OKI Electronic Components

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KGA4133 Preliminary

12.5 Gbps Transimpedance Amplifier IC

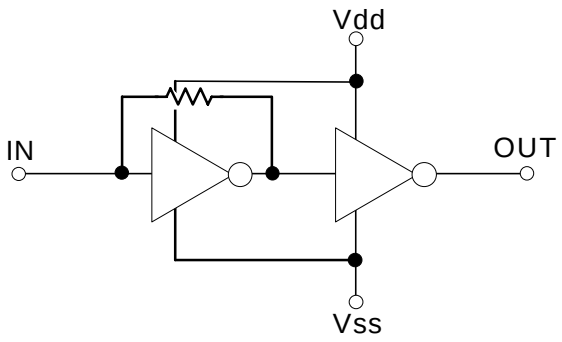
DESCRIPTION

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
- Sensitvity : < –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

(Ta = 25°C, V_{dd} = +3.3 V, V_{SS} = –2 V, $C_{(diode)}+C_{(stray)}$ = 0.20 pF)

Parameters		Units	Min.	Typ.	Max.
Transimpedance ($I_{(IN)}$<450 µA)		Ω	—	500	—
Bandwidth (–3 dB)		GHz	10	10.5	—
Transimpedance Flatness (300 kHz to 6 GHz)		dBΩ	—	—	±1
Equivalent Input Noise Current	*1)	pA/√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)	°C	0	—	+85

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

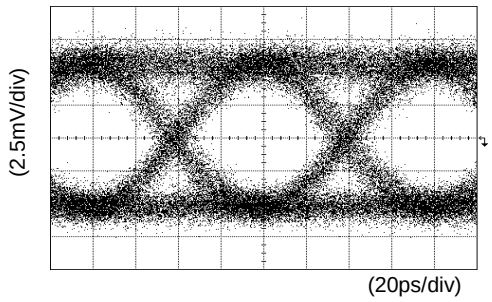
*2) Value of optical sensitivity is guaranteed by design, assuming responsivity of photo diode of 0.90 A/W.

*3) At backside of die.

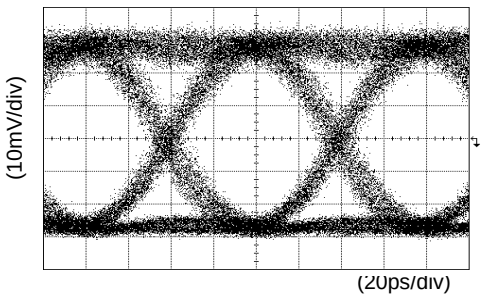
EYE DIAGRAMS

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

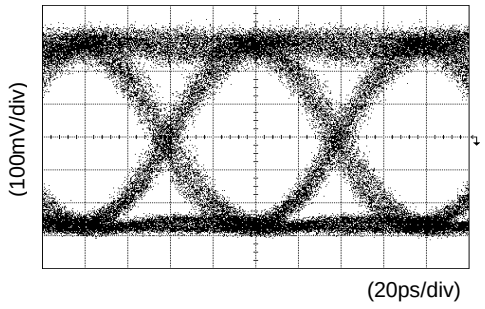
Optical Input Power= -17[dBm]



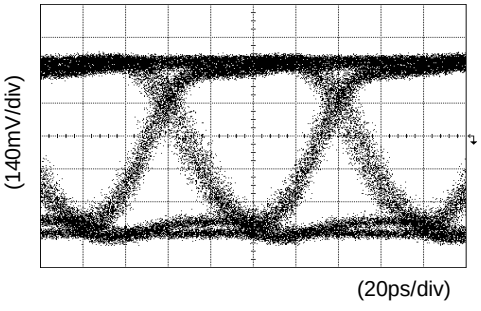
Optical Input Power = -10[dBm]



Optical Input Power = 0[dBm]

