



29 dB Gain, 22 dBm P1dB, 0.01 GHz to
20 GHz, Broadband AC Low Noise Amplifier, Bench-
Top , 110/220VAC, 3.5 dB Noise Figure, SMA

TECHNICAL DATA SHEET

PE15A63024

The PE15A63024 is an AC powered Bench-Top Low Noise Amplifier that operates across a wideband frequency range from 10 MHz to 20 GHz. This 50 Ohm highly linear design exhibits impressive typical performance that includes 29 dB gain, 3.5 dB noise figure, +22 dBm P1dB, and +29 dBm output IP3. Maximum RF input power (CW) is 0 dBm. The rugged MIL Grade aluminium package is finished in gray paint and has SMA Female connectors at the RF input and output ports, and an indicator light on the front panel. The rear panel supports an IEC 320-C14 AC power socket (IEC 320-C13 plug required), and an On/Off switch. The module supports a wide operating AC voltage range from 110VAC to 220VAC with 60 mA supply current. Designed for high reliability, the package supports an integrated heatsink and cooling fan and is suitable for outdoor operation (moisture exposure dependent on temperature and humidity conditions). The amplifier has an operational temperature range from -40°C to +85°C and meets a series of environmental test conditions including Altitude, Vibration, Humidity, and Shock.

Features

- AC Powered Bench-Top Low Noise Amplifier/10 MHz to 20 GHz
- High Linearity
- Small Signal Gain 29 dB typ
- Low Noise Figure 3.5 dB typ
- VSWR 1.8:1 typ
- Output P1dB +22 dBm typ
- Output Psat +23 dBm typ
- Output IP3 +29 dBm typ
- AC Supply 110-220VAC @ 60 mA
- Max RF Input Power (CW) 0 dBm
- 50 Ohm Design
- Integrated Heatsink and Cooling Fan
- RF Input and Output SMA Female Connectors
- On/Off Switch and Indicator Light
- Operational Temperature Range -40°C to +85°C
- Rugged MIL Grade Aluminum Package Design with Gray Paint finish
- Guaranteed Environmental Test Conditions Altitude, Vibration, Humidity, Shock

Applications

- Test & Measurement
- 5G Communication
- Wireless Infrastructure
- Military & Commercial Communications
- Military Electronic Systems
- Research & Development
- Microwave Radio
- VSAT
- Fiber Optics

Electrical Specifications (TA= 25°C)

Description	Minimum	Typical	Maximum	Units
Frequency Range	0.01		20	GHz
Gain	26	29		dB
Gain Flatness		±1.25		dB
Gain Variation over Temp.		±0.7		dB/°C
Output at 1 dB Compression Point	+19	+22		dBm
Saturation Output Power		+23		dBm
Output 3 rd Intercept Point		+29		dBm
Reverse Isolation		-65		dB
Noise Figure		3.5	5.5	dB
Input VSWR		1.5:1		
Output VSWR		1.9:1		
Operating AC Voltage		110 to 220		VAC

Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: [29 dB Gain, 22 dBm P1dB, 0.01 GHz to 20 GHz, Broadband AC Low Noise Amplifier, Bench-Top , 110/220VAC, 3.5 dB Noise Figure, SMA PE15A63024](#)



29 dB Gain, 22 dBm P1dB, 0.01 GHz to
20 GHz, Broadband AC Low Noise Amplifier, Bench-
Top, 110/220VAC, 3.5 dB Noise Figure, SMA

TECHNICAL DATA SHEET

PE15A63024

Supply Current (AC 110-220V)	60	mA
Operating Temperature Range (OTR)	-40	+85 °C

Performance by Frequency

Biasing Up Procedure		Power OFF Procedure	
Step 1	Connect input and output with 50 Ohm source and load with in band return loss better than 10dB.	Step 1	Flip switch to "OFF" position
Step 2	Connect AC Plug	Step 2	Remove AC Plug
Step 3	Flip switch to "ON" position	Step 3	Remove RF Connection

Absolute Maximum Rating

Parameter	Rating
Supply Voltage	110V to 240V AC
RF Input Power (RFIN)*	+0dBm

*Note: Maximum RF input power is defined to protect the amplifier from damage. Input power may be increased at the users ownrisk to achieve the full output power of the amplifier. Please reference gain and power curves and monitor the temperature.

