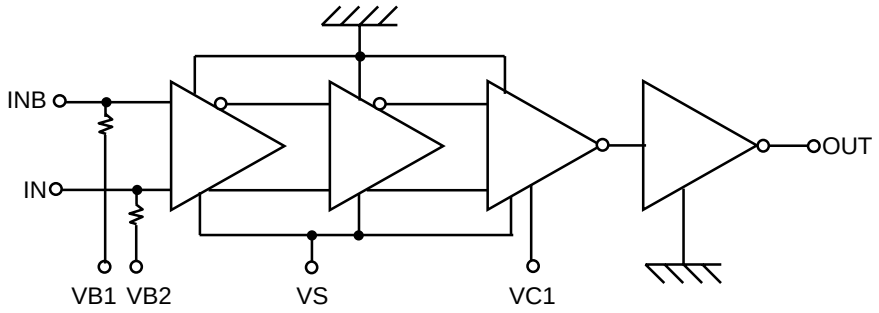
KGL4126F

10.7 Gbps Mach-Zehnder Modulator Driver IC

FEATURES

- High Output Voltage: Maximum Amplitude > 5.0 Vpp
- X-Point Control Function
- Output Amplitude Control Function

FUNCTION DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit	Note
Supply Voltage	VS	-6.5	0.3	V	
X-Point Control Voltage	VB1	VS-4.5 (Min. -6.5)	VS+2.4 (Max. 0.3)	V	
Output Amplitude Control Voltage	VC1	-6.5	VS+1.2 (Max. 0.3)	V	
DC Bias for Output Stage Amplifier	VD	0	5.0	V	
Operating Temperature at Package Base	Ts	-10	100	°C	
Storage Temperature	Tst	-40	125	°C	

RECOMMENDED OPERATING CONDITIONS

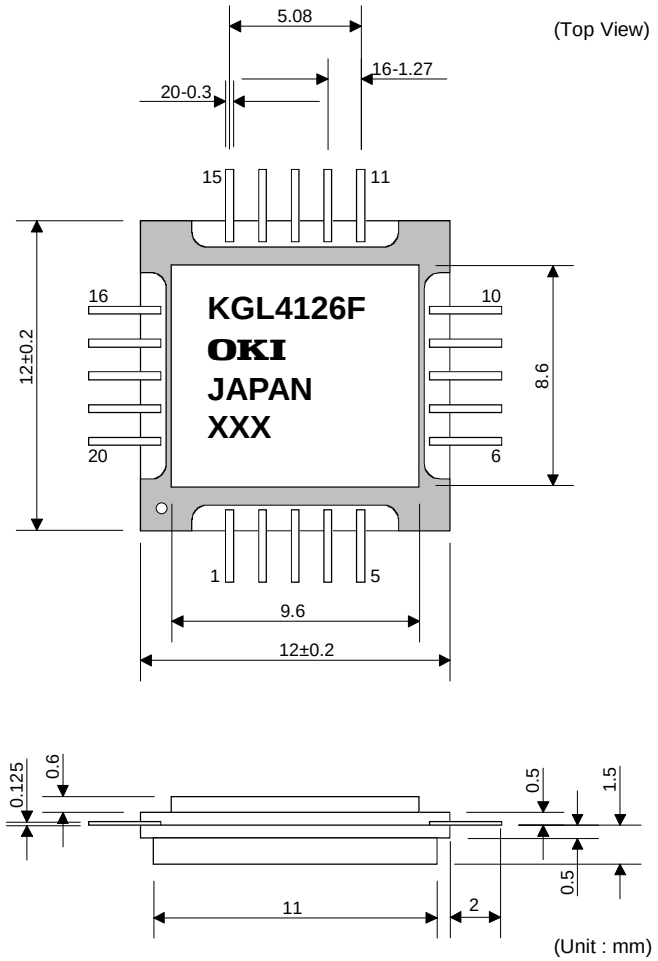
Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	VS	-5.46		-4.94	V
Supply Voltage*1,2	VD	2.0		3.5	V
X-Point Control Voltage	VB1	VS+0.8		VS+2.2	V
Output Amplitude Control Voltage*1	VC1	VS		VS+1.0	V
Operating Temperature at Package Base	Ts	0		85	°C
Input Interface	AC coupled (External blocking capacitor is required)				
Output Interface	AC coupled (External Bias-T is required for VD)				

*1 Output Amplitude can be controlled by VC1 and VD voltage. We recommend to control output amplitude by VD voltage. (VD is more effective than VC1.)
*2 VD is supplied at Output Port using External Bias-T.

