

# GB79

## 10 Gb/s Limiting Amplifier

### Features

Operates at OC-192/STM-64 data rates up to 10.6 Gb/s

Differential operation with 50  $\Omega$  matched inputs and outputs

Single-ended input and output capability

40dB gain at 2.5 Gb/s (single-ended)

3mV typical sensitivity at 10 Gb/s (BER=10<sup>-9</sup>)

650 mW (typ) power dissipation.  
Single -5.2V power supply

5 mVp-p (min) to 2 Vp-p (max) input voltage range

Output peak-to-peak swing adjustable from 50mV to 1Vpp

Available in 6mm micro LGA package

0 to 85 °C operating temperature

### Applications

LAN and WAN optical data systems

Serial data paths up to 10.6 Gb/s

Fiber optic receivers, transceivers and transmitters

High-speed VCSEL driver; pre-driver for laser module

### General description

The Nortel Networks GB79 is a monolithic limiting amplifier providing wideband, low noise amplification of signals up to 10.6 Gb/s. It features differential inputs and outputs and performance optimized for data rates of 2.5 and 10 Gb/s.

The device offers typical gain of 40 dB and has an input sensitivity of 3mVpp (BER=10<sup>-9</sup>) at 10 Gb/s.

The device is fabricated using an advanced InGaP/GaAs HBT process and is supplied in a 6mm 36-ball micro-LGA package.

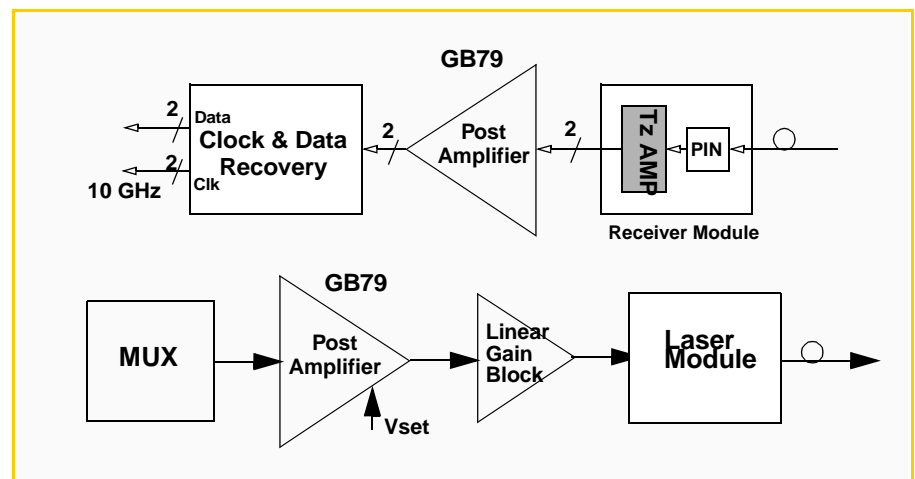


Figure1: Typical applications block diagram

Nortel Networks High Performance Optical Component Solutions offers a portfolio of optical networking interface devices for use in high-performance optical receiver and transmitter applications. The GB79 is one of our family of 10 Gb/s components. The complete family provides for power and chip-count savings to the designer of fiber-based datacom or telecom solutions. The GB79 is also one of a range of limiting and AGC amplifiers for use in optical receivers operating from 155 Mb/s to 10 Gb/s.

## Functional description

The GB79 is intended to be used in OC-192/STM-64 applications with either single-ended or differential input data.

During operation, this circuit can accept input signals ranging from 5 mVp-p to 2 Vp-p differential, and will return an output selected by voltage “Vset” up to 1 Vp-p per side, single-ended. If desired, this output may be extinguished. Input and output is matched to 50  $\Omega$  over the bandwidth of interest.

The input reference lines (VrefP and VrefN) must be (RF) decoupled to ground. They are part of an on-chip feedback scheme that allows the differential amplifier to self-balance. This allows input signals to be AC-coupled to the amplifier. DC-coupling to the input of the device over-rides the on-chip self-balancing feedback.

