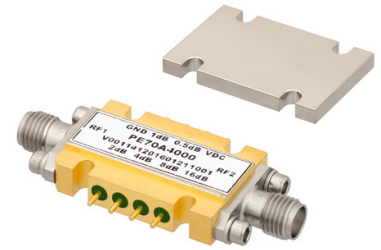


6 Bit TTL Controlled Programmable Attenuator, 31.5 dB Up to 13 GHz, 0.5 dB Steps, SMA Female

PE70A4000



Features

- 0.5 dB LSB steps to 31.5 dB Attenuation
- Single Control Line Per Bit
- +/-0.3 dB typical Bit Error
- 45 nsec Switching Speed
- CMOS Compatible Control Circuit
- Hermetically Sealed Module
- Field Replaceable SMA Connectors
- -55°C to +85°C Operating Temperature
- Designed to meet MIL-STD-883 Conditions

Applications

- Military Radio
- Radar
- Electronic Counter Measures
- Space Systems
- Test Instrumentation
- Telecom Infrastructure

Description

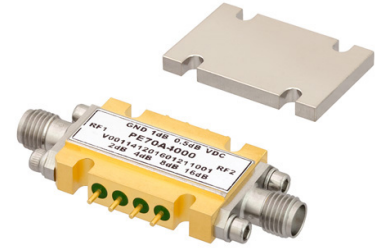
The PE70A4000 is a 6-Bit Digital Attenuator that has 31.5 dB of total attenuation with bit values of 0.5 (LSB), 1, 2, 4, 8, and 16 dB across a wide frequency range from DC to 13 GHz. The design is based on GaAs IC technology that offers exceptional performance characteristics that include 5.5 dB typical insertion loss at 13 GHz, +38 dB input IP3, and fast switching speed of 45 nsec. The design also features excellent Attenuation Accuracy with +/- 0.3 dB typical bit error and single control lines per bit that are CMOS compatible. The drop-in package is hermetically sealed and supports Field Replaceable SMA connectors. And for added confidence, this rugged package assembly is designed to meet MIL-STD-883 test conditions for Hermeticity and Temperature Cycle.

Electrical Specifications (Values at +25°C, sea level)

Description	Min	Typ	Max	Unit
Frequency Range	DC		13	GHz
Impedance		50		Ohms
Attenuation Range	0		31.5	dB
Insertion Loss		5.5	6	dB
VSWR		1.67:1		
Output VSWR		1.67:1		
Power Rating			22	dBm
Input at 0.1 dB Compression Point		+22		dB
Input IP3			+46	dBm
Survival Power Average -55 to +85 deg C				
Step Size		0.5		dB
Switching Time		45		ns
Voltage Accuracy		±10%		
DC Voltage			-5	
DC Current			9	mA
Control Bits		6		Bits

6 Bit TTL Controlled Programmable Attenuator, 31.5 dB Up to 13 GHz, 0.5 dB Steps, SMA Female

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Performance by Frequency

Description	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 4 GHz		3.2	3.7	dB
	4 - 8 GHz		4.2	4.7	
	8 - 11 GHz		5.0	5.5	
	11 - 13 GHz		5.5	6	
Attenuation Range	DC - 13 GHz		31.5		dB
Return Loss (RF1 & RF2, All Atten. States)	DC - 13 GHz		12		dB
Attenuation Accuracy: (Referenced to Insertion Loss)					
All States	DC - 3 GHz	± (0.2 + 3% of Atten. Setting) Max			dB
0.5 - 27.5 dB	3 - 10 GHz	± (0.4 + 3% of Atten. Setting) Max			dB
28.0 - 31.5 dB	3 - 10 GHz	± (0.4 + 4% of Atten. Setting) Max			dB
All States	10 - 13 GHz	± (0.6 + 10% of Atten. Setting) Max			dB
Input Power for 0.1 dB Compression	1 - 13 GHz		+22		dBm
Input Third Order Intercept Point	RF State		+46		dBm
(Two-Tone Input Power= 0 dBm Each Tone)	All Other States		+38		dBm
Switching Characteristics					
tRISE, tFALL (10/90% RF)			22		ns
tON/tOFF (50% CTL to 10/90% RF)	DC - 13 GHz		45		ns

Absolute Maximum Rating

Parameter	Rating	Units
RF Input Power	+25	dBm
Control Voltage	-0.5 to +5.5	Vdc
Bias Voltage	-7	Vdc
Thermal Resistance	346°	C/W
Operating Temperature	-55° to +85°	C
Storage Temperature	-65° to +150°	C



ESD Sensitive Material,
Transport material in
Approved ESD bags.
Handle only in approved
ESD Workstation.