Mechanical Specifications

Size	
Length	6.46 in [164.08 mm]
Width	5.83 in [148.08 mm]
Height	2.28 in [57.91 mm]
Weight	2.505 lbs [1.14 kg]
Input Connector	SMA Female
Output Connector	SMA Female

Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: [29 dB Gain, 22 dBm P1dB, 0.01 GHz to 20 GHz, Broadband AC Low Noise Amplifier, Bench-Top, 110/220VAC, 3.5 dB Noise Figure, SMA PE15A63024](#)



29 dB Gain, 22 dBm P1dB, 0.01 GHz to
20 GHz, Broadband AC Low Noise Amplifier, Bench-
Top , 110/220VAC, 3.5 dB Noise Figure, SMA

TECHNICAL DATA SHEET

PE15A63024

Environmental Specifications

Temperature

Operating Range

-40 to +85 deg C

Storage Range

-50 to +105 deg C

Humidity

100% RH at 35°C, 95%RH at 40°C

Shock

20G for 11msec half sine wave, 3 axis both directions

Vibration

25g RMS (15 degrees 2KHz) endurance, 1 hour per axis

Altitude

30,000 ft.

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

Plotted and Other Data

Notes:

Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: [29 dB Gain, 22 dBm P1dB, 0.01 GHz to 20 GHz, Broadband AC Low Noise Amplifier, Bench-Top , 110/220VAC, 3.5 dB Noise Figure, SMA PE15A63024](#)



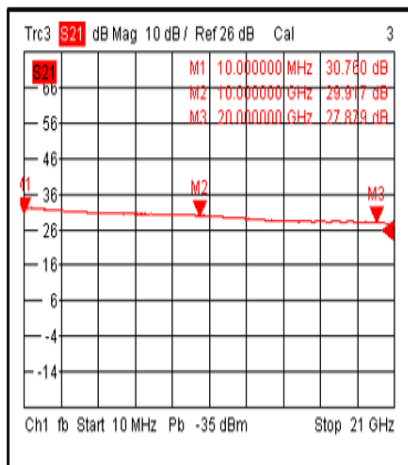
29 dB Gain, 22 dBm P1dB, 0.01 GHz to
20 GHz, Broadband AC Low Noise Amplifier, Bench-
Top, 110/220VAC, 3.5 dB Noise Figure, SMA

TECHNICAL DATA SHEET

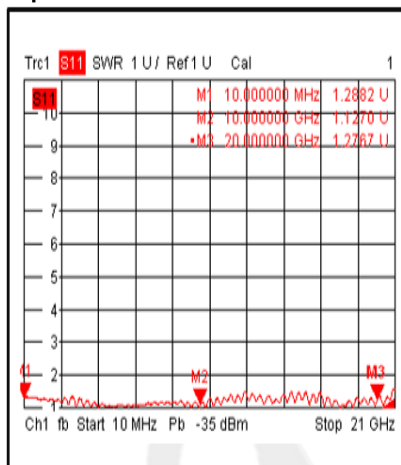
PE15A63024

Typical Performance Data

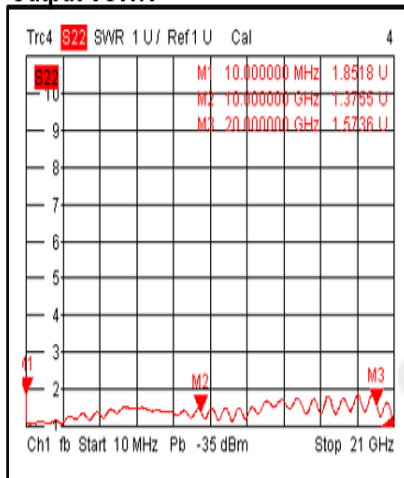
Gain



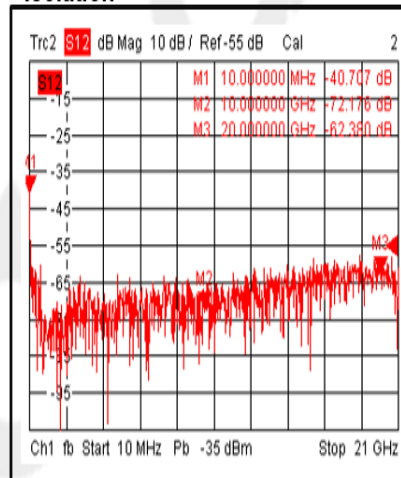
Input VSWR



Output VSWR



Isolation



Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: [29 dB Gain, 22 dBm P1dB, 0.01 GHz to 20 GHz, Broadband AC Low Noise Amplifier, Bench-Top, 110/220VAC, 3.5 dB Noise Figure, SMA PE15A63024](#)