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input Data Rate		NRZ	10.7			Gbps
Supply Current of VS	Iss			210	250	mA
Supply Current of VD	ID	Supply DC Bias by Bias-T		70	100	mA
Input Amplitude	Vin	Differential (AC Coupled)	0.25		1	Vpp
		Single-Ended (AC Coupled)	0.5		1	Vpp
Output Amplitude (Max)	Vo (Max)	50 Ω load,(AC Coupled)	5.0			Vpp
X-Point Control	Xp	NRZ, 50 Ω load	40		60	%
Output Rise/Fall Time	Tr/Tf	50 Ω load 20%-80%			40	ps
Input Return Loss	S11	100kHz–10 GHz		13		dB

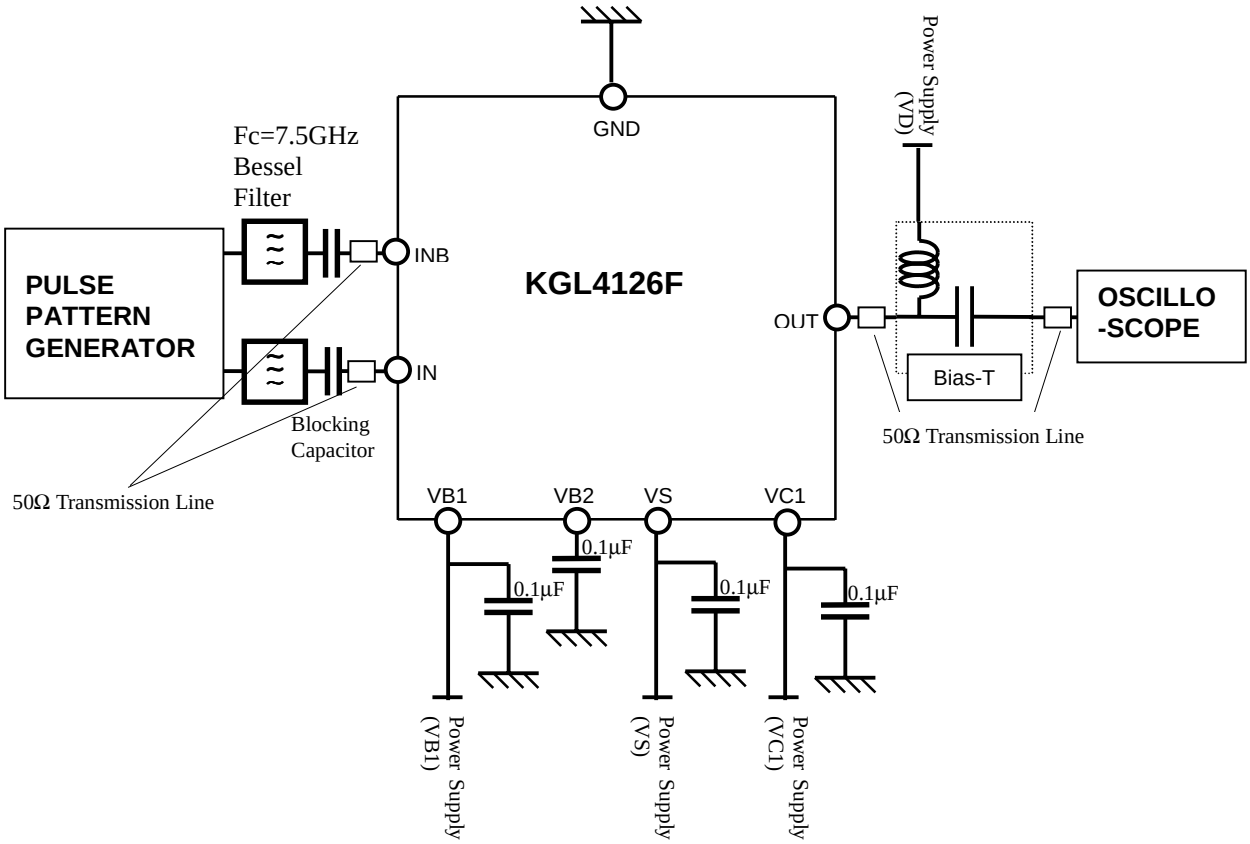
PACKAGE DIMENSIONS



PINCONNECTION

No.	Symbol	Note
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	OUT.	Signal Output and DC Bias Port
