TQ6202

622-Mb/s Wide Dynamic Range Transimpedance Amplifier

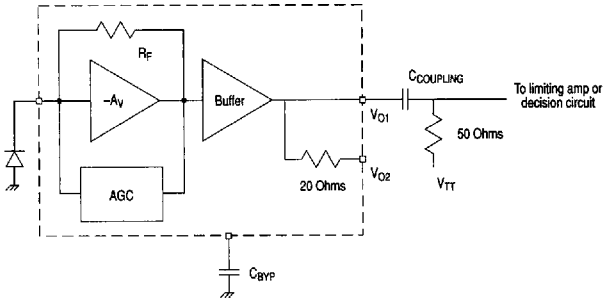
PRELIMINARY DATA SHEET

SONET/SDH/ATM

General Description

The TQ6202 is a high-speed, low-noise transimpedance amplifier suitable for OC-12 and STM-4 optical receivers. Its self-contained AGC circuit accommodates optical inputs greater than 3 dBm. Advanced technology and innovative circuit design produce a high-sensitivity amplifier with wide margins.

Block Diagram



Function Description

The TQ6202 employs a high-gain amplifier with AGC. It is designed for use in optical receivers in die form.

Input. A typical configuration will utilize a PIN photodiode with the anode connected to ground and the cathode connected directly to the I_{IN} pad through a bond wire. Optical power estimates in this data sheet assume a PIN responsivity of 0.9 A/W with a capacitance of 0.5 pF (including stray capacitance).

Output. The V_{O1} output is normally AC-coupled to the following stage (limiting amplifier or decision circuit) through a blocking capacitor ($C_{COUPLING}$ = 0.33 µF). A V_{O2} output has been provided with a 20-ohm series resistance to allow for at-speed die-level testing. Normally, the V_{O2} output will be left unbonded.

Bypass capacitor. Power supply rejection is enhanced by connecting C_{BYP} to an external capacitor to ground. A value of 0.22 µf is recommended. This should be a surface mount capacitor mounted next to the TQ6202 with minimal wire bond length.

Power supplies and general layout considerations. Good high-frequency design techniques need to be used in designing an optical receiver using the TQ6202. These will include a low-inductance RF ground plane and good supply bypassing. Wire bond lengths and surface trace lengths should be minimized.

Die mounting comments. Die thickness is 25 mils. Pad openings are 4 mils square. Die metallization is gold. Die dimensions are 38 by 48 mils, ± 2 mils. Die surface is passivated; normal vacuum wands may be used in die handling.

Features

- *Low-noise GaAs MESFET process*
- *Self-contained AGC circuit*
- *575 MHz bandwidth*
- *3V detector bias voltage*
- *+1 dBm overload*
- *–34 dBm sensitivity with PIN detector*
- *SONET OC-12 and SDH STM-4 receivers*

Table 1. Recommended Operating Range

Symbol	Parameter	Min	Typ	Max	Unit
V_{DD}	Positive supply voltage	4.75	5.0	5.25	V
T_D	Die temperature	–40		85	°C

Table 2. DC Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{DD}	Positive supply current				40	mA
V_I	Input voltage	I_{IN} = 0	2.3	2.9	3.6	V
I_{IN}	AGC threshold			15		µA
R_{OUT1}	Output resistance	Pad 10		30		
R_{OUT2}	Output resistance	Pad 13	30	50	65	

Note:

- *Specifications apply over recommended operating range.*

Table 3. AC Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$f_{-3dB\ (UPPER)}$	Upper –3 dB bandwidth	I_{IN} 1 µA	450	600		MHz
$f_{-3dB\ (LOWER)}$	Lower –3 dB bandwidth	I_{IN} 1 µA		10		KHz
τ	AGC time constant			5		µsec
PSRR	Supply rejection	C_{BYP} = 2.2 µF, 25 KHz–10 MHz		–40		dB
R_M	Transresistance	$R_L = \infty$	10 K			
S	Sensitivity	Noise bandwidth = 110 MHz		–34		dBm
I_I	Input noise current	Noise bandwidth = 110 MHz		60		nA
P_{MAX}	Optical overload		1	3		dBm

