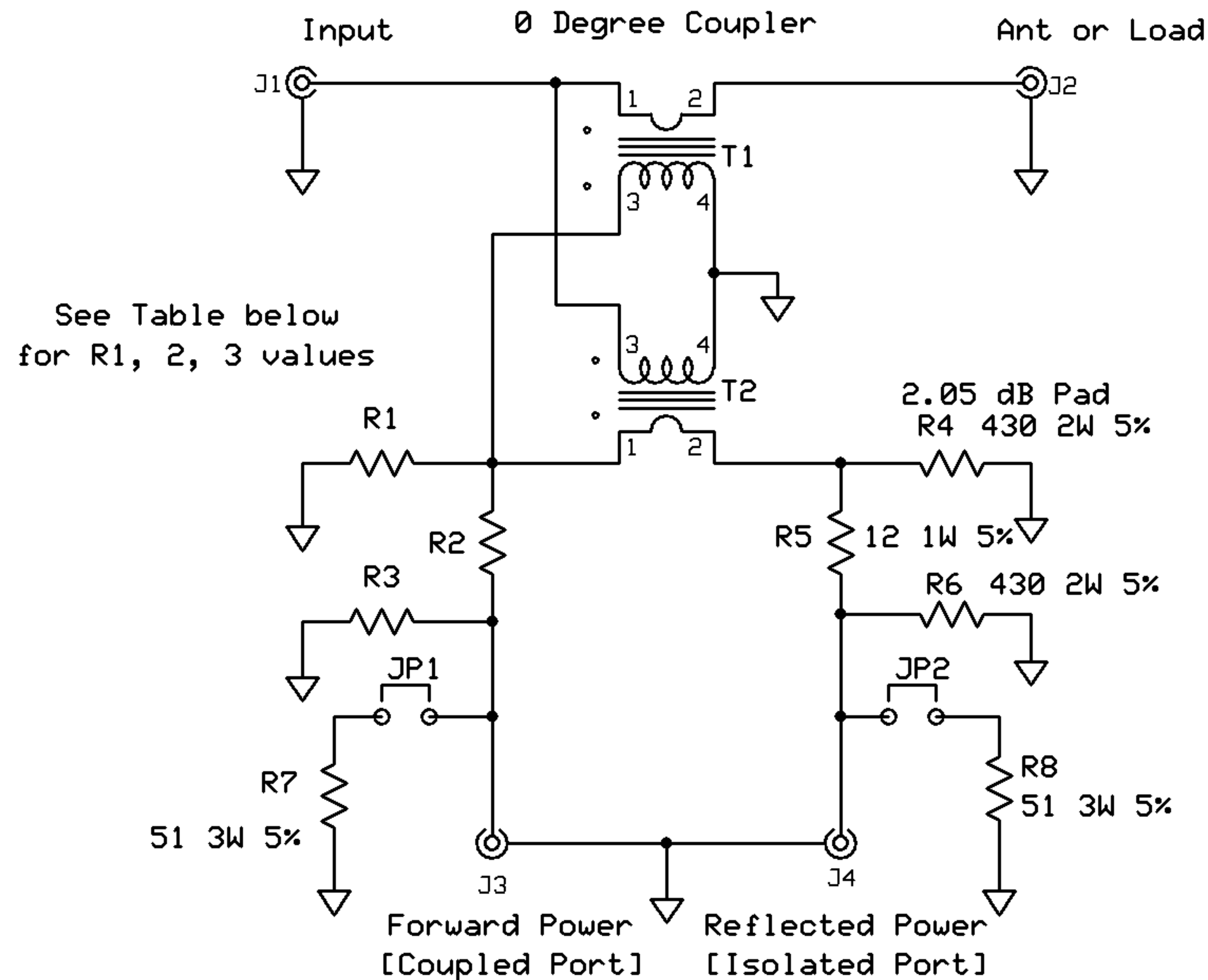
250 Watt 27.97dB Coupler

T1, T2 FT-50A-61 1T:25T #26 [~47uH]
T1, T2 FT-82-61 1T:25T #26 [~49uH]

250 Watt 30.1dB Coupler

T1, T2 FT-50A-61 1T:32T #26 [~77uH]
T1, T2 FT-82-61 1T:32T #26 [~81uH]

Toroid secondaries are all
wound in Clockwise direction



See Table below
for R1, 2, 3 values

NOTE: All ports must be terminated in 50 ohms
When a port is not in use insert JP1 or JP2
so the Coupler sees the required impedance.