Vset may be set to ground which causes the amplifier to limit at  $\sim 1$  Vpp. Applying a negative potential to Vset reduces the output peak-to-peak swing of the amplifier to diminish.

Outputs from the amplifier may be DC-coupled with 50  $\Omega$  terminations to ground, or AC coupled to 50  $\Omega$  loads.

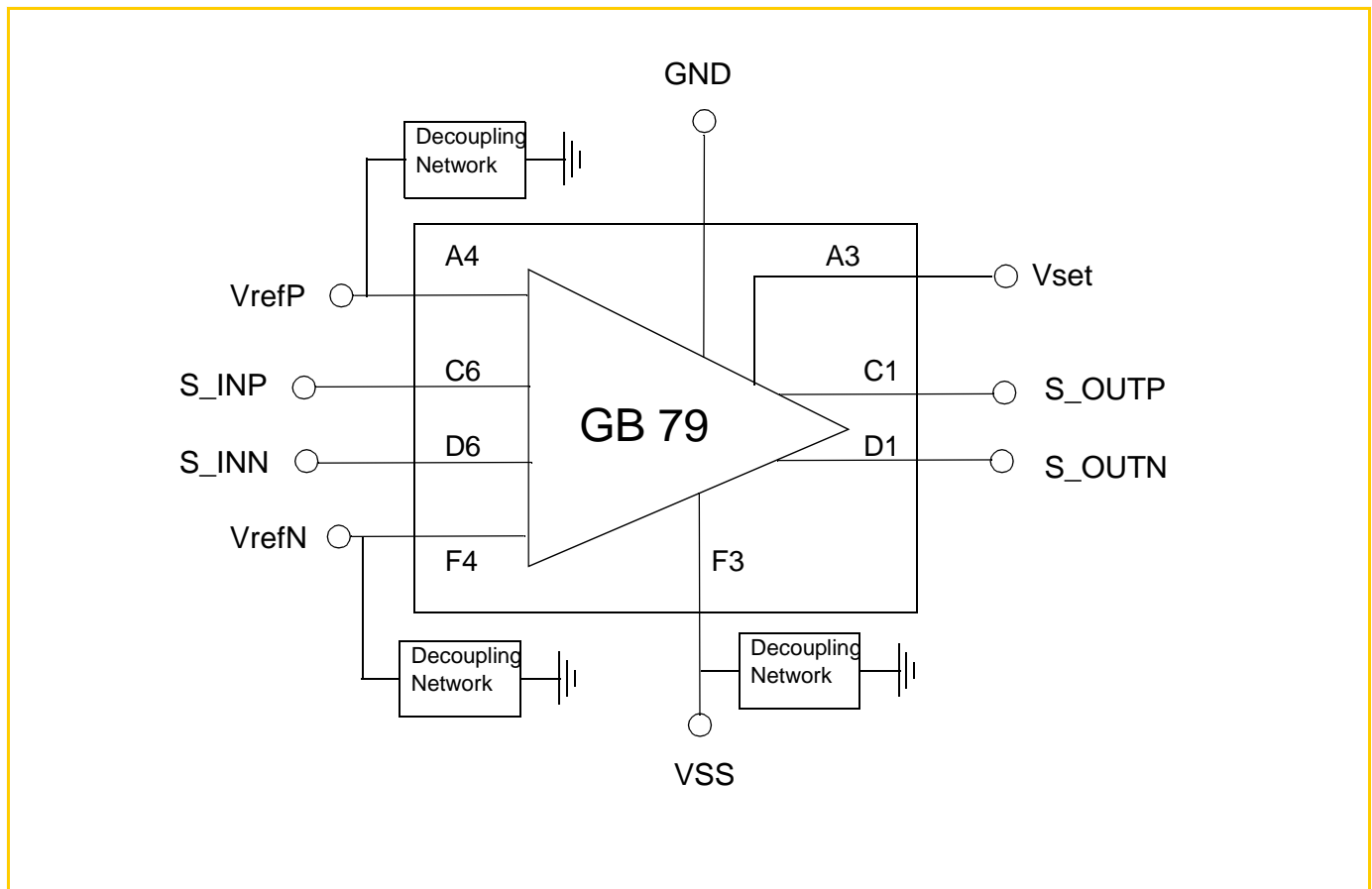


Figure 2: Functional block diagram

Table 1: Absolute maximum ratings

Parameter	description	min	max	units
VSS	Supply voltage	-6.5	0.5	V
Tstg	Storage Temperature	-65	125	°C
Tj	Junction temperature	0	150	°C
Vset	Output level control voltage	-6.5	0.5	V
Vin	Input voltage (VrefP/VrefN open)	-3	0.5	V

