

KGA4133

Preliminary

12.5 Gbps Transimpedance Amplifier IC

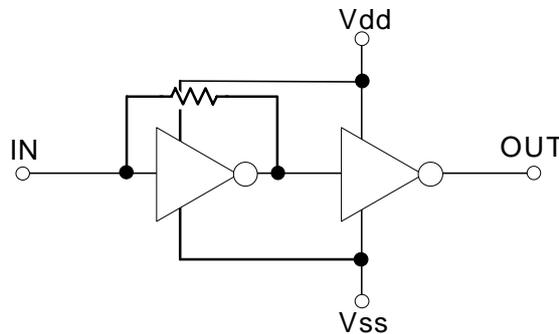
DESCRIPTION

Oki's 12.5 Gbps transimpedance amplifier is fabricated 0.1 μm gate length P-HEMTs for high-speed optical communication. The IC has a high overload and a wide band width.

FEATURES

- Transimpedance : 500Ω
- Sensitivity : < -18 dBm
- Overload : > +5 dBm
- Broadband Amplifier : > 10 GHz
- Low Noise Current : < 10 pA/√Hz
- Group Delay : < ±20 ps
- +3.3 V and -2 V Power Supply

FUNCTION DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Parameters	Symbol	Units	Rating
Supply Voltage	V _{dd}	V	0 to +5
Supply Voltage	V _{ss}	V	-5 to 0
Input Current	I _(IN)	mA	6
Storage Temperature Range	T _{ST}	°C	-40 to 125

RECOMMENDED OPERATING CONDITIONS (Ta = 25°C)

Parameters	Symbol	Units	Min.	Typ.	Max.
Supply Voltage	V _{dd}	V	+3.14	+3.3	+3.46
Supply Voltage	V _{ss}	V	-2.1	-2	-1.9

ELECTRICAL CHARACTERISTICS

($T_a = 25^\circ\text{C}$, $V_{dd} = +3.3\text{ V}$, $V_{SS} = -2\text{ V}$, $C(\text{diode})+C(\text{stray}) = 0.20\text{ pF}$)

Parameters	Units	Min.	Typ.	Max.
Transimpedance ($I_{(IN)} < 450\ \mu\text{A}$)	Ω	—	500	—
Bandwidth (-3 dB)	GHz	10	10.5	—
Transimpedance Flatness (300 kHz to 6 GHz)	$\text{dB}\Omega$	—	—	± 1
Equivalent Input Noise Current *1)	$\text{pA}/\sqrt{\text{Hz}}$	—	9.5	—
Optical Sensitivity *2)	dBm	—	-18	—
Optical Overload *2)	dBm	—	+5	—
Input Offset Voltage	V	—	+0.16	—
Group Delay	ps	—	—	± 20
Output Return Loss (<10 GHz)	dB	—	—	10
Power Consumption	W	—	0.22	—
Operating Temperature Range *3)	$^\circ\text{C}$	0	—	+85

*1) Averaged Equivalent Input Noise Current from 130 MHz to 9.0 GHz.

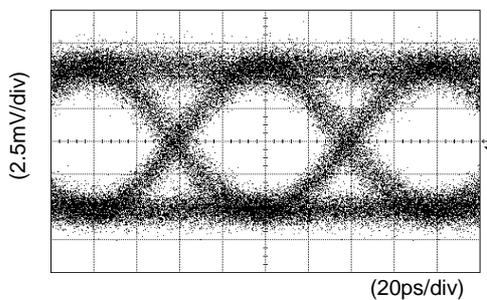
*2) Value of optical sensitivity is guaranteed by design, assuming responsivity of photo diode of 0.90 A/W.

*3) At backside of die.

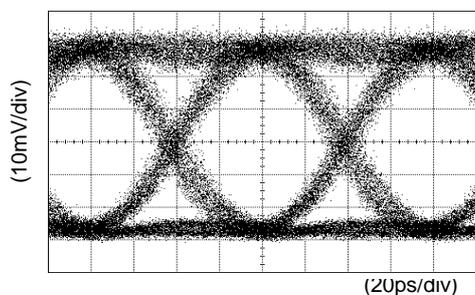
EYE DIAGRAMS

(12.5 Gbps PRBS $2^{31}-1$ Input signal)

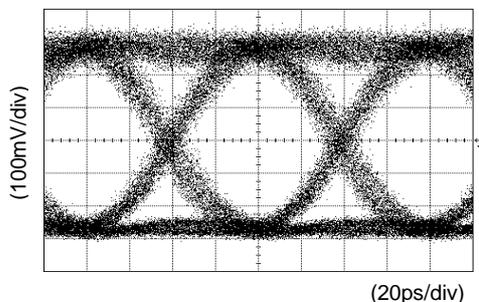
Optical Input Power = -17[dBm]



