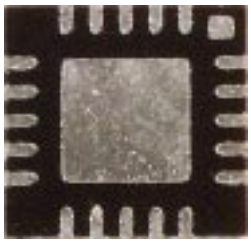
CATV TIA/Gain Block

TGA2803-EPU-SM

Top View



Bottom View

Description

The TriQuint TGA2803-EPU is an ultra-linear, packaged TIA/Gain Block which operates from 40MHz to 1000MHz. The amplifier is available in a standard 4x4 mm 20 lead MLP package. The amplifier provides flat gain along with ultra-low distortion. It also provides high output power with low DC power consumption. This amplifier is ideally suited for use in CATV distribution systems or other applications requiring extremely low noise and distortion. Demonstration Boards are available.

Key Features and Performance

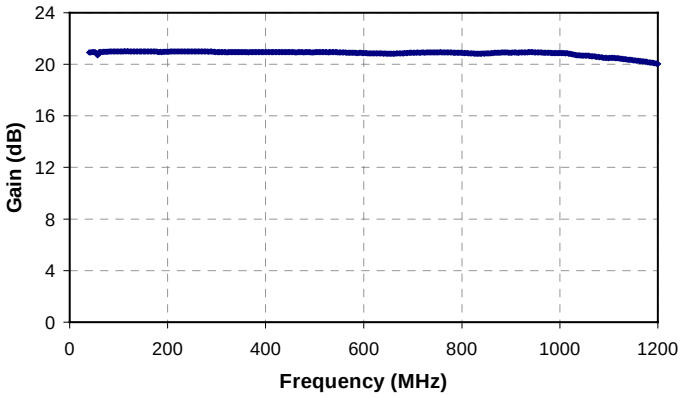
- Low Cost 4 x 4 mm Surface Mount Package
- 20 dB Flat Gain
- 800 Ω Transimpedance *****
- <5pA/ √Hz Equivalent Input Noise Current *****
- 1.5 dB 75 Ω Noise Figure
- Ultra-Low Distortion (45dBm IP3 typ.)
- Wide Bandwidth (40MHz - 1GHz)
- Low DC Power Consumption
- Single Supply Bias (+8V)
- Proven GaAs Technology

***** Includes 1:1 balun, No photodiode or auto-transformer

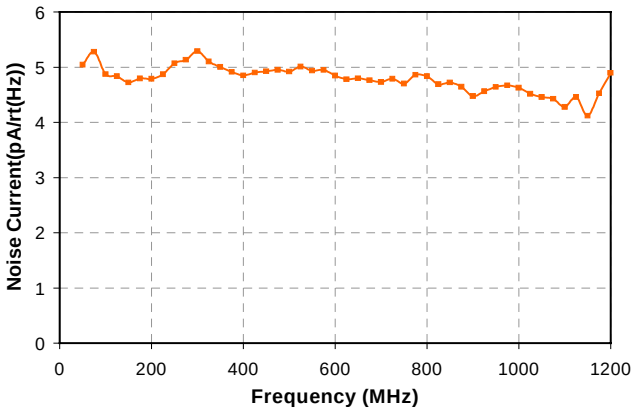
Primary Applications

- HFC Nodes
- CATV Line Amplifiers
- Head End Equipment

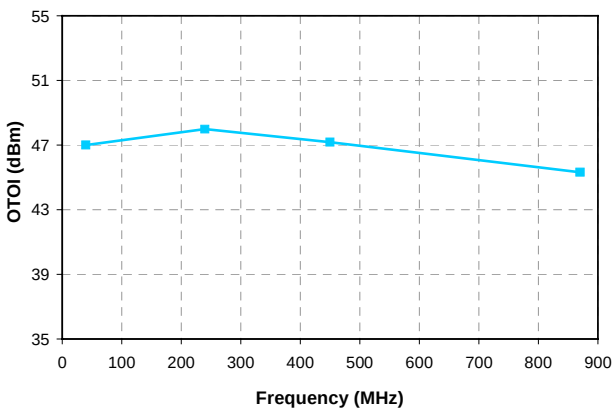
Typical 75 Ω Gain
w/External Balun Losses Removed



Input Referred Current Noise
with High Impedance source



75 Ω Output TOI



Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

Table I
Maximum Ratings 1/

Symbol	Parameter	Min	Max	Units	Notes
V_{DD}	Bias Supply Voltage	0	15	V	
I_{DD}	Bias Supply Current		500	mA	1/ 2/
P_{IN}	RF Input Power		77	dBmV	3/
T_{ASSY}	Assembly Temperature (30 seconds max)		300	°C	
T_{STG}	Storage Temperature	-65	150	°C	
T_{CASE}	Package Operating Temperature (Heat Slug)	-40	110	°C	

1/ These values reflect maximum operable values for this device. Operating above the recommended values may directly affect MTTF.