These are stress ratings only. Exposure to stresses beyond these maximum ratings may cause permanent damage to, or affect the reliability of the device. Avoid operating the device outside the recommended operating conditions defined below:

Table 2: Recommended operating conditions

Symbol	Parameter	min	typical	max	units
VSS	Supply Voltage	-5.5	-5.2	-4.9	V
Tamb	Operating temperature	0		85	°C
Vset	Output level control voltage	VSS+2.6		0	V
Vin p-p	Differential input voltage	10		2000	mV p-p

Table 3: DC electrical characteristics

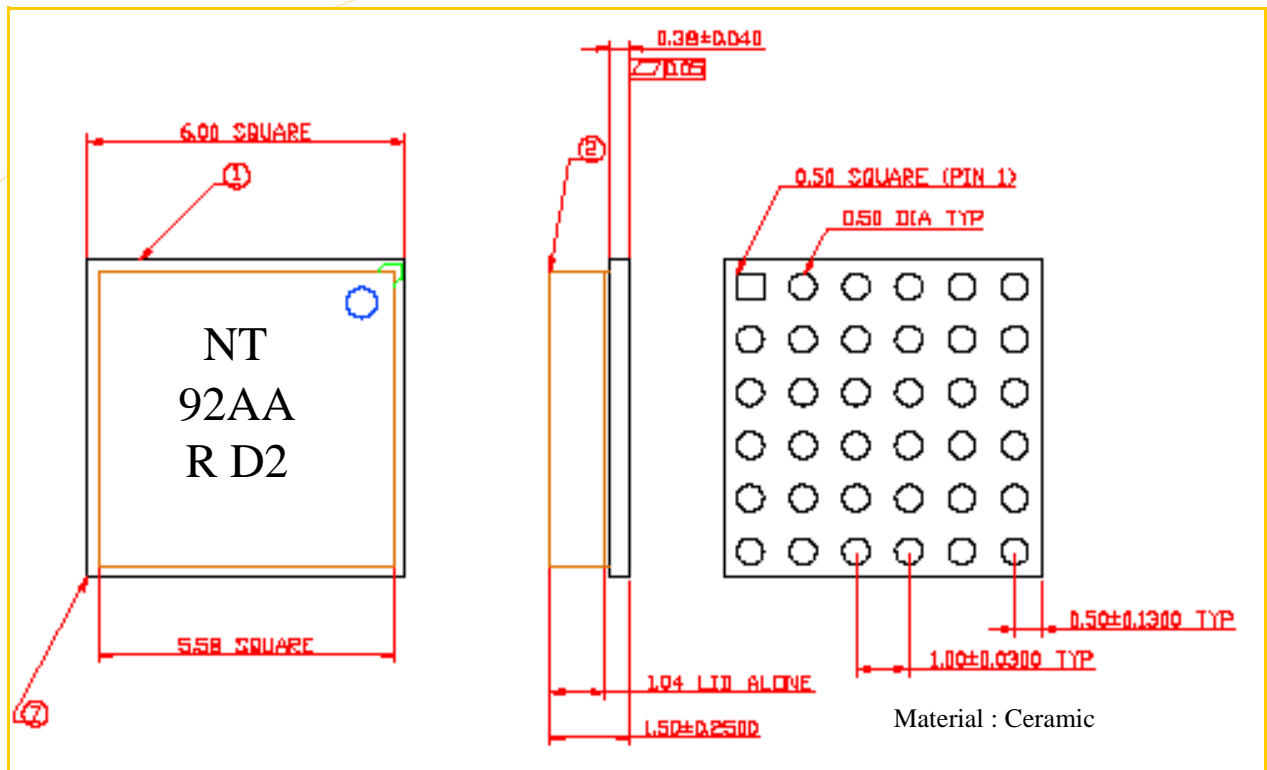
Symbol	Parameter	min	typical	max	units
Icc	Supply Current		125		mA
Vinput	Input Bias Voltage		-1.6		V
Vout	Output Bias Voltage (Note 1)		-0.5		V
Rout	Output resistance		50		Ω