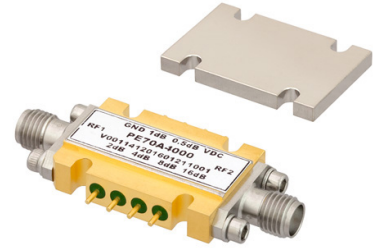
Mechanical Specifications

Size

Length	1.035 in [26.29 mm]
Width	0.68 in [17.27 mm]
Height	0.36 in [9.14 mm]
Weight	0.075 lbs [34.02 g]
Connector 1	Field Replaceable SMA Female
Connector 2	Field Replaceable SMA Female

6 Bit TTL Controlled Programmable Attenuator, 31.5 dB Up to 13 GHz, 0.5 dB Steps, SMA Female

PE70A4000



Environmental Specifications

Temperature

Operating Range

-55 to +85 deg C

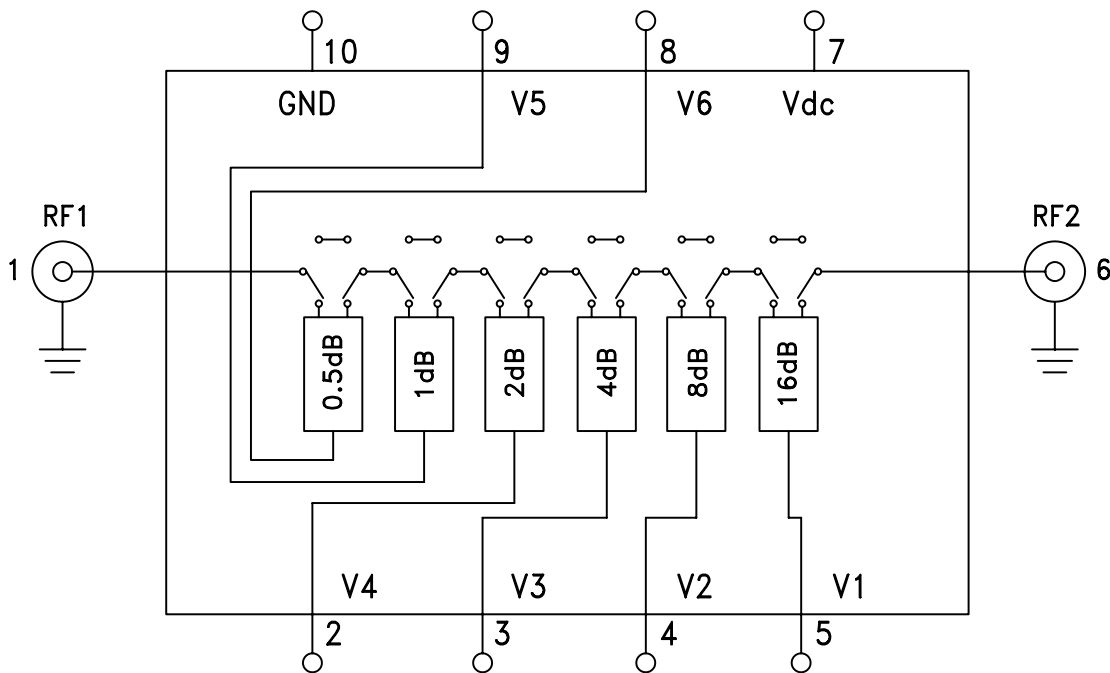
Compliance Certifications (see [product page](#) for current document)

Plotted and Other Data

Notes:

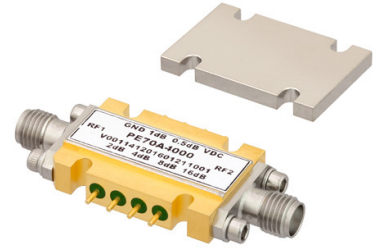
- Values at 25 °C, sea level
- ESD Sensitive Material, Transport material in Approved ESD bags. Handle only in approved ESD Workstation.