2/ Total Current

3/ Total Input Power

Table II
DC Specifications

Symbol	Parameter	Typ	Unit
V_{DD}	Bias Supply Voltage	8	V
I_{DD}	Bias Supply Current	350	mA
V_{G1}	Gate 1 Voltage (Pin 19)	0.90	V
V_{G2}	Gate 2 Voltage (Pin 7)	2.66	V
V_{out1}	RF Output 1 Voltage (Pin 14/15)	V_{DD}	V
V_{out2}	RF Output 2 Voltage (Pin 11/12)	V_{DD}	V

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Table III
RF Specifications 1/

T_A=25°C, V_{DD}=8V

Symbol	Parameter	Min	Typ	Max	Units	Note
BW	Bandwidth	40		870	MHz	
S_{21}	Power Gain		20		dB	2/
GF	Gain Flatness		± 0.3		dB	2/
NF	Noise Figure		1.5		dB	2/
TZ	Transimpedance		800		Ω	
I_n	Equivalent Input Current Noise		5		pA/rtHz	3/
CTB	Composite Triple-Beat Distortion		-72		dBc	5/
CSO	Composite Second-Order Distortion		-75		dBc	5/
IP_3	Two-Tone, Third-Order Intercept (450 MHz)		46		dBm	
IRL	Input Return Loss		16		dB	
ORL	Output Return Loss		20		dB	
I_D	Drain Current		350		mA	4/
P1dB	Output Power at P1dB (450 MHz)		27		dBm	