10	GND	Ground
11	GND	Ground
12	VC1	Output Amplitude Control Port
13	VS	Supply Voltage Port
14	VB2	Input Termination Port
15	VB1	X-Point Control and Inverted Input Termination Port
16	GND	Ground
17	INB	Inverted Input Terminal
18	GND	Ground
19	IN	Signal Input Terminal
20	GND	Ground

AC CHARACTERISTICS TEST CIRCUIT



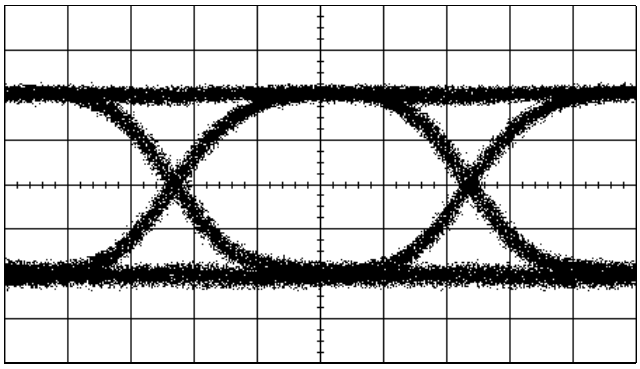
TYPICAL CHARACTERISTICS (WAVEFORM)

Measured Condition (@25°C)

Display Factor V : 1.0V/div, H : 20 ps/div, Offset : 0V
Input Signal 10.7Gbps, NRZ, PN31, Differential 0.25Vpp, AC Coupled
Tr/Tf(20-80%)≅40ps (through 7.5GHz Bessel Filters)