Functional Block Diagram



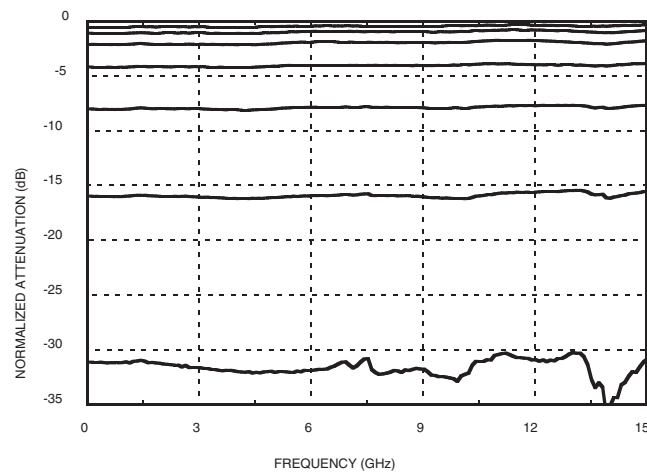
6 Bit TTL Controlled Programmable Attenuator, 31.5 dB Up to 13 GHz, 0.5 dB Steps, SMA Female

PE70A4000

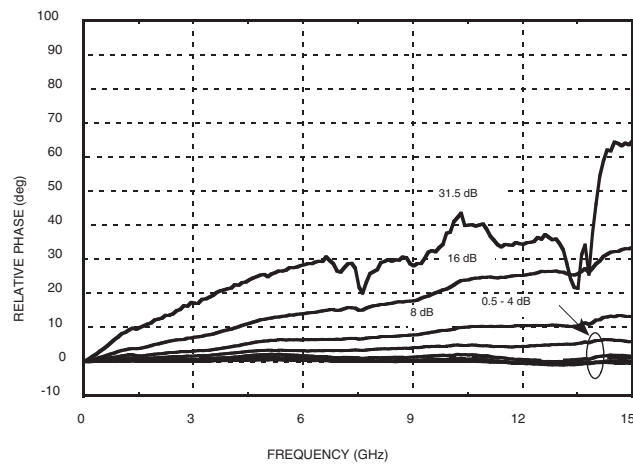


Typical Performance Data

Normalized Attenuation (Only Major States are Shown)

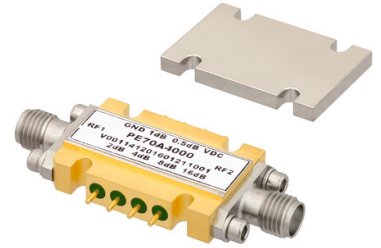


Relative Phase vs. Frequency (Only Major States are Shown)