Notes

- *Specifications apply over recommended operating range.*
- *$C_{DETECTOR}$ + C_{STRAY} = 0.5 pF*
- *Detector responsivity = 0.9 A/W*
- *BER = 1E–10*

Table 4. Pad Descriptions

Pad	Name	Type	Description	Pad Location (1)
1	GND1	Ground	(2)	–482.6, –355.6
2	I_{IN}	Input	Connect to photodiode (3)	–482.6, –152.4
3	C_{BYP}	Bypass	Connect to bypass capacitor	–482.6, –25.4
4	GND1	Ground	(2)	–482.6, 126.8
5	V_{DD}	Supply	5V supply	–482.6, 279.4
6	I_{IN}	Input	Connect to photodiode (3)	–355.6, 355.6
7	NC		Do not connect	–228.6, 355.6
8	NC		Do not connect	–101.6, 355.6
9	NC		Do not connect	25.4, 355.6
10	V_{O1}	Output	30-ohm output; normal output (3)	355.6, 355.6
11	V_{DD}	Supply	5V supply	482.6, 304.8
12	GND2	Ground	(2)	482.6, 152.2
13	V_{O2}	Output	50-ohm output; normally used for test purposes only (4)	482.6, 0.0
14	NC		Do not connect	482.6, –228.6
15	GND2	Ground	(2)	482.6, –355.6

Notes:

1 *Pad locations are in microns, as measured from the center of the die.*

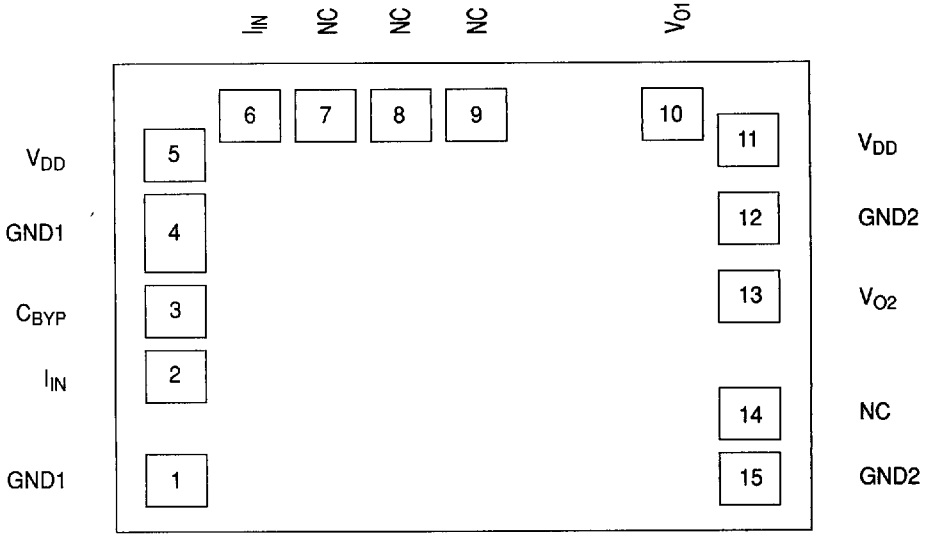
2 *Adequate grounding will consist of one connection to either of the GND1 pads and one connection to either of the GND2 pads. It is optional, but not required, to bond out both GND1 pads and both GND2 pads.*

3 *Pads 2 and 6 (I_{IN}) are connected on the die. Both pads are provided to give the user flexibility in bonding. Bond to either pad, but not to both pads.*

4 *V_{O2} can be used for a 50-ohm drive environment, as may exist in a die-level test. The user should not use both V_{O1} and V_{O2} at the same time.*

5 *The back side of the die should be biased to the most negative supply and attached with conductive epoxy.*

Pad Layout



Ordering Information

TQ6202-D ***Die form, shipped in gel pack***

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