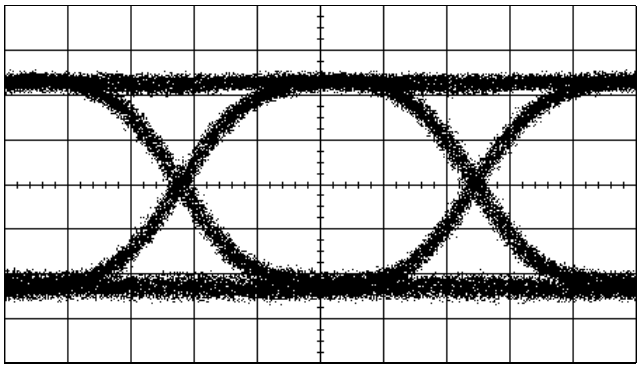
Waveform @10.7Gbps Operate

@4.0Vpp



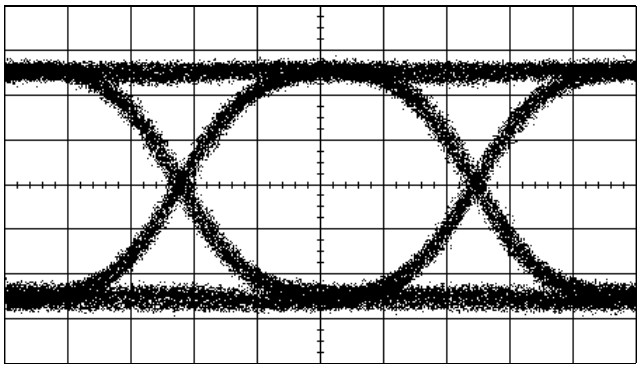
VS : -5.0V Iss : 207.7mA
VB1 : -3.75V Crossing-Point : 50.1%
VC1 : -4.0V
VD : 2.475V I_D : 52.4mA
Power : 1.168W
Amplitude: 4.003Vpp
Tr : 27.6ps
Tf : 27.1ps
JitterP-P : 10.9ps

@4.5Vpp



VS : -5.0V Iss : 207.7mA
VB1 : -3.74V Crossing-Point [%] : 50.2%
VC1 : -4.0V
VD : 2.83V I_D : 60.1mA
Power : 1.208W
Amplitude: 4.506Vpp
Tr : 28.0ps
Tf : 28.0ps
JitterP-P : 10.8ps

@5.0Vpp

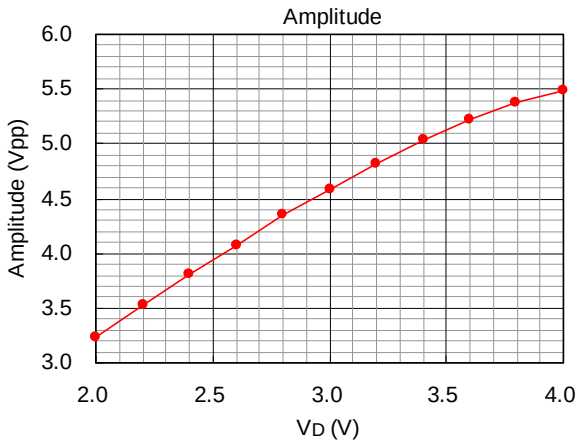


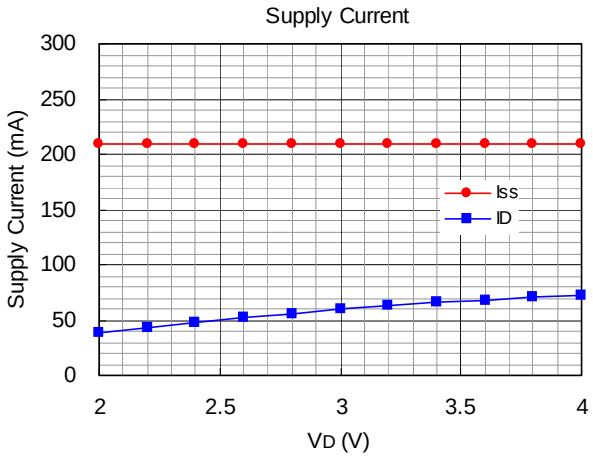
VS : -5.0V Iss : 207.6mA
VB1 : -3.74V Crossing-Point : 50.1%
VC1 : -4.0V
VD : 3.22V I_D : 67.3mA
Power : 1.255W
Amplitude: 5.005Vpp
Tr : 29.3ps
Tf : 28.4ps
JitterP-P : 10.9ps

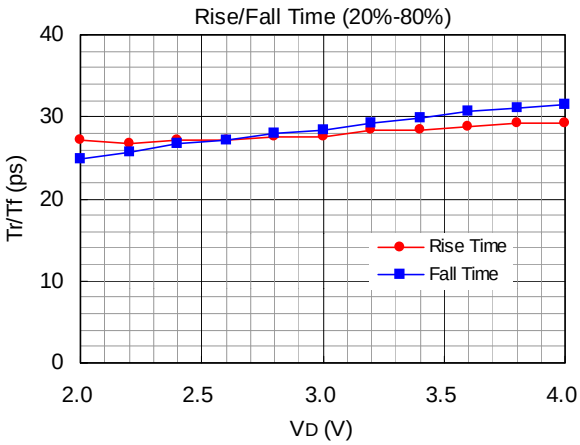
Note JitterP-P means " 6 × Jitter(RMS) ".