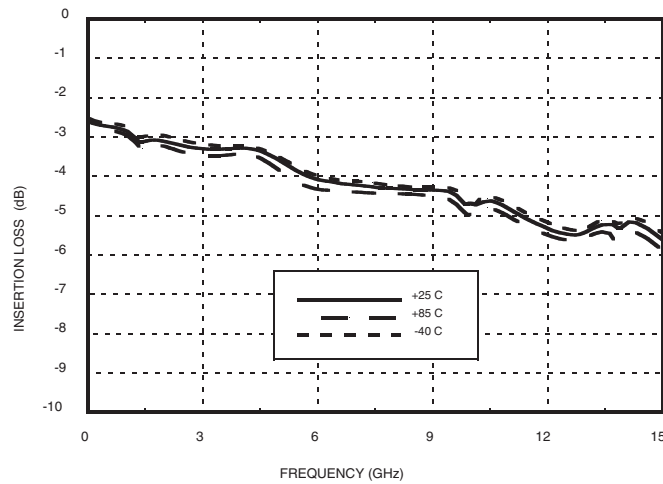


6 Bit TTL Controlled Programmable Attenuator,
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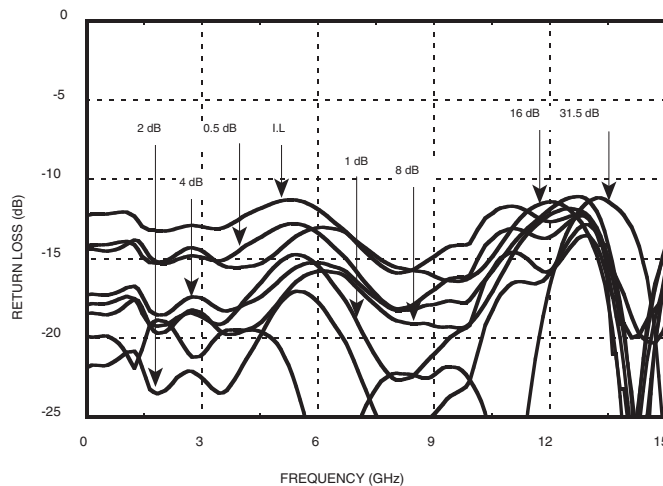
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Insertion Loss

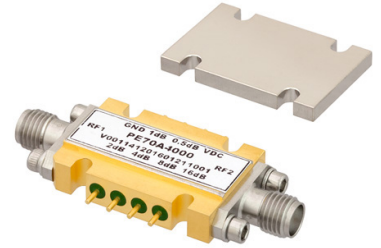


Return Loss RF1, RF2 (Only Major States are Shown)

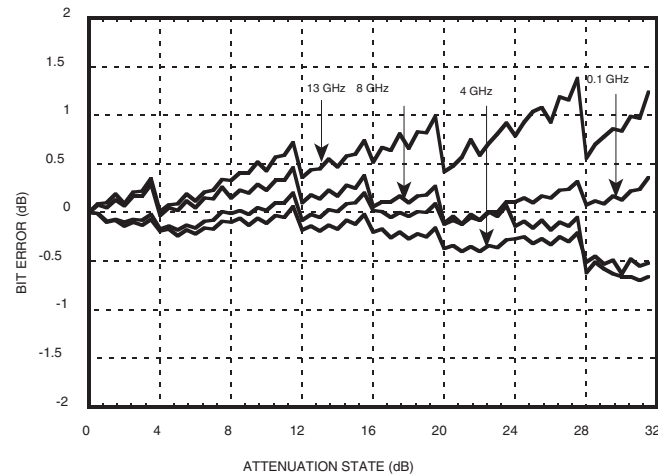


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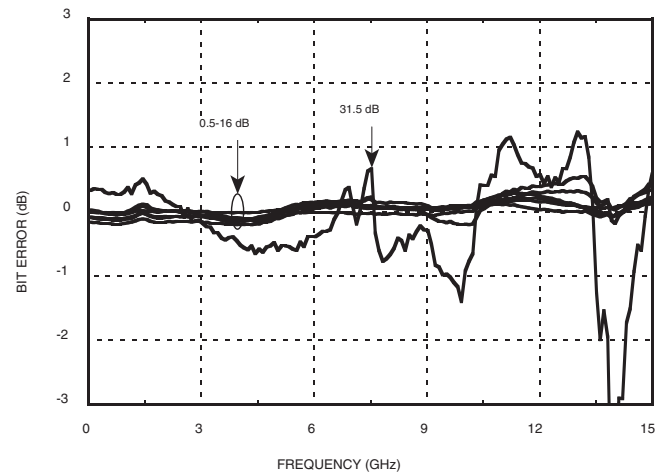
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Bit Error vs. Attenuation State

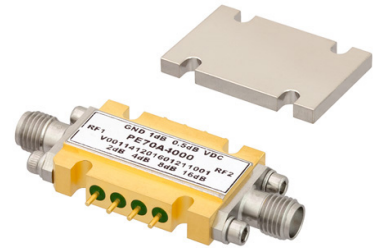


Bit Error vs. Frequency (Only Major States are Shown)