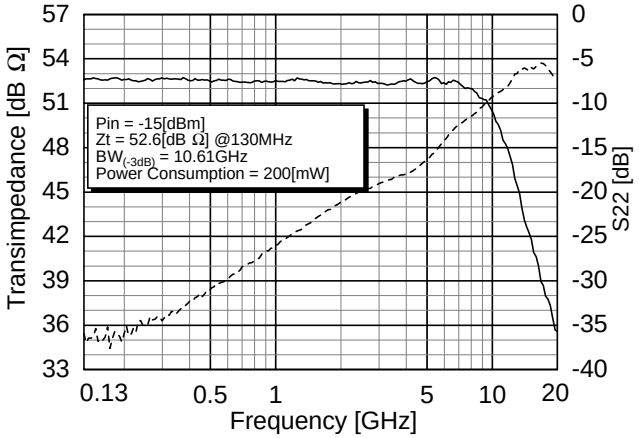


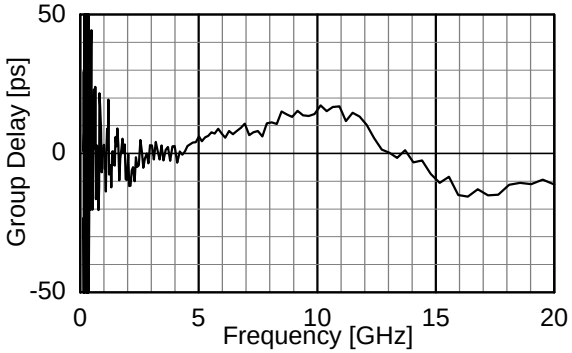
Optical Input Power = +5[dBm]



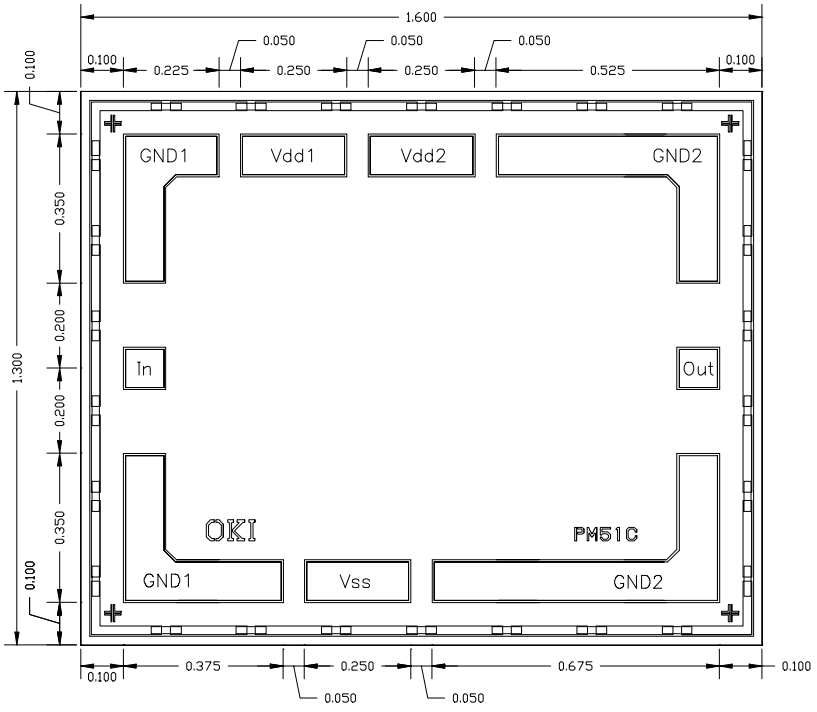
TYPICAL FREQUENCY RESPONSE AND GROUP DELAY

(V_{dd} = +3.3 V, Vss = –2 V, Ta = 25°C, $C_{(PD)} \approx$ 0.20 pF, Responsivity of PD = 0.90 A/W)





PAD LAYOUT



(Dimensions in mm)

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