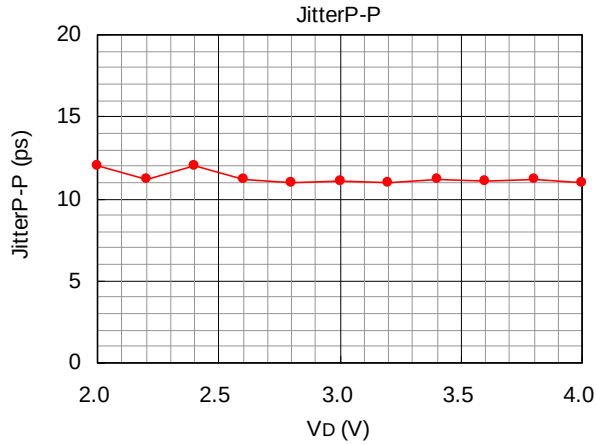
TYPICAL CHARACTERISTICS (SUPPLY VOLTAGE DEPENDENCE : VD)

Measured Condition (@25°C)
Input Signal 10.7Gbps NRZ PRBS31, Differential 0.25Vpp
VS=-5.0V, VB1@Xp≅50%, VC1=-4.0V



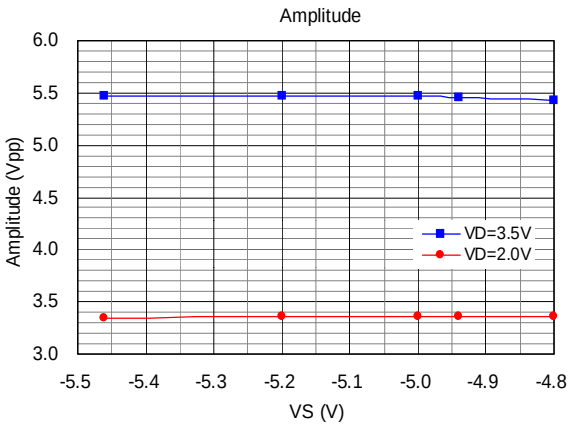


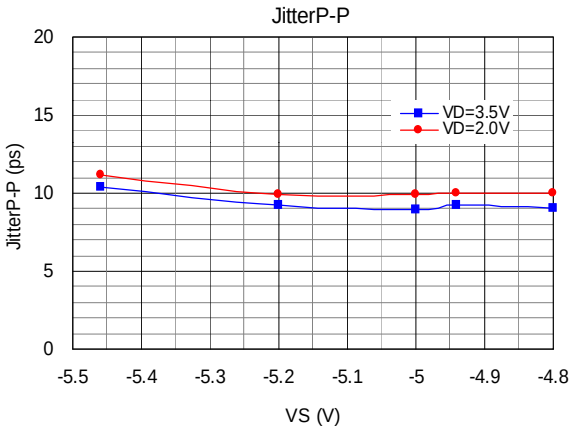


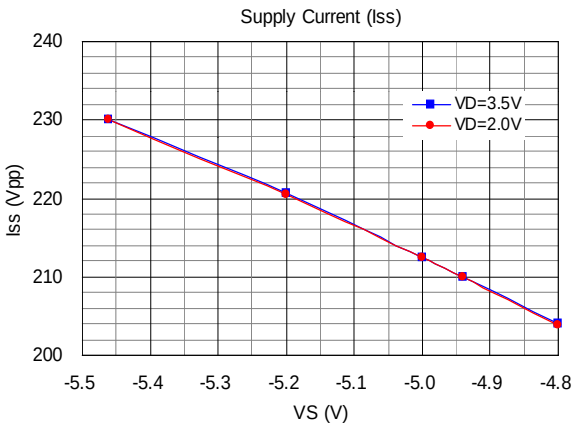


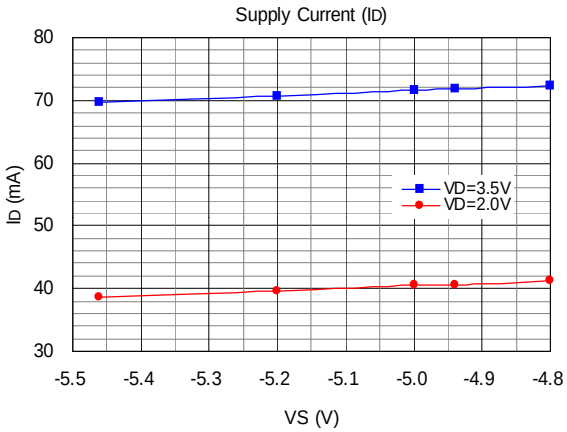