11.97 db Pad

R1	82 Ohm	3W 5%	Metal Oxide [Axial]
R2	91 Ohm	1W 5%	Metal Oxide [Axial]
R3	82 Ohm	2W 5%	Metal Oxide [Axial]

22.3 db Pad

R1	56 Ohm	3W 5%	Metal Oxide [Axial]
R2	330 Ohm	1W 5%	Metal Oxide [Axial]
R3	56 Ohm	2W 5%	Metal Oxide [Axial]

2.05 db Pad

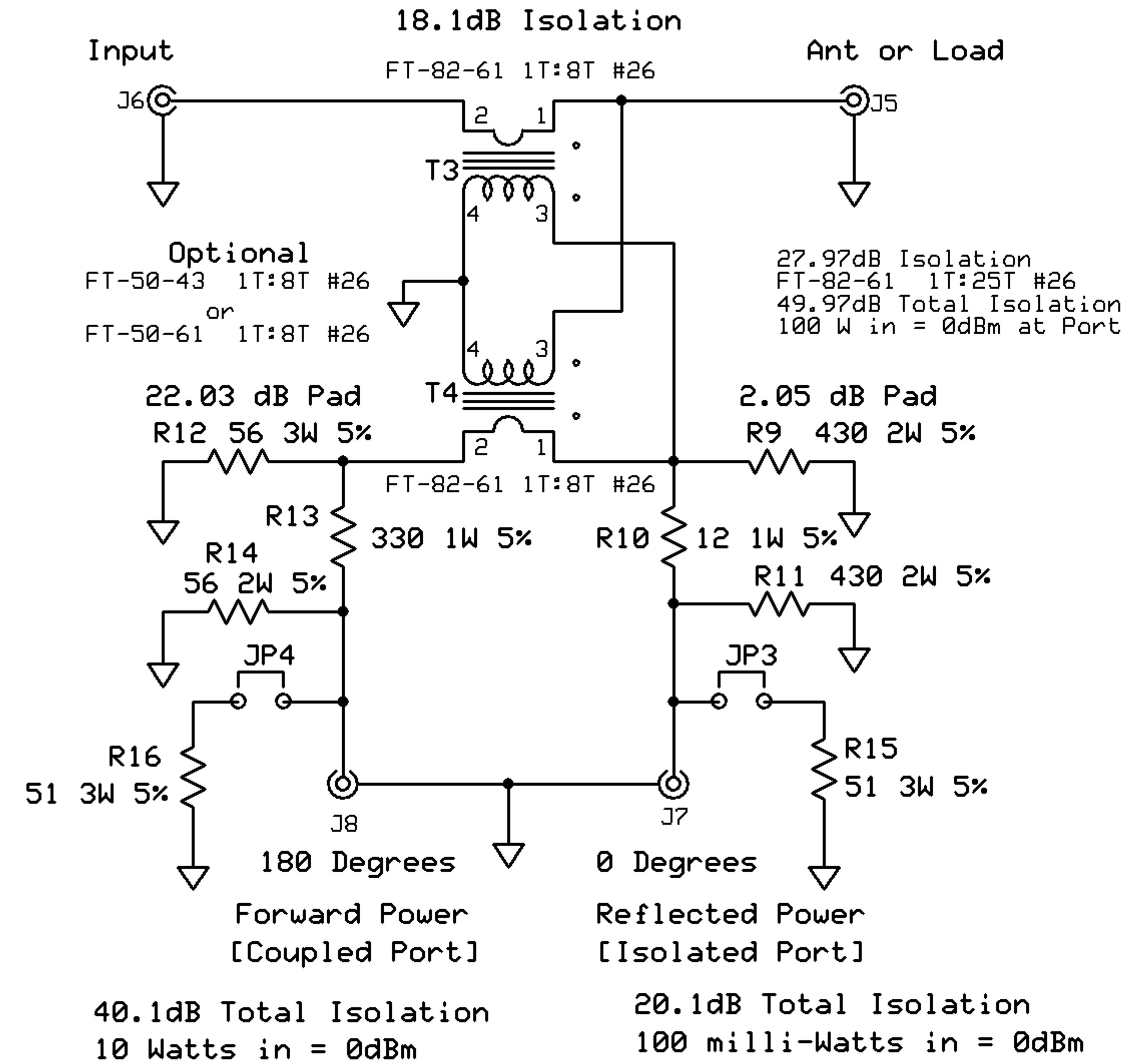
R4, R6	430 Ohm	3W 5%	Metal Oxide [Axial]
R5	12 Ohm	1W 5%	Metal Oxide [Axial]

Termination Resistors

R7, R8	51 Ohm	3W 5%	Metal Oxide [Axial]
--------	--------	-------	---------------------

Example of an alternate design

180 Degree Coupler



NOTE: The only significant difference in the 180 degree Coupler
and the 0 degree coupler is the phasing of T1 and T2.