1/ Using electrical application circuit on pg. 8

2/ 1:1 Balun losses have been removed from the measurement

3/ Measured with open-circuited input

4/ Reducing drain current and voltage will degrade linearity of device

5/ At +40dBmV/channel output, 82 channels flat, 40-550 MHz

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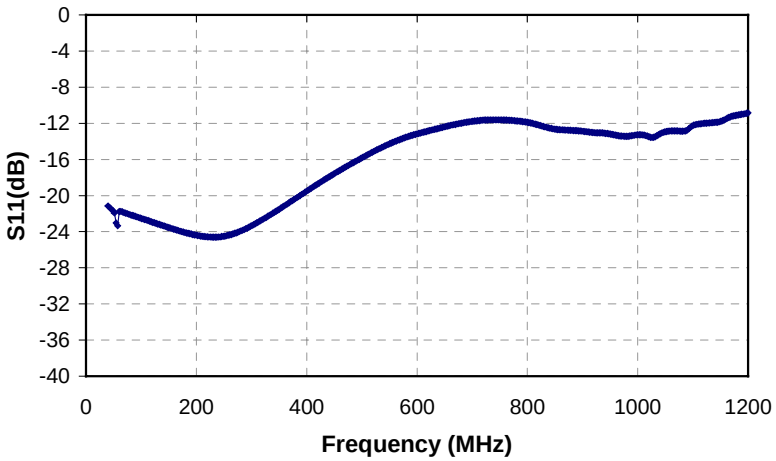
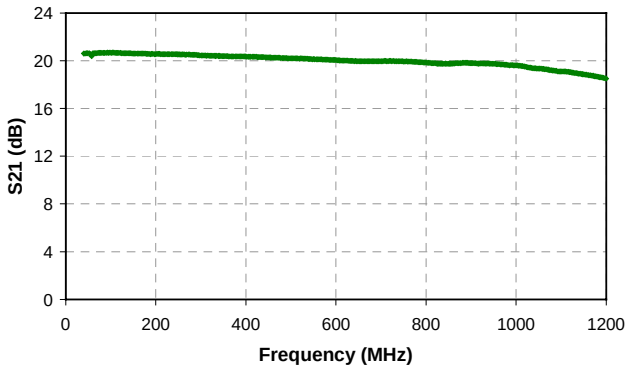
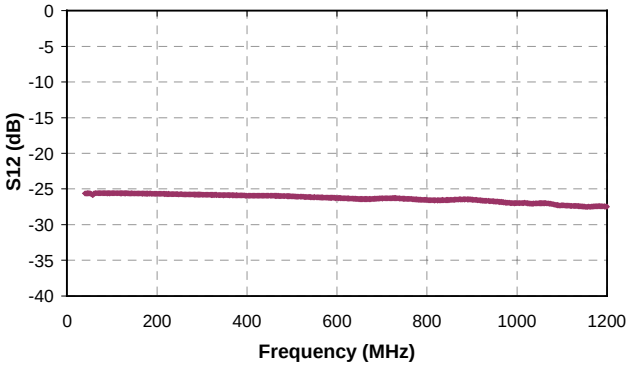
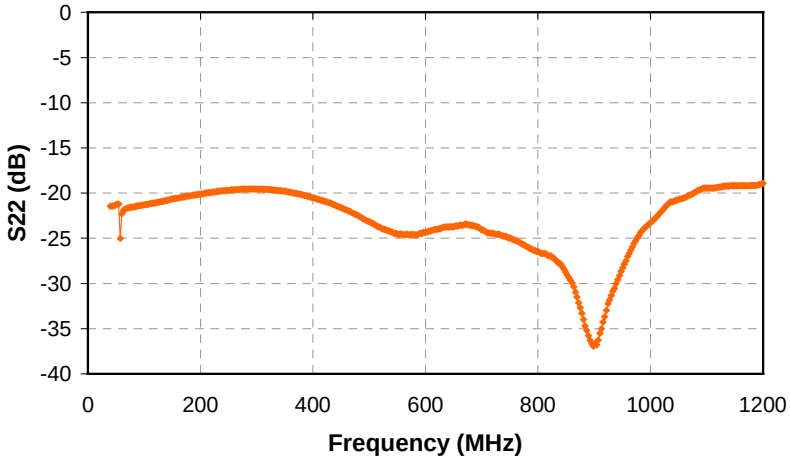
Typical Measured S-Parameters (75 Ω)
Using Application Circuit
(includes effects of external baluns)