TYPICAL CHARACTERISTICS (SUPPLY VOLTAGE DEPENDENCE : VS)

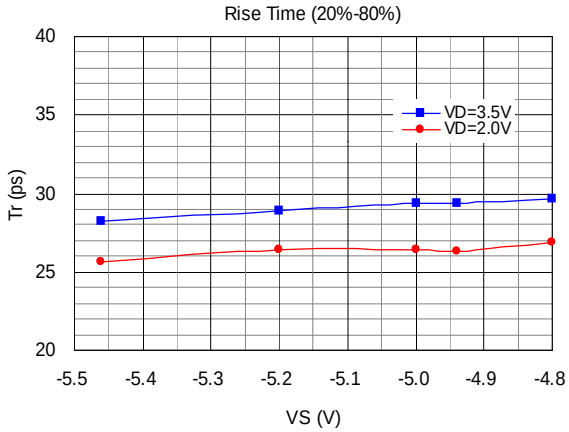
Measured Condition (@25°C)
Input Signal 10.7Gbps NRZ PRBS31, Differential 0.25Vpp
VB1@Xp≅50%, VC1=-4.0V

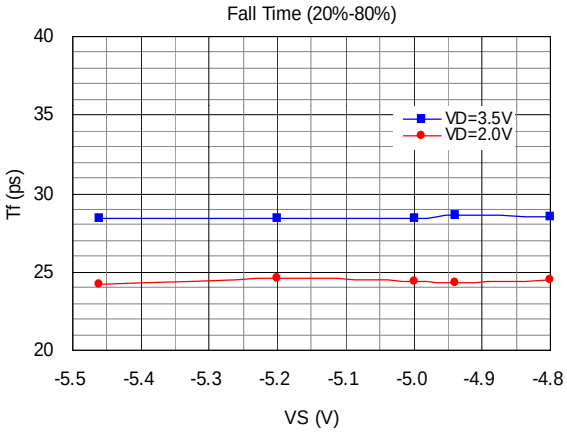










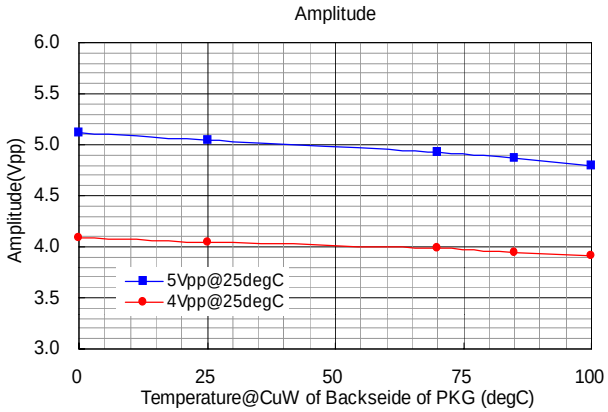


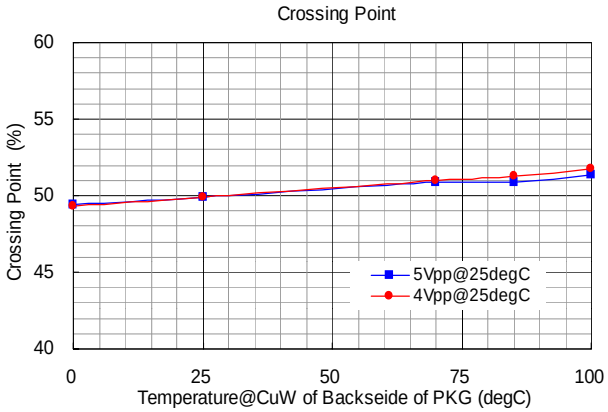
TYPICAL CHARACTERISTICS (TEMPERATURE CHARACTERISTICS)

