

ATTENUATORS, PIN DIODE

“PHASE-FREE” 0.25–18 GHz

SERIES DF & FF

GENERAL INFORMATION:

KDI/Triangle's phase free Pin diode attenuators change the amplitude of a microwave signal with matched (low) VSWR over the full attenuation range, and with minimum phase shift change. The units are supplied with either an analog or with a digital control input, with a dynamic attenuation range of 32 dB minimum. Standard digital units are supplied with 8 TTL logic inputs (bits) and therefore can produce 256 discrete values of attenuation. Units with 10 or 12 bits can be provided as specials.

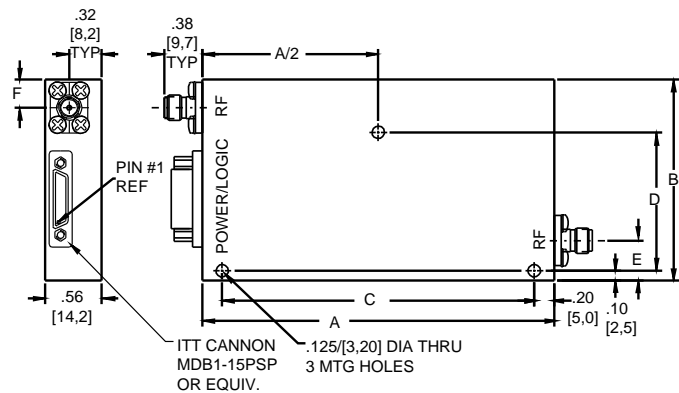
GENERAL SPECIFICATIONS:

Frequency Range:	0.25 to 18.0 GHz
RF Impedance:	50 OHMS
D.C. Voltage:	± 15 volts at ± 50 mA
Logic (DF Series)	TTL compatible
No. of Bits:	8 L.S.B. = 0.125 dB.
Attenuation:	31.875 dB
Control Range (FF Series)	0-10 volts produces 0-32 dB. Other control voltages can be provided on request.
Control Input Impedance	10 K Ohms, 20 pf
Accuracy/Frequency Flatness	For octave models, the frequency sensitivity including digital settability is typically ± 0.8 dB to 20 dB; ± 1.25 dB to 32 dB over the frequency range. Narrow band units are proportionally more accurate.
RF Power:	100 mW CW 60 watts peak operational. Units will not be damaged by application of 1 watt CW 100 watts peak.
Temperature Information:	Operating temperature from -55°C to +85°C
Temperature Stability:	A) Standard: ±0.3 dB from +10°C to +40°C B) ± 0.5 dB to 20 dB and ±0.75 dB to 32 dB can be provided from -54°C to +85°C. If this stability is desired, add a suffix TT to model number. For example, if the DF-74 is desired with temperature compensation, it is ordered as DF-74-TT.
Connectors:	SMA standard. A mating multipin connector can be supplied with each unit upon request. ITT Cannon MDB-1-15SSL or equivalent.
Switching Speed:	Response time of all models is 10 microsec. Faster models (to 150 nanosec.) can be quoted on request.
Linearization:	Any of the models "FF" can be supplied with a linearizer by adding a prefix 2. For example, if the FF-47 is desired with a linearizer, it is ordered as a 2-FF-47. The overall accuracy including linearity and frequency sensitivity is then ±0.75 dB to 20 dB and ±1.25 dB to 32 dB.



Notes:

1. Harmonic Distortion: Approximately -50 dBc for Pin ≤ 0 dBm at a frequency of 1.0 GHz for most units. This value improves by approximately 10 dB per octave as the frequency increases; however, since this value is dependent on bandwidth of the unit, power input, and switching speed required, the factory should be consulted if harmonic content is an important system requirement.
2. The phase shift over the center half of the frequency range is 1/2 of the value listed, e.g.: the phase shift of the FF-47 is ±5° from 2.5 to 3.5 GHz (0–20 dB). See Fig. 2
3. Other configurations (up to 12 Bits) or units with different attenuation values can be quoted on request.



DIGITAL MODELS (DF SERIES)

POWER LOGIC PIN CONNECTIONS

Out-Line	A	B	C	D	E	F	G
	in[mm]	in[mm]	in[mm]	in[mm]	in[mm]	in[mm]	in[mm]
1	4.00[101,6]	4.00[10,1]	3.600[91,4]	3.375[85,72]	0.38[9,65]	0.39[9,90]	0.32[8,12]
2	3.00[76,2]	2.00[50,8]	2.600[66,04]	1.375[34,92]	0.35[8,9]	0.25[6,4]	0.32[8,12]
3	4.00[101,6]	2.00[50,8]	3.600[91,4]	3.375[85,72]	0.45[11,4]	0.25[6,4]	0.34[8,6]
4	4.50[114,3]	4.00[101,6]	4.100[104,14]	3.375[85,72]	0.31[7,87]	0.31[7,87]	—
5	3.50[88,9]	2.00[50,8]	3.100[78,74]	1.375[34,92]	0.40[10,2]	0.28[7,11]	—
6	4.50[114,3]	2.00[50,8]	4.100[104,14]	1.375[34,92]	0.45[11,4]	0.25[6,4]	—