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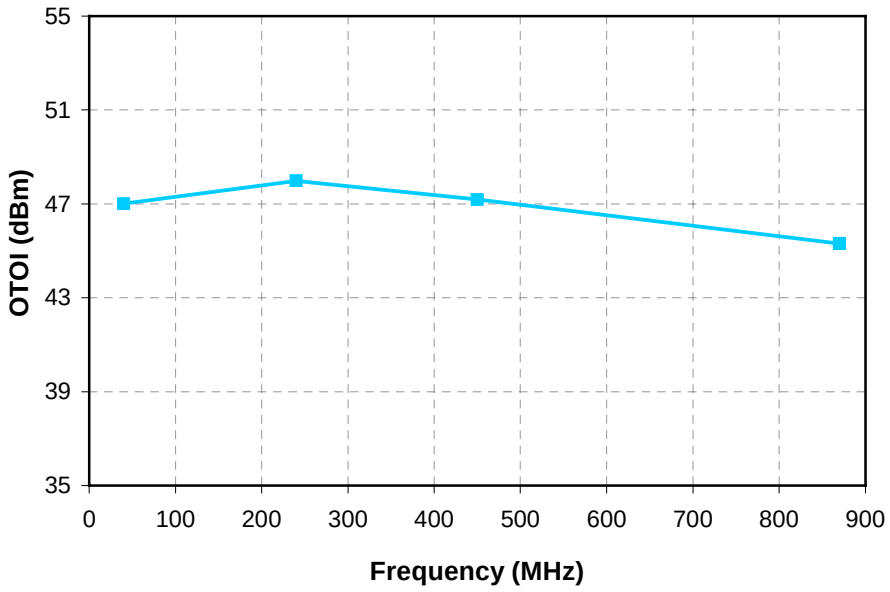
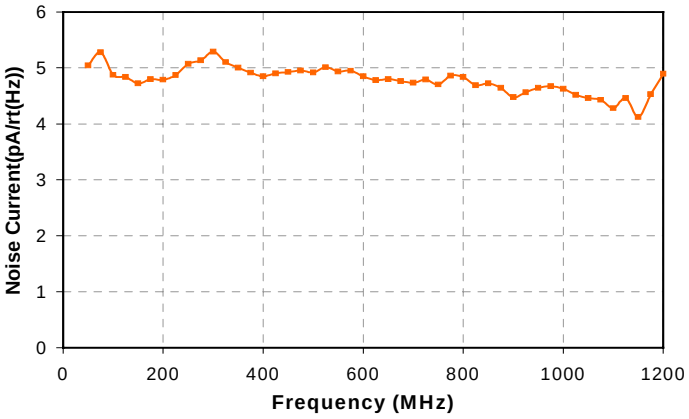
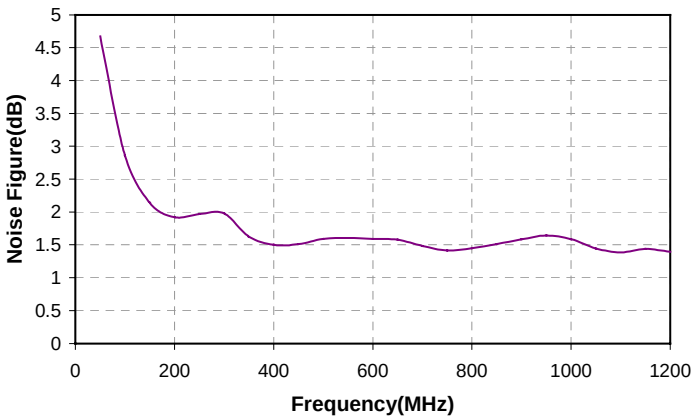
Typical Measured Performance Using Application Circuit

(includes effects of external baluns)



Input balun losses removed





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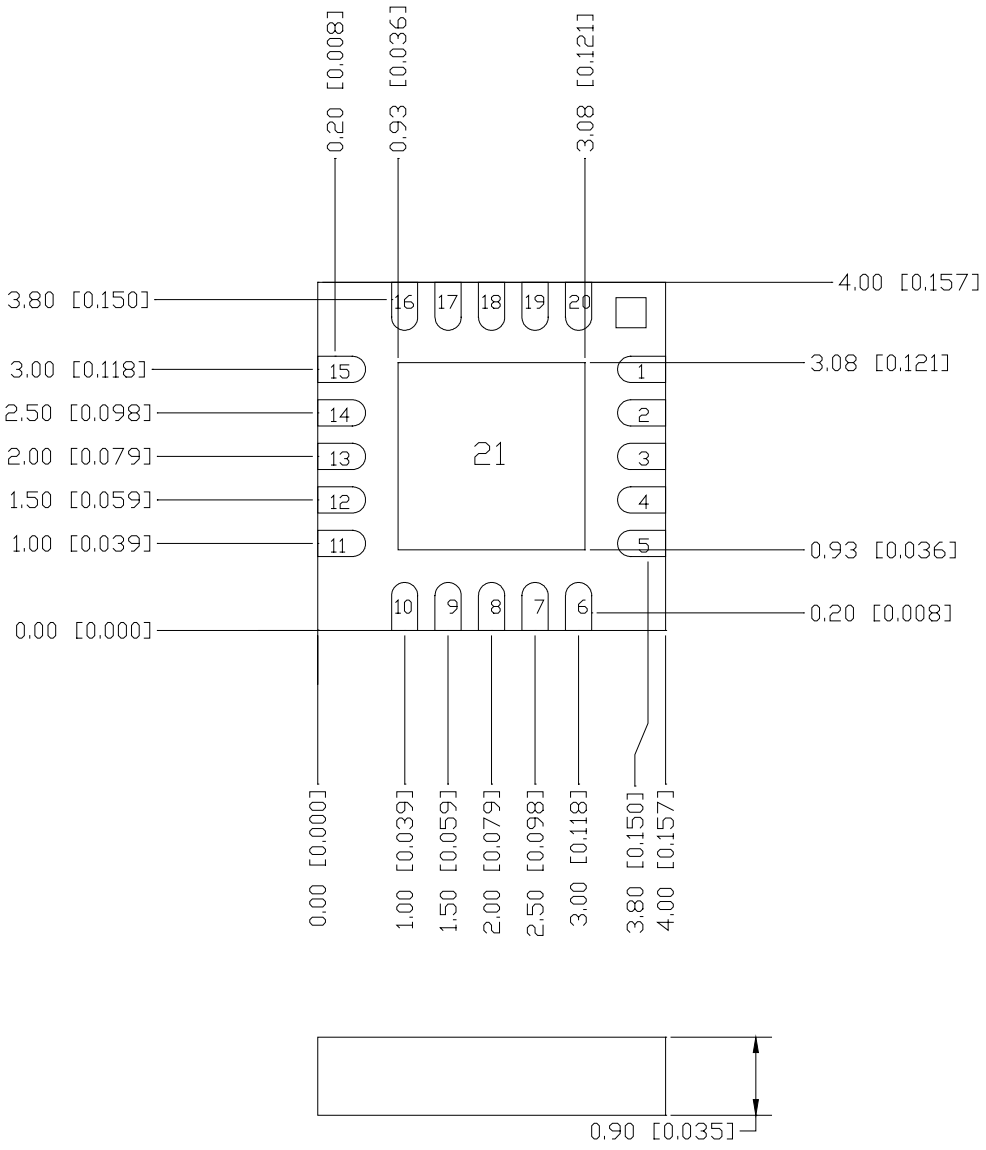
Mechanical Specifications