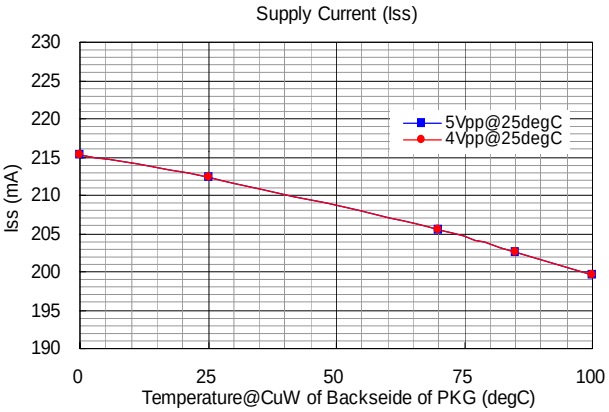
Measured Condition

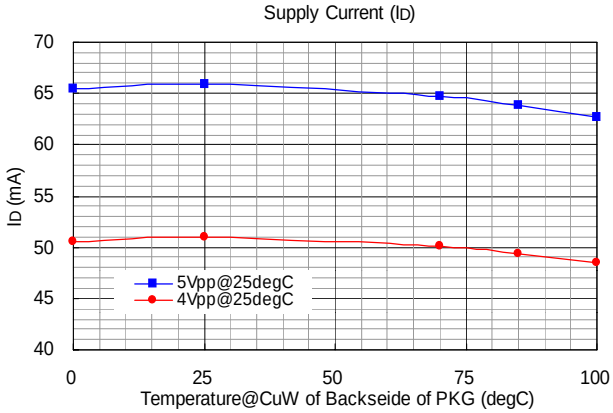
Input Signal 10.7Gbps NRZ PRBS31, Differential 0.25Vpp

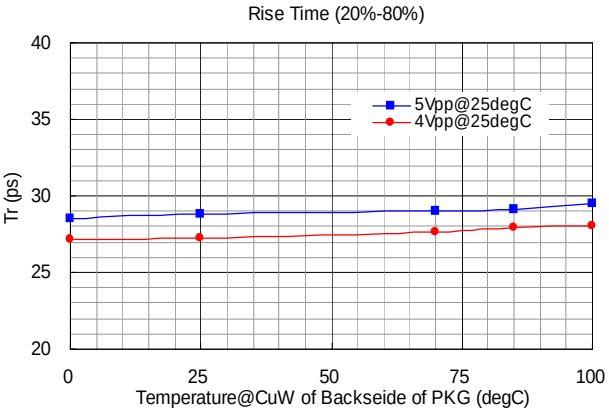
VS=-5V, VC1=-4.0V, VB1:Xp50%@25degC

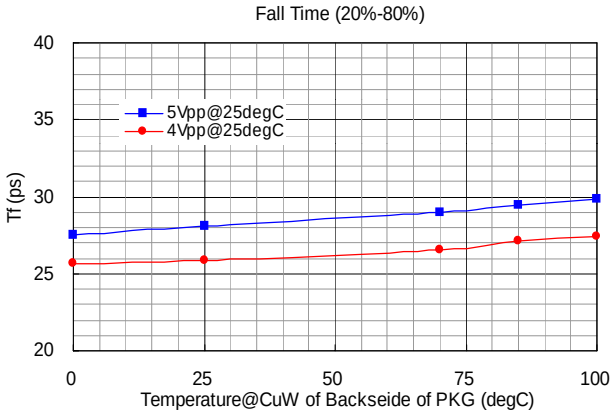