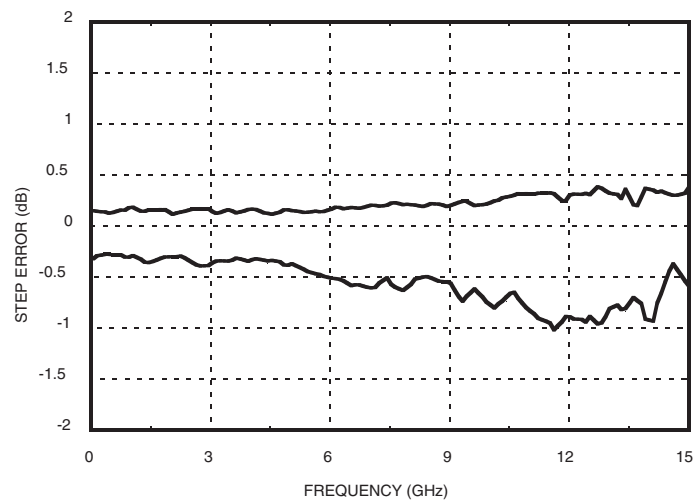


6 Bit TTL Controlled Programmable Attenuator,
31.5 dB Up to 13 GHz, 0.5 dB Steps, SMA Female

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Worst Case Step Error Between Successive Attenuation States



Bias Voltage & Current

Vdc Range = -5V ± 10%		
V	I (Typ.) (mA)	I (Max.) (mA)
-5.0	5	9

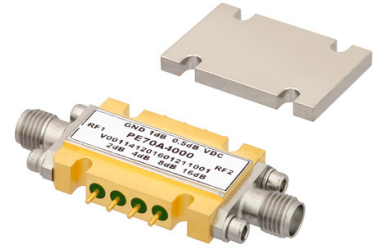
(Bias current increases with switching rate to 15 - 20 mA)

Control Voltage (CMOS Compatible)

State	Bias Condition
Low	0 to +1.5V @ 5 µA Typ.
High	+3.5 to +5V @ 800 µA Typ.

6 Bit TTL Controlled Programmable Attenuator, 31.5 dB Up to 13 GHz, 0.5 dB Steps, SMA Female

PE70A4000



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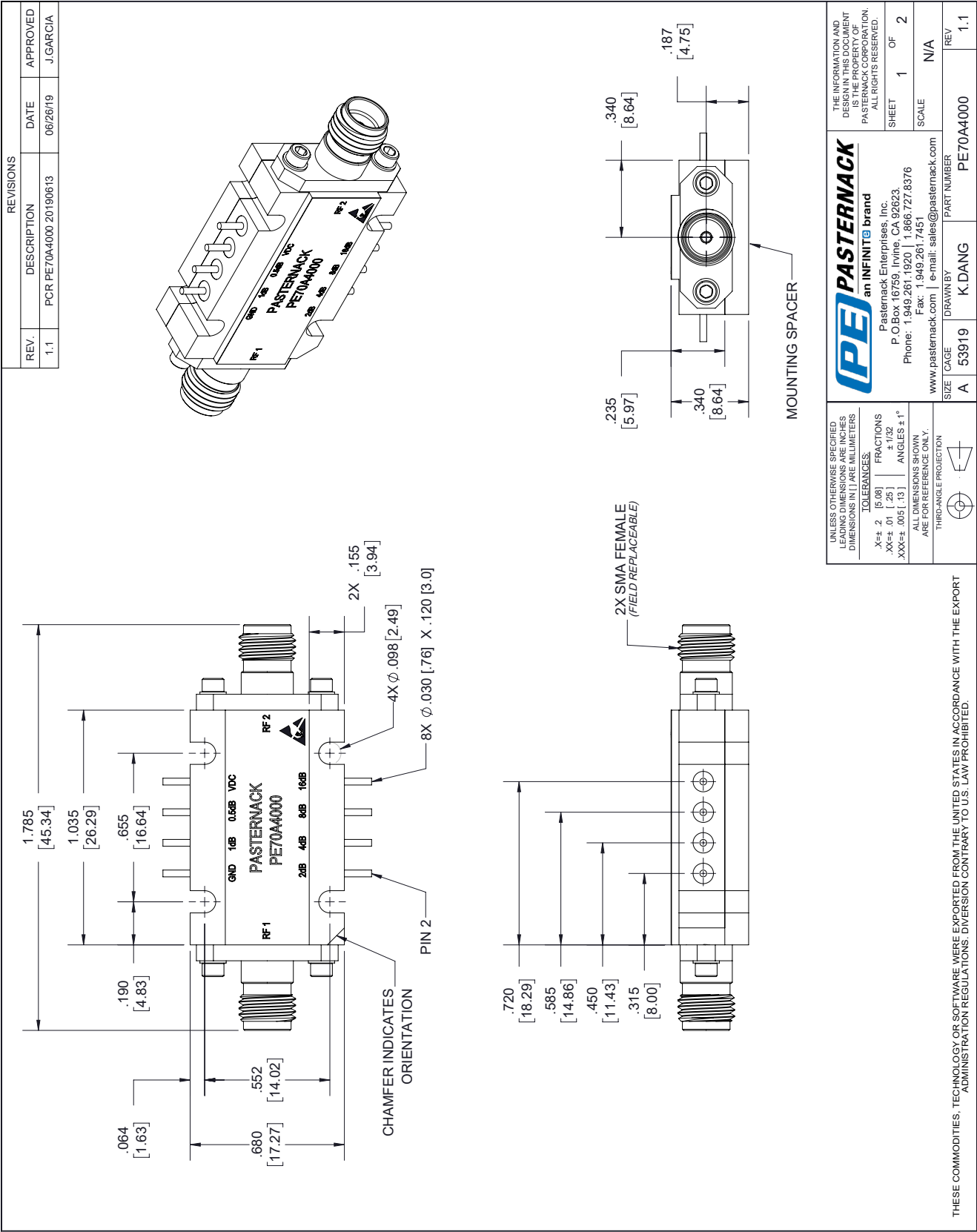
Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: [6 Bit TTL Controlled Programmable Attenuator, 31.5 dB Up to 13 GHz, 0.5 dB Steps, SMA Female PE70A4000](#)