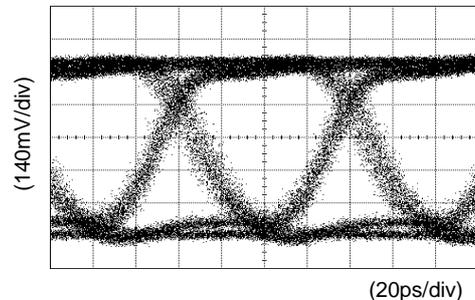
Optical Input Power = -10[dBm]



Optical Input Power = 0[dBm]

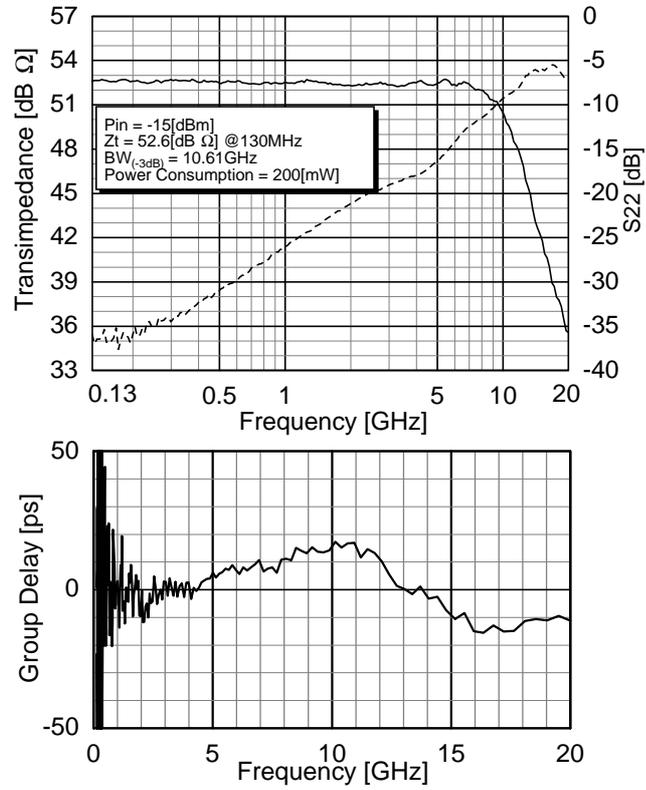


Optical Input Power = +5[dBm]

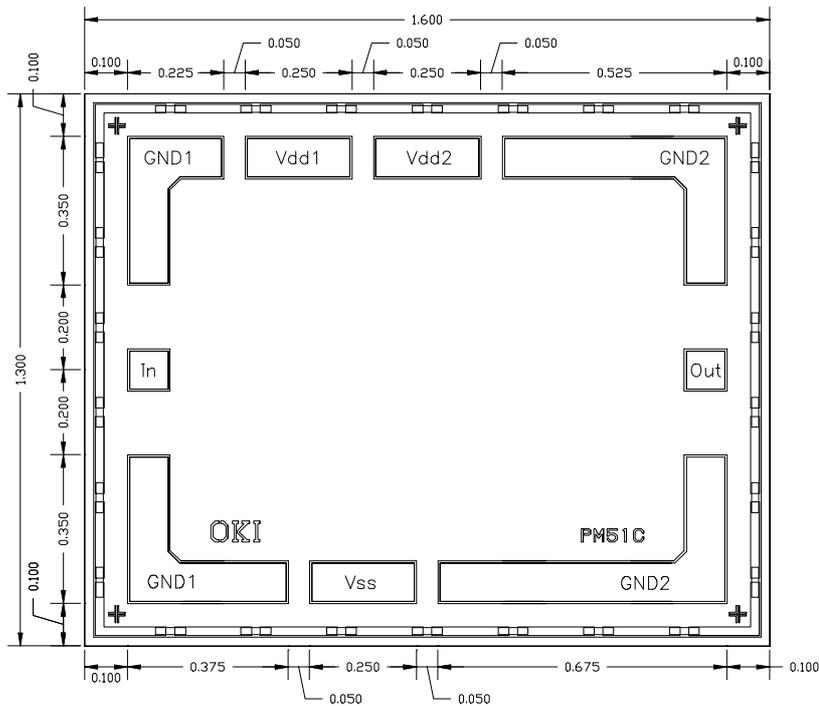


TYPICAL FREQUENCY RESPONSE AND GROUP DELAY

($V_{dd} = +3.3\text{ V}$, $V_{ss} = -2\text{ V}$, $T_a = 25^\circ\text{C}$, $C_{(PD)} \approx 0.20\text{ pF}$, Responsivity of PD = 0.90 A/W)



PAD LAYOUT



(Dimensions in mm)

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