Units: millimeters (inches)
Package Tolerance +/- 0.10 (0.004)

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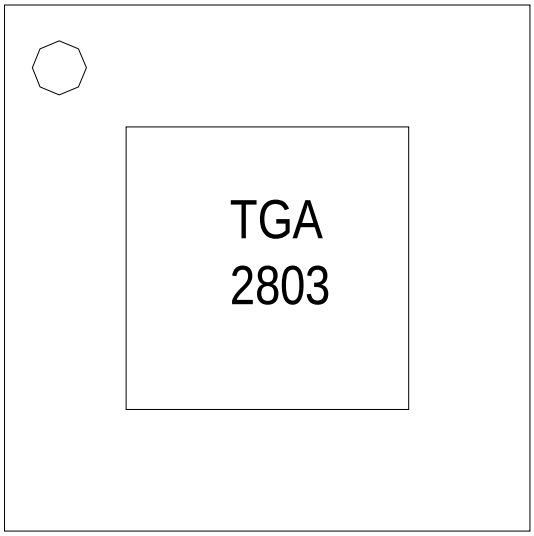
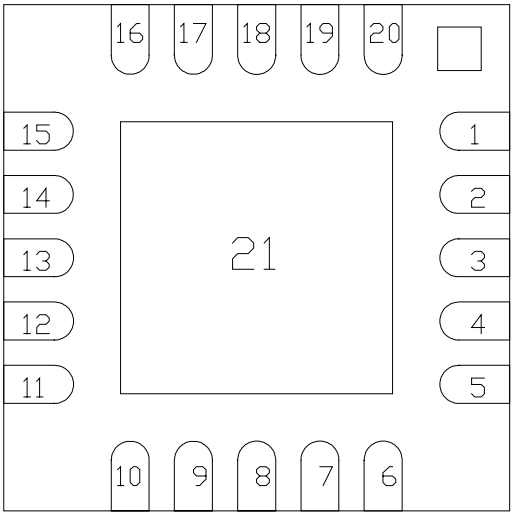
Pinout



Top Side

Dot indicates Pin 1



Bottom Side

Pin	Description	Pin	Description
1	RF Input 1	11	RF Output 2
2	RF Input 1	12	RF Output 2
3	GND	13, 21	GND
4	RF Input 2	14	RF Output 1
5	RF Input 2	15	RF Output 1
6	NC	16	NC
7	VG2 (Optional) 2/	17	VDD (choked)
8	VDD	18	VDD
9	VDD (choked)	19	VG1 (Optional) 2/
10	Isense 1/	20	NC

1/ Bias current monitor: $I_{bias} = V_{Pin\ 10} / 4\Omega$

2/ VG1 and VG2 are internally biased but are user adjustable. VG1 adjusts DC current versus linearity performance. To a lesser extent VG2 varies gain and linearity.