Simply reversing the Input and Load connections will
accomplish the same result on the opposite port.

Reference Material

"RF Directional Couplers" by Michael G. Ellis, Ph.D.
U.S. Patent #3,426,298, Broadband Directional Coupler
"The Lumped-Element Directional Coupler" by
William E. Sabin W0IYH, QEX March 1995 pp 3 - 11
Attenuator Values from Hamcalc V113
Toroid Data, Formulas and Calculators:
Kits and Parts and Amidon Catalog Jan 2000

0 Degree and 180 Degree Directional Couplers

K9IVB

Rev 1.0

8/04/2014

Page # or name

RF Coupler BOM

Ref Des	Value	Description	Part Number	Mfg	PAD	Mouser or Vendor #	Qty
J1, J2	BNC	RF Connectors / Coaxial Connectors JACK RT-ANG BNC PCB	5414284-2	TE/AMP		571-5414284-2	2
		RF Connectors / Coaxial Connectors R/A PCB Skt White 50Ohm	1-1337543-0 414284-1	TE/AMP TE/AMP		571-1-1337543-0 BNC-149	All Electronics
		BNC RA JACK PCB STD bulkhead Hrdwr		Molex		538-73138-5033	
J3, J4 JP1, JP2 Shunt	SMA End Launch	RF Connectors / Coaxial Connectors PC END MT JCK GLD .062" BOARD THICK	142-0701-801 [No Hardware]	Johnson / Emmerson	End Launch SMA	530-142-0701-801	2 2 2
R1, R3	82 3W 5%	Metal Oxide Resistors RSS3 82 5%TR	MOS3CT631R820J	KOA Speer	0.75" Axial	660-MOS3CT631R820J	2
R2	91 1W 5%	Metal Oxide Resistors RSS2 91 5%TR	MOS2CT52R910J	KOA Speer	0.6" Axial	660-MOS2CT52R910J	1
R4, R6	430 2W 5%	Metal Oxide Resistors 2W 430 5%	MOS2CT52R431J	KOA Speer	0.6" Axial	660-MOS2CT52R431J	2
R5	12 1W 5%	Metal Oxide Resistors 2W 12 5%	MO2CT631R120J	KOA Speer	0.6" Axial	660-MO2CT631R120J	1
R7, R8 T1, T2 [25W] T1, T2 [250W] T1, T2 [>250W]	51 3W 5% FT50-43 1T:xxT #26 FT50A-61 1T:xxT #26 FT-82-61 1T:xxT #26	Metal Oxide Resistors RSS3 51 5%TR 3W 300ppm	MOS3CT631R510J	KOA Speer	0.75" Axial	660-MOS3CT631R510J FT-50-43 FT-50A-61 FT-82-61	2 2 Kits & Parts Amidon Kits & Parts
PCB		2.01" x 2.11"		OSH Park		https://oshpark.com/shared_projects/9u4tr17X	\$21.10 / 3 pieces

Ref: RF Coupler Alternate Design Example

J5, 6, 7, 8 JP3, 4	Ref Ref	See above See above					
R9, 11	430 2W 5%	Metal Oxide Resistors 2W 430 5%	MOS2CT52R431J	KOA Speer	0.6" Axial	660-MOS2CT52R431J	
R10	12 1W 5%	Metal Oxide Resistors 2W 12 5%	MO2CT631R120J	KOA Speer	0.6" Axial	660-MO2CT631R120J	
R12, 14	56 3W 5%	Metal Oxide Resistors RSS3 56 5%TR	MOS3CT631R560J	KOA Speer	0.75" Axial	660-MOS3CT631R560J	
R13	330 1W 5%	Metal Oxide Resistors RSS2 330 5%TR	MOS2CT52R331J	KOA Speer	0.6" Axial	660-MOS2CT52R331J	
R15, 16 T3, 4	51 3W 5% FT-82-61 1T:8T #26	Metal Oxide Resistors RSS3 51 5%TR 3W 300ppm	MOS3CT631R510J	KOA Speer	0.75" Axial	660-MOS3CT631R510J FT-82-61	Kits & Parts