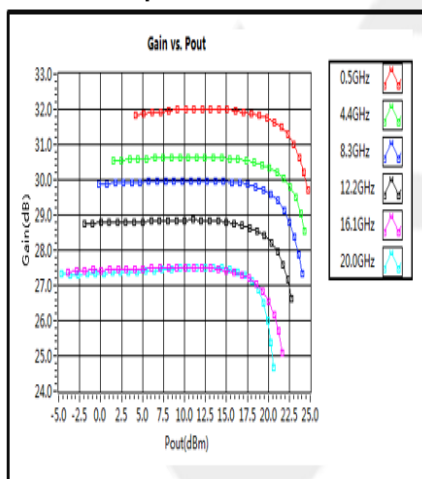


29 dB Gain, 22 dBm P1dB, 0.01 GHz to
20 GHz, Broadband AC Low Noise Amplifier, Bench-
Top, 110/220VAC, 3.5 dB Noise Figure, SMA

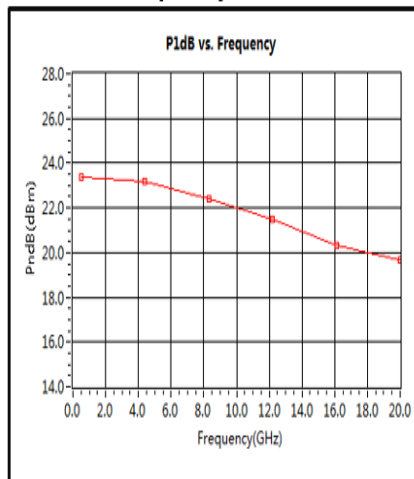
TECHNICAL DATA SHEET

PE15A63024

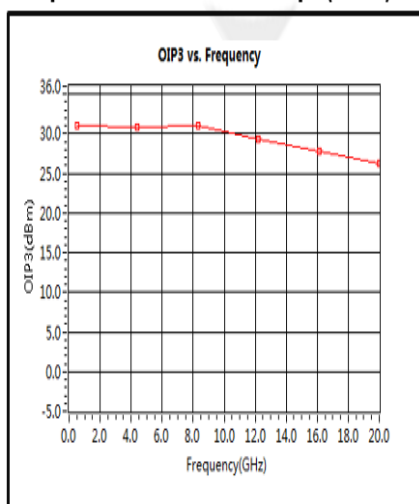
Gain vs. Output Power



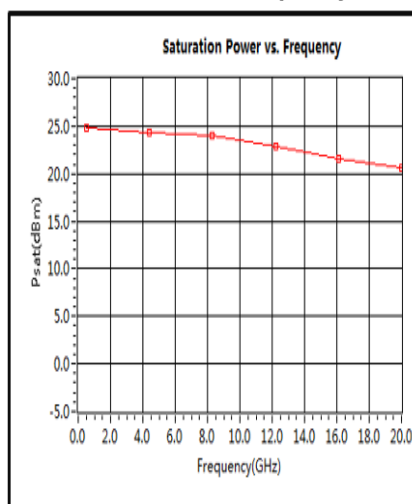
P1dB vs. Frequency



Output Third Order Intercept (OIP3)



Saturated Power vs. Frequency



Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: [29 dB Gain, 22 dBm P1dB, 0.01 GHz to 20 GHz, Broadband AC Low Noise Amplifier, Bench-Top, 110/220VAC, 3.5 dB Noise Figure, SMA PE15A63024](#)

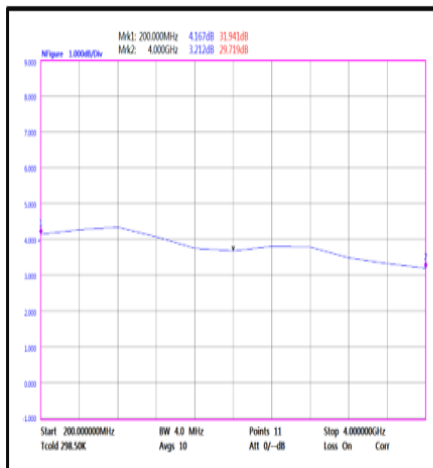


29 dB Gain, 22 dBm P1dB, 0.01 GHz to
20 GHz, Broadband AC Low Noise Amplifier, Bench-
Top, 110/220VAC, 3.5 dB Noise Figure, SMA