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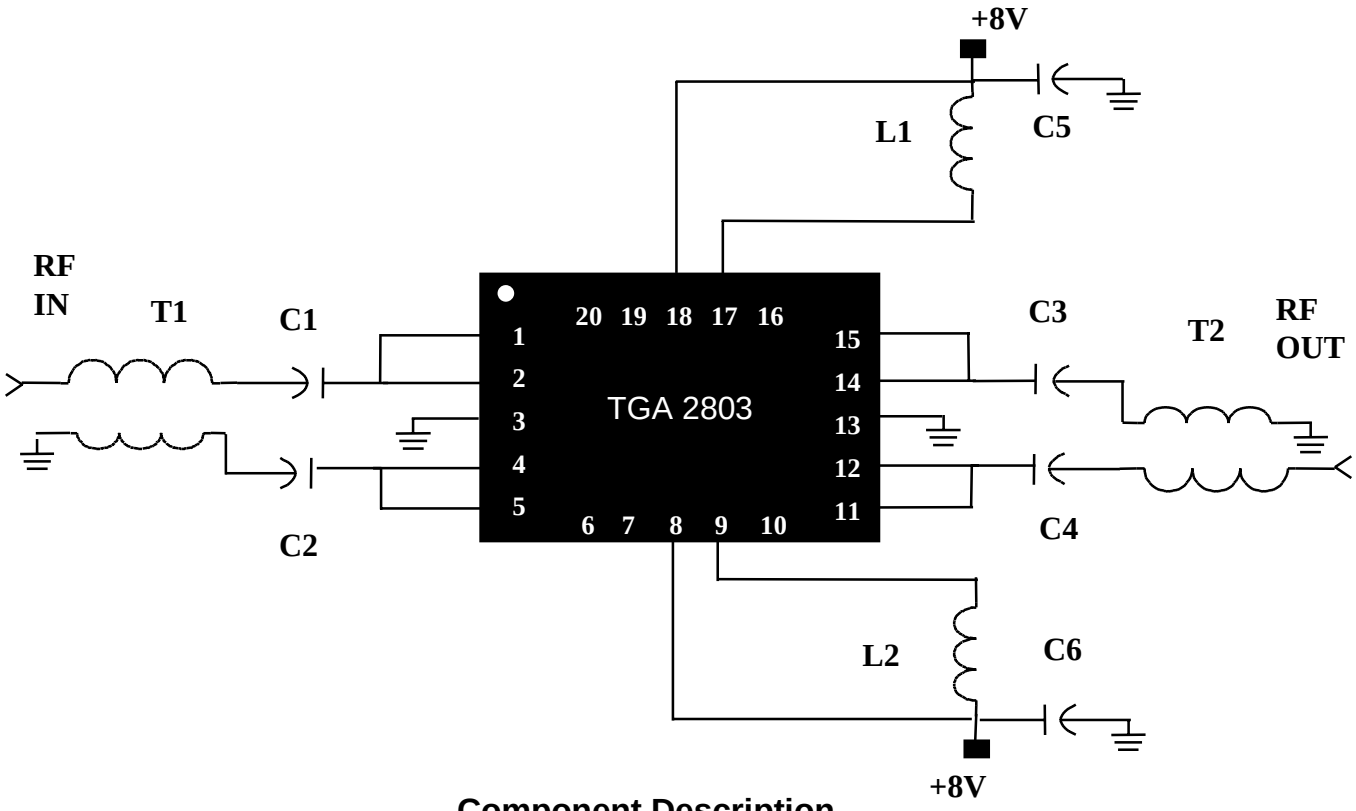
Recommended Electrical Assembly



Component Description

Ref	Description
C1	0.01μF Capacitor
C2	0.01μF Capacitor
C3	470pF Capacitor
C4	470pF Capacitor
C5	270pF Capacitor
C6	270pF Capacitor
L1	820nH Inductor
L2	820nH Inductor
T1	Balun **1/**
T2	Balun **1/**

1/ Balun performance impacts amplifier return losses and gain. Best performance can be achieved by winding 34 or 36 gauge bifilar wire around a small binocular core made from low-loss magnetic material. Suitable wire may be obtained from MWS Wire Industries. Core vendors include Ferronics, Fairrite, TDK, and Micrometals.