Table 4: AC characteristics

Symbol	Parameter	min	typical	max	units
BW(3dB)	Small Signal Bandwidth at -3dB point		6.0		GHz
Sens	Input Sensitivity at BER=10e-9, 10Gb/s, single-ended		3		mVpp
Gain	Small signal gain (at 2.5 GHz)		40		dB
Gain	Small signal gain (at 10 GHz)		29		dB
S22	Output return loss (to 6 GHz)			-10	dB
S11	Input return loss (to 6 GHz)			-10	dB
Vout p-p	Output swing (single-ended)	50		1000	mV p-p

The above parameters are specified under the following conditions:

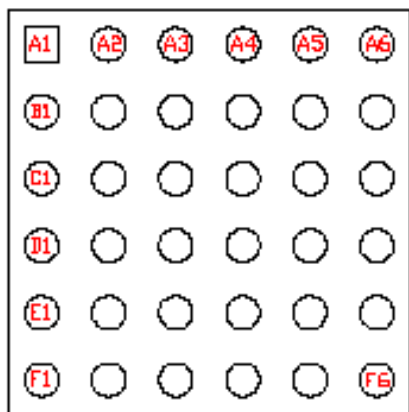
- Supply Voltage (VSS) = -5.2 V ± 5%
- Operating Temperature (Tamb) = 0 to 85°C
- Note 1: When terminated with 50 ohms to ground.



Notes:

- 1) All dimensions are in mm unless otherwise noted.
- 2) Tolerances:  
(Unless otherwise noted)  
x.xx +/- 0.10  
x.xxx +/- 0.025
- 3) 50-150 micron thick epoxy when cured for lid attach

Figure 3: LGA package mechanical details



BACK VIEW (PIN OUT DEFINITION)

Table 5: Ball grid assignment

Pad	Name	Pad	Name
A1	GND	D1	S_OUTN
A2	GND	D2	NC
A3	Vset	D3	GND
A4	VrefP	D4	GND
A5	GND	D5	NC
A6	GND	D6	S_INN
B1	GND	E1	GND
B2	GND	E2	GND
B3	GND	E3	GND
B4	GND	E4	GND
B5	GND	E5	GND
B6	GND	E6	GND
C1	S_OUTP	F1	GND
C2	NC	F2	GND
C3	GND	F3	VSS
C4	GND	F4	VrefN
C5	NC	F5	GND
C6	S_INP	F6	GND

Figure 4: Package pinout diagram

## Ordering information

Please quote the Product Code from Table 6 below when ordering as this is the identification that appears on the part when shipped.

Table 6: Product ordering information

Product Code	Product Name
Packaged Die: A0809180 (GSMM92AA)	GB79 Limiting Amplifier
Bare Die: A0821784 (QMV1187A-A)	GB79 Limiting Amplifier



For additional information on Nortel Networks products and services, please contact your local representative.

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