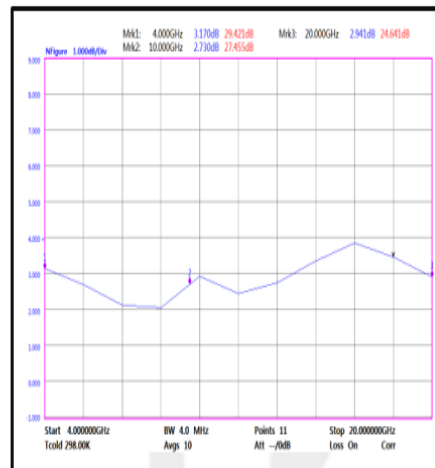
TECHNICAL DATA SHEET

PE15A63024

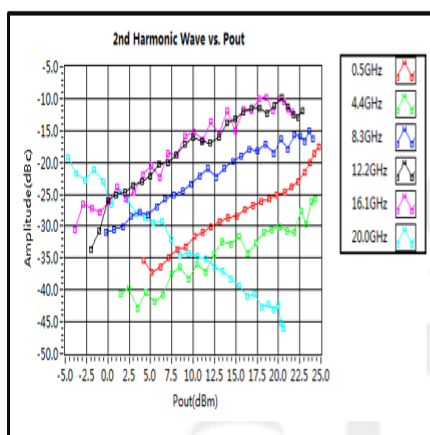
Noise Figure(0.2-4GHz)



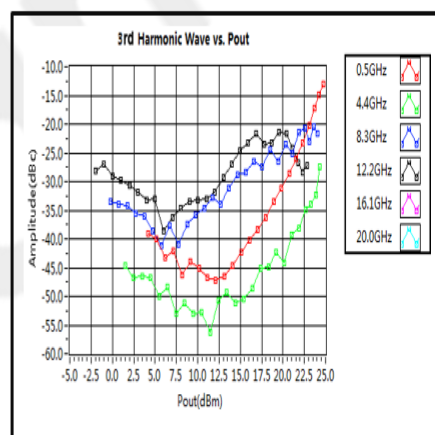
Noise Figure(4-20GHz)



2nd Harmonic Wave Output Power



3rd Harmonic Wave Output Power



Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: [29 dB Gain, 22 dBm P1dB, 0.01 GHz to 20 GHz, Broadband AC Low Noise Amplifier, Bench-Top, 110/220VAC, 3.5 dB Noise Figure, SMA PE15A63024](#)



29 dB Gain, 22 dBm P1dB, 0.01 GHz to
20 GHz, Broadband AC Low Noise Amplifier, Bench-
Top , 110/220VAC, 3.5 dB Noise Figure, SMA

TECHNICAL DATA SHEET

PE15A63024

29 dB Gain, 22 dBm P1dB, 0.01 GHz to 20 GHz, Broadband AC Low Noise Amplifier, Bench-Top , 110/220VAC, 3.5 dB Noise Figure, SMA from Pasternack Enterprises has same day shipment for domestic and International orders. Our RF, microwave and millimeter wave products maintain a 99.4% availability and are part of the broadest selection in the industry.