Alternatively, off-the-shelf baluns can be purchased from a number of vendors including Mini-Circuits (ADTL1-18-75), M/A-COM (ETC1-1-13), and Pulse Engineering (CX2071).

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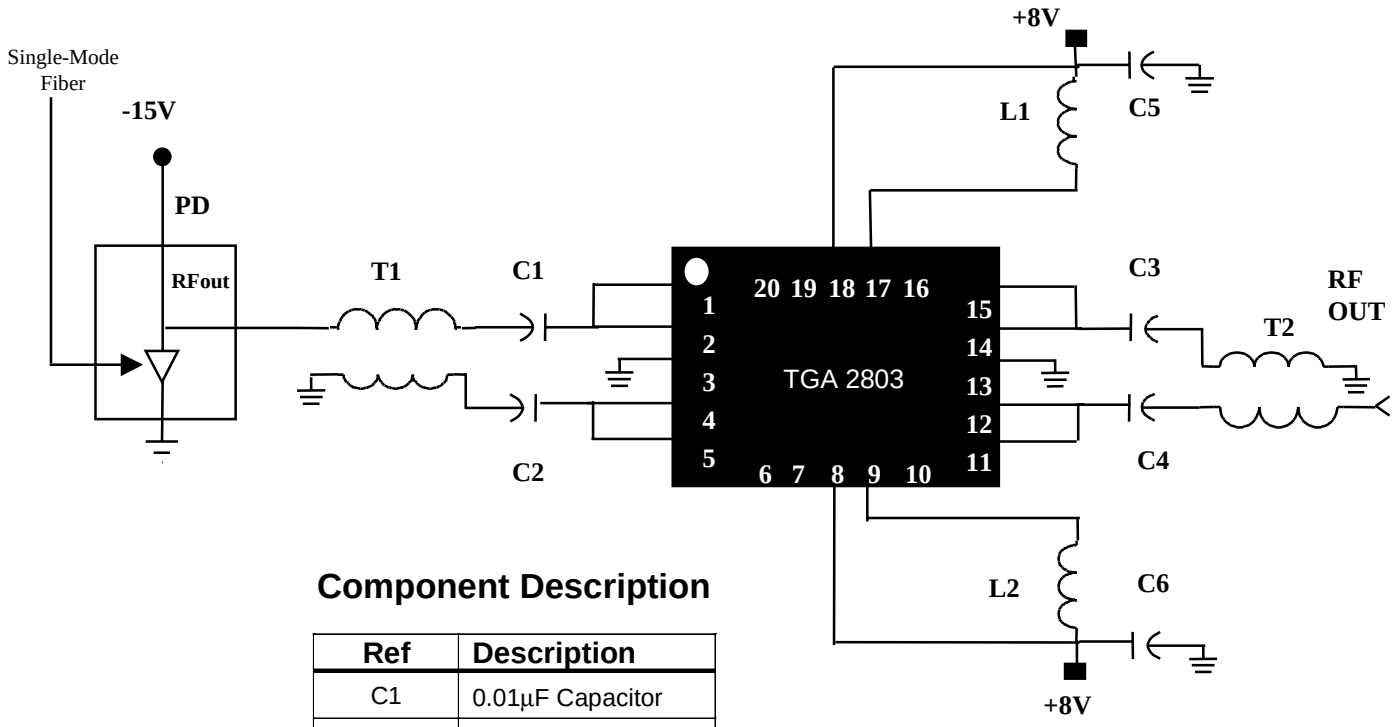
Recommended Electro-Optical Assembly



Component Description

Ref	Description
C1	0.01µF Capacitor
C2	0.01µF Capacitor
C3	470pF Capacitor
C4	470pF Capacitor
C5	270pF Capacitor
C6	270pF Capacitor
L1	820nH Inductor
L2	820nH Inductor
T1	Balun **1/**
T2	Balun **1/**
PD	Broadband Photodiode **2/**

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2/ Emcore 2609C Broadband Photodiode Module is recommended. The module includes a 4:1 impedance transformer.

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