PIN	FUNCTION
1-12	Logic inputs
13	+15 VDC
14	-15 VDC
15	GND

KEY: Inches[Millimeters] .XX ±.03 .XXX ±.010 [.X ±0.8 .XX ±0.25]



KDI/Triangle
An MCE Company CORPORATION

60 South Jefferson Road, Whippany, NJ 07981
Tel: 973-887-8100 • Fax: 973-884-0445
E-Mail: kdisales@aol.com
See us on the web @ www.kditriangle.com

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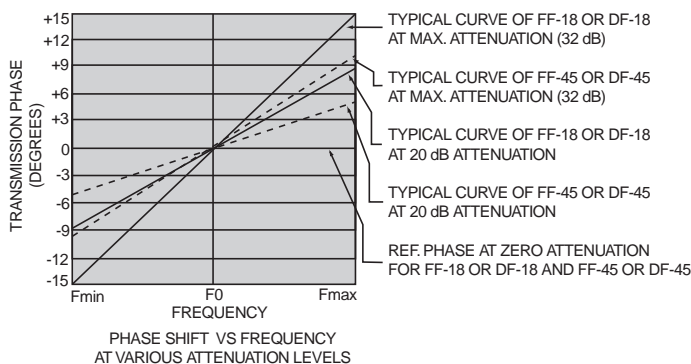
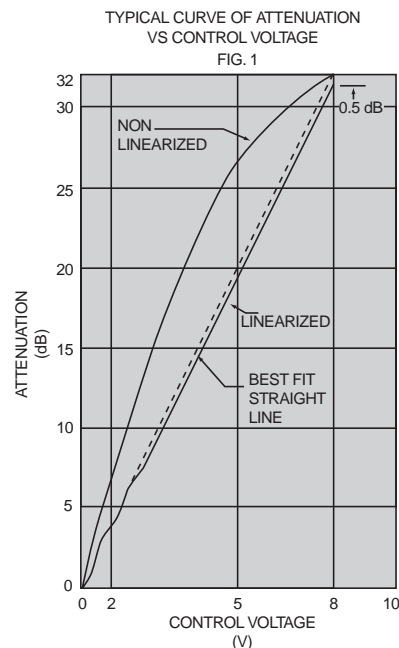
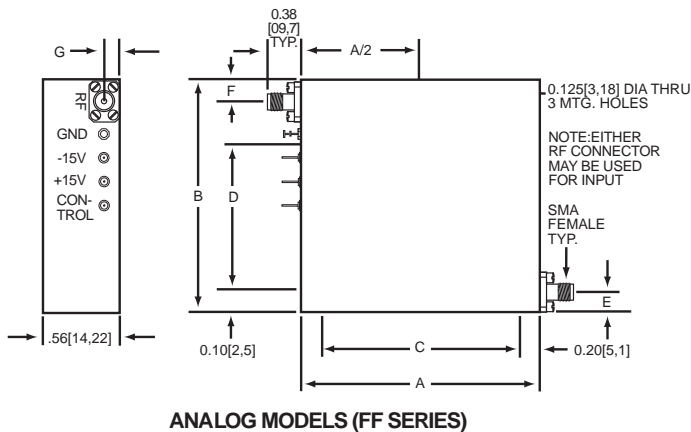
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SERIES DF & FF

SPECIFICATIONS

Digital Model*	Analog Model No.	Frequency Range GHz	FF Outline	DF Outline	DF Series Least Significant Bit dB Note 3	Atten. Range Maximum dB	Insertion Loss Maximum dB	VSWR For All Values of Atten. Maximum	Maximum Phase Shift ± Deg. 0-20 dB	Maximum Phase Shift ± Deg. 20-32 dB
FF-18	DF-18	0.25-0.5	1	4	.125	32	4.5	1.5	10	15
FF-32	DF-32	0.95-1.25	1	4	.125	32	3.0	1.5	5	7.5
FF-36	DF-36	1.0-2.0	3	6	.125	32	4.0	1.5	10	15
FF-45	DF-45	1.7-2.4	3	6	.125	32	3.5	1.5	6	10
FF-47	DF-47	2.0-4.0	3	6	.125	32	3.0	1.5	10	15
FF-62	DF-62	4.0-8.0	2	5	.125	32	3.75	1.75	12	15
FF-73	DF-73	7.0-12.4	2	5	.125	32	4.25	1.8	12	15
FF-74	DF-74	8.0-18.0	2	5	.125	32	5.5	2.2	15	20

* Add Prefix "2" for Linearization
Add Suffix "TT" for Temp Comp; -55 to +85°C



KEY: Inches[Millimeters] .XX ±.03 .XXX ±.010 [.X ±0.8 .XX ±0.25]



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