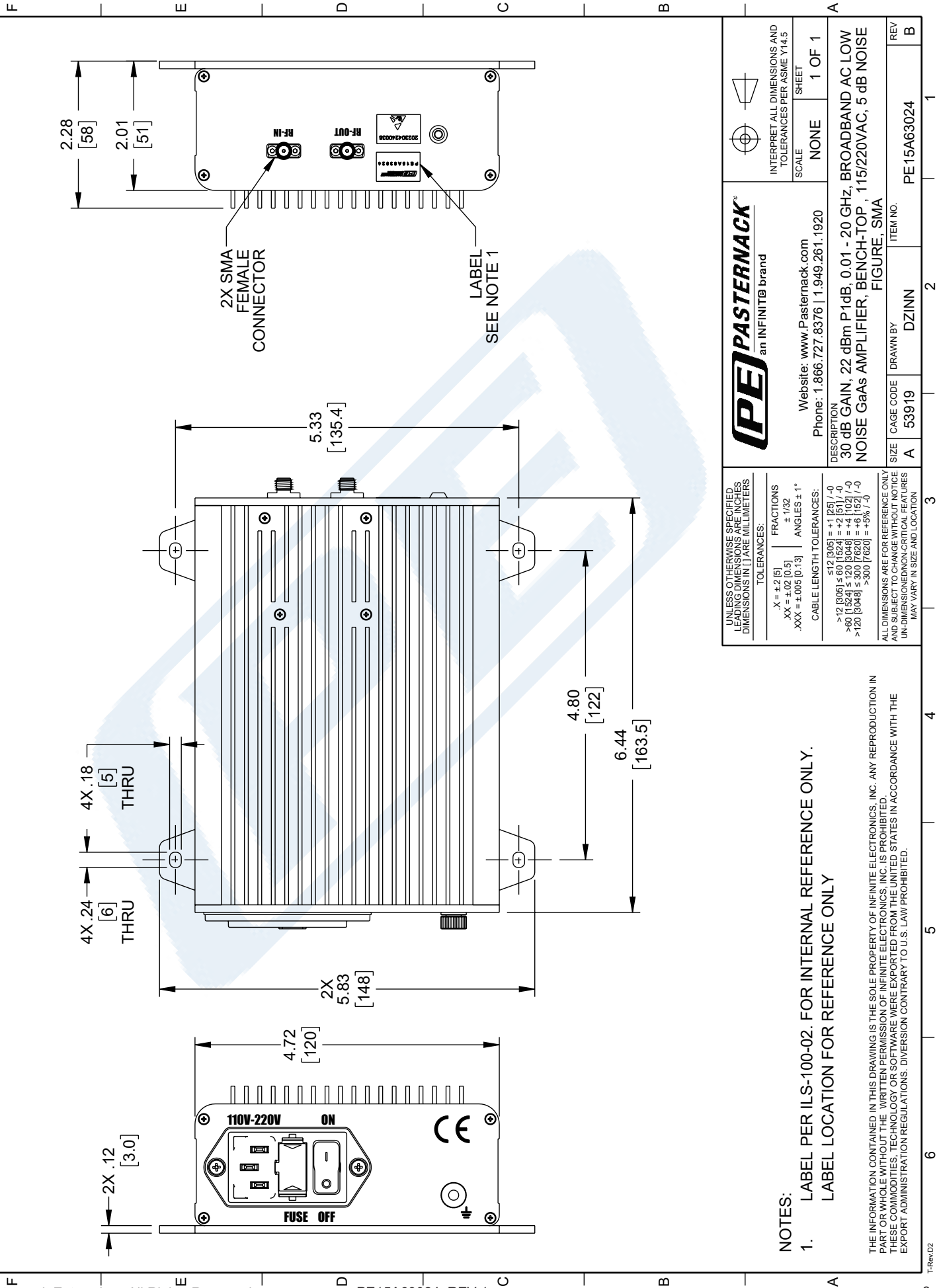
Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: [29 dB Gain, 22 dBm P1dB, 0.01 GHz to 20 GHz, Broadband AC Low Noise Amplifier, Bench-Top , 110/220VAC, 3.5 dB Noise Figure, SMA PE15A63024](https://www.pasternack.com/31-dbm-ip3-4-db-20-ghz-low-noise-broadband-amplifier-30-db-gain-sma-pe15a63024-p.aspx)

URL: <https://www.pasternack.com/31-dbm-ip3-4-db-20-ghz-low-noise-broadband-amplifier-30-db-gain-sma-pe15a63024-p.aspx>

The information contained in 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 reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.

PE15A63024 CAD Drawing

29 dB Gain, 22 dBm P1dB, 0.01 GHz to 20 GHz, Broadband AC Low Noise Amplifier, Bench-Top , 110/220VAC, 3.5 dB Noise Figure, SMA



PASTERNAK
an INFINITI@ brand

Website: www.Pasternack.com
Phone: 1.866.727.8376 | 1.949.261.1920

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

TOLERANCES:

XX = ±.02 [0.5]	FRACTIONS ± 1/32
XXX = ±.005 [0.13]	ANGLES ± 1°

CABLE LENGTH TOLERANCES:

≤ 12 [305]	≤ 60 [1524]	≤ 120 [3048]	≤ 240 [6096]	≤ 300 [7620]	≤ 480 [12192]	≤ 600 [15240]	≤ 720 [18288]	≤ 900 [22860]	≤ 1080 [27432]	≤ 1260 [32004]	≤ 1440 [36576]	≤ 1620 [41148]	≤ 1800 [45720]	≤ 2160 [54912]	≤ 2520 [64104]	≤ 3060 [77724]	≤ 3600 [91344]	≤ 4320 [109968]	≤ 5040 [128592]	≤ 5760 [147216]	≤ 6480 [165840]	≤ 7200 [184464]	≤ 8100 [206016]	≤ 9000 [227568]	≤ 10800 [274320]	≤ 12600 [321072]	≤ 14400 [367824]	≤ 16200 [414576]	≤ 18000 [461328]	≤ 21600 [549120]	≤ 25200 [641040]	≤ 30600 [777240]	≤ 36000 [913440]	≤ 43200 [1099680]	≤ 50400 [1285920]	≤ 57600 [1472160]	≤ 64800 [1658400]	≤ 72000 [1844640]	≤ 81000 [2060160]	≤ 90000 [2275680]	≤ 108000 [2743200]	≤ 126000 [3210720]	≤ 144000 [3678240]	≤ 162000 [4145760]	≤ 180000 [4613280]	≤ 216000 [5491200]	≤ 252000 [6410400]	≤ 306000 [7772400]	≤ 360000 [9134400]	≤ 432000 [10996800]	≤ 504000 [12859200]	≤ 576000 [14721600]	≤ 648000 [16584000]	≤ 720000 [18446400]	≤ 810000 [20601600]	≤ 900000 [22756800]	≤ 1080000 [27432000]	≤ 1260000 [32107200]	≤ 1440000 [36782400]	≤ 1620000 [41457600]	≤ 1800000 [46132800]	≤ 2160000 [54912000]	≤ 2520000 [64104000]	≤ 3060000 [77724000]	≤ 3600000 [91344000]	≤ 4320000 [109968000]	≤ 5040000 [128592000]	≤ 5760000 [147216000]	≤ 6480000 [165840000]	≤ 7200000 [184464000]	≤ 8100000 [206016000]	≤ 9000000 [227568000]	≤ 10800000 [274320000]	≤ 12600000 [321072000]	≤ 14400000 [367824000]	≤ 16200000 [414576000]	≤ 18000000 [461328000]	≤ 21600000 [549120000]	≤ 25200000 [641040000]	≤ 30600000 [777240000]	≤ 36000000 [913440000]	≤ 43200000 [1099680000]	≤ 50400000 [1285920000]	≤ 57600000 [1472160000]	≤ 64800000 [1658400000]	≤ 72000000 [1844640000]	≤ 81000000 [2060160000]	≤ 90000000 [2275680000]	≤ 108000000 [2743200000]	≤ 126000000 [3210720000]	≤ 144000000 [3678240000]	≤ 162000000 [4145760000]	≤ 180000000 [4613280000]	≤ 216000000 [5491200000]	≤ 252000000 [6410400000]	≤ 306000000 [7772400000]	≤ 360000000 [9134400000]	≤ 432000000 [10996800000]	≤ 504000000 [12859200000]	≤ 576000000 [14721600000]	≤ 648000000 [16584000000]	≤ 720000000 [18446400000]	≤ 810000000 [20601600000]	≤ 900000000 [22756800000]	≤ 1080000000 [27432000000]	≤ 1260000000 [32107200000]	≤ 1440000000 [36782400000]	≤ 1620000000 [41457600000]	≤ 1800000000 [46132800000]	≤ 2160000000 [54912000000]	≤ 2520000000 [64104000000]	≤ 3060000000 [77724000000]	≤ 3600000000 [91344000000]	≤ 4320000000 [109968000000]	≤ 5040000000 [128592000000]	≤ 5760000000 [147216000000]	≤ 6480000000 [165840000000]	≤ 7200000000 [184464000000]	≤ 8100000000 [206016000000]	≤ 9000000000 [227568000000]	≤ 10800000000 [274320000000]	≤ 12600000000 [321072000000]	≤ 14400000000 [367824000000]	≤ 16200000000 [414576000000]	≤ 18000000000 [461328000000]	≤ 21600000000 [549120000000]	≤ 25200000000 [641040000000]	≤ 30600000000 [777240000000]	≤ 36000000000 [913440000000]	≤ 43200000000 [1099680000000]	≤ 50400000000 [1285920000000]	≤ 57600000000 [1472160000000]	≤ 64800000000 [1658400000000]	≤ 72000000000 [1844640000000]	≤ 81000000000 [2060160000000]	≤ 90000000000 [2275680000000]	≤ 108000000000 [2743200000000]	≤ 126000000000 [3210720000000]	≤ 144000000000 [3678240000000]	≤ 162000000000 [4145760000000]	≤ 180000000000 [4613280000000]	≤ 216000000000 [5491200000000]	≤ 252000000000 [6410400000000]	≤ 306000000000 [7772400000000]	≤ 360000000000 [9134400000000]	≤ 432000000000 [10996800000000]	≤ 504000000000 [12859200000000]	≤ 576000000000 [14721600000000]	≤ 648000000000 [16584000000000]	≤ 720000000000 [18446400000000]	≤ 810000000000 [20601600000000]	≤ 900000000000 [22756800000000]	≤ 1080000000000 [27432000000000]	≤ 1260000000000 [32107200000000]	≤ 1440000000000 [36782400000000]	≤ 1620000000000 [41457600000000]	≤ 1800000000000 [46132800000000]	≤ 2160000000000 [54912000000000]	≤ 2520000000000 [64104000000000]	≤ 3060000000000 [77724000000000]	≤ 3600000000000 [91344000000000]	≤ 4320000000000 [109968000000000]	≤ 5040000000000 [128592000000000]	≤ 5760000000000 [147216000000000]	≤ 6480000000000 [165840000000000]	≤ 7200000000000 [184464000000000]	≤ 8100000000000 [206016000000000]	≤ 9000000000000 [227568000000000]	≤ 10800000000000 [274320000000000]	≤ 12600000000000 [321072000000000]	≤ 14400000000000 [367824000000000]	≤ 16200000000000 [414576000000000]	≤ 18000000000000 [461328000000000]	≤ 21600000000000 [549120000000000]	≤ 25200000000000 [641040000000000]	≤ 30600000000000 [777240000000000]	≤ 36000000000000 [913440000000000]	≤ 43200000000000 [1099680000000000]	≤ 50400000000000 [1285920000000000]	≤ 57600000000000 [1472160000000000]	≤ 64800000000000 [1658400000000000]	≤ 72000000000000 [1844640000000000]	≤ 81000000000000 [2060160000000000]	≤ 90000000000000 [2275680000000000]	≤ 108000000000000 [2743200000000000]	≤ 126000000000000 [3210720000000000]	≤ 144000000000000 [3678240000000000]	≤ 162000000000000 [4145760000000000]	≤ 180000000000000 [4613280000000000]	≤ 216000000000000 [5491200000000000]	≤ 252000000000000 [6410400000000000]	≤ 306000000000000 [7772400000000000]	≤ 360000000000000 [9134400000000000]	≤ 432000000000000 [10996800000000000]	≤ 504000000000000 [12859200000000000]	≤ 576000000000000 [14721600000000000]	≤ 648000000000000 [16584000000000000]	≤ 720000000000000 [18446400000000000]	≤ 810000000000000 [20601600000000000]	≤ 900000000000000 [22756800000000000]	≤ 1080000000000000 [27432000000000000]	≤ 1260000000000000 [32107200000000000]	≤ 1440000000000000 [36782400000000000]	≤ 1620000000000000 [41457600000000000]	≤ 1800000000000000 [46132800000000000]	≤ 2160000000000000 [54912000000000000]	≤ 2520000000000000 [64104000000000000]	≤ 3060000000000000 [77724000000000000]	≤ 3600000000000000 [91344000000000000]	≤ 4320000000000000 [109968000000000000]	≤ 5040000000000000 [128592000000000000]	≤ 5760000000000000 [147216000000000000]	≤ 6480000000000000 [165840000000000000]	≤ 7200000000000000 [184464000000000000]	≤ 8100000000000000 [206016000000000000]	≤ 9000000000000000 [227568000000000000]	≤ 10800000000000000 [274320000000000000]	≤ 12600000000000000 [321072000000000000]	≤ 14400000000000000 [367824000000000000]	≤ 16200000000000000 [414576000000000000]	≤ 18000000000000000 [461328000000000000]	≤ 21600000000000000 [549120000000000000]	≤ 25200000000000000 [641040000000000000]	≤ 30600000000000000 [777240000000000000]	≤ 36000000000000000 [913440000000000000]	≤ 43200000000000000 [1099680000000000000]	≤ 50400000000000000 [1285920000000000000]	≤ 57600000000000000 [1472160000000000000]	≤ 64800000000000000 [1658400000000000000]	≤ 72000000000000000 [1844640000000000000]	≤ 81000000000000000 [2060160000000000000]	≤ 90000000000000000 [2275680000000000000]	≤ 108000000000000000 [2743200000000000000]	≤ 126000000000000000 [3210720000000000000]	≤ 144000000000000000 [3678240000000000000]	≤ 162000000000000000 [4145760000000000000]	≤ 180000000000000000 [4613280000000000000]	≤ 216000000000000000 [5491200000000000000]	≤ 252000000000000000 [6410400000000000000]	≤ 306000000000000000 [7772400000000000000]	≤ 360000000000000000 [9134400000000000000]	≤ 432000000000000000 [10996800000000000000]	≤ 504000000000000000 [12859200000000000000]	≤ 576000000000000000 [14721600000000000000]	≤ 648000000000000000 [16584000000000000000]	≤ 720000000000000000 [18446400000000000000]	≤ 810000000000000000 [20601600000000000000]	≤ 900000000000000000 [22756800000000000000]	≤ 1080000000000000000 [27432000000000000000]	≤ 1260000000000000000 [32107200000000000000]	≤ 1440000000000000000 [36782400000000000000]	≤ 1620000000000000000 [41457600000000000000]	≤ 1800000000000000000 [46132800000000000000]	≤ 2160000000000000000 [54912000000000000000]	≤ 2520000000000000000 [64104000000000000000]	≤ 3060000000000000000 [77724000000000000000]	≤ 3600000000000000000 [91344000000000000000]	≤ 4320000000000000000 [109968000000000000000]	≤ 5040000000000000000 [128592000000000000000]	≤ 5760000000000000000 [147216000000000000000]	≤ 6480000000000000000 [165840000000000000000]	≤ 7200000000000000000 [184464000000000000000]	≤ 8100000000000000000 [206016000000000000000]	≤ 9000000000000000000 [227568000000000000000]	≤ 10800000000000000000 [274320000000000000000]	≤ 12600000000000000000 [321072000000000000000]	≤ 14400000000000000000 [367824000000000000000]	≤ 16200000000000000000 [414576000000000000000]	≤ 18000000000000000000 [461328000000000000000]	≤ 21600000000000000000 [549120000000000000000]	≤ 25200000000000000000 [641040000000000000000]	≤ 30600000000000000000 [777240000000000000000]	≤ 36000000000000000000 [913440000000000000000]	≤ 43200000000000000000 [1099680000000000000000]	≤ 50400000000000000000 [1285920000000000000000]	≤ 57600000000000000000 [1472160000000000000000]	≤ 64800000000000000000 [1658400000000000000000]	≤ 72000000000000000000 [1844640000000000000000]	≤ 81000000000000000000 [2060160000000000000000]	≤ 90000000000000000000 [2275680000000000000000]	≤ 108000000000000000000 [2743200000000000000000]	≤ 126000000000000000000 [3210720000000000000000]	≤ 144000000000000000000 [3678240000000000000000]	≤ 162000000000000000000 [4145760000000000000000]	≤ 180000000000000000000 [4613280000000000000000]	≤ 216000000000000000000 [5491200000000000000000]	≤ 252000000000000000000 [6410400000000000000000]	≤ 306000000000000000000 [7772400000000000000000]	≤ 360000000000000000000 [9134400000000000000000]	≤ 432000000000000000000 [10996800000000000000000]	≤ 504000000000000000000 [12859200000000000000000]	≤ 576000000000000000000 [14721600000000000000000]	≤ 648000000000000000000 [16584000000000000000000]	≤ 720000000000000000000 [18446400000000000000000]	≤ 810000000000000000000 [20601600000000000000000]	≤ 900000000000000000000 [22756800000000000000000]	≤ 1080000000000000000000 [27432000000000000000000]	≤ 1260000000000000000000 [32107200000000000000000]	≤ 1440000000000000000000 [36782400000000000000000]	≤ 1620000000000000000000 [41457600000000000000000]	≤ 1800000000000000000000 [46132800000000000000000]	≤ 2160000000000000000000 [54912000000000000000000]	≤ 2520000000000000000000 [64104000000000000000000]	≤ 3060000000000000000000 [77724000000000000000000]	≤ 3600000000000000000000 [91344000000000000000000]	≤ 4320000000000000000000 [109968000000000000000000]	≤ 5040000000000000000000 [128592000000000000000000]	≤ 5760000000000000000000 [147216000000000000000000]	≤ 6480000000000000000000 [165840000000000000000000]	≤ 7200000000000000000000 [184464000
------------	-------------	--------------	--------------	--------------	---------------	---------------	---------------	---------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	---------------------	---------------------	---------------------	---------------------	---------------------	---------------------	---------------------	----------------------	----------------------	----------------------	----------------------	----------------------	----------------------	----------------------	----------------------	----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	---------------------------	---------------------------	---------------------------	---------------------------	---------------------------	---------------------------	---------------------------	----------------------------	----------------------------	----------------------------	----------------------------	----------------------------	----------------------------	----------------------------	----------------------------	----------------------------	-----------------------------	-----------------------------	-----------------------------	-----------------------------	-----------------------------	-----------------------------	-----------------------------	------------------------------	------------------------------	------------------------------	------------------------------	------------------------------	------------------------------	------------------------------	------------------------------	------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------	--------------------------------	--------------------------------	--------------------------------	--------------------------------	--------------------------------	--------------------------------	--------------------------------	--------------------------------	--------------------------------	---------------------------------	---------------------------------	---------------------------------	---------------------------------	---------------------------------	---------------------------------	---------------------------------	----------------------------------	----------------------------------	----------------------------------	----------------------------------	----------------------------------	----------------------------------	----------------------------------	----------------------------------	----------------------------------	-----------------------------------	-----------------------------------	-----------------------------------	-----------------------------------	-----------------------------------	-----------------------------------	-----------------------------------	------------------------------------	------------------------------------	------------------------------------	------------------------------------	------------------------------------	------------------------------------	------------------------------------	------------------------------------	------------------------------------	-------------------------------------	-------------------------------------	-------------------------------------	-------------------------------------	-------------------------------------	-------------------------------------	-------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------	---------------------------------------	---------------------------------------	---------------------------------------	---------------------------------------	---------------------------------------	---------------------------------------	---------------------------------------	--	--	--	--	--	--	--	--	--	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	---	---	---	-------------------------------------