URL: <https://www.pasternack.com/31.5db-programmable-sma-female-sma-female-0-watts-attenuator-pe70a4000-p.aspx>

The information contained within this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part in order to implement improvements. Pasternack Enterprises reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack Enterprises does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack Enterprises does not assume liability arising out of the use of any part or document.

PE70A4000 CAD Drawing

6 Bit TTL Controlled Programmable Attenuator, 31.5 dB Up to 13 GHz, 0.5 dB Steps, SMA Female



Pin Description

Pin Number	Function	Description	Interface Schematic
1	RF1	This pin is DC coupled and matched to 50 Ohms. Blocking capacitors are required if RF line potential is not equal to 0 Vdc.	RF1
5, 4, 3, 2, 9, 8	V1 - V6	See truth table and control voltage table.	
6	RF2	This pin is DC coupled and matched to 50 Ohms. Blocking capacitors are required if RF line potential is not equal to 0 Vdc.	RF2
7	Vdc	Supply voltage: -5 Vdc ±10%.	
10	GND	Power Supply Ground	

Truth Table

Control Voltage Input						Attenuation State RF1 - RF2
V1	V2	V3	V4	V5	V6	
16 dB	8 dB	4 dB	2 dB	1 dB	0.5 dB	Reference I.L.
Low	Low	Low	Low	Low	Low	
Low	Low	Low	Low	Low	High	0.5 dB
Low	Low	Low	Low	High	Low	1 dB
Low	Low	Low	High	Low	Low	2 dB
Low	Low	High	Low	Low	Low	4 dB
Low	High	Low	Low	Low	Low	8 dB
High	Low	Low	Low	Low	Low	16 dB
High	High	High	High	High	High	31.5 dB
Any combination of the above states will provide an attenuation approximately equal to the sum of the bits selected.						

UNLESS OTHERWISE SPECIFIED
LEADING DIMENSIONS ARE IN INCHES
DIMENSIONS IN [] ARE MILLIMETERS

TOLERANCES:

.X±.2 [5.08]
.XX±.01 [25]
.XXX±.005 [13]

FRACTIONS
± 1/32
ANGLES ± 1°

ALL DIMENSIONS SHOWN
ARE FOR REFERENCE ONLY.

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SHEET 2 OF 2

SCALE N/A

SIZE [CAGE] PART NUMBER

A 53919 K.DANG PE70A4000

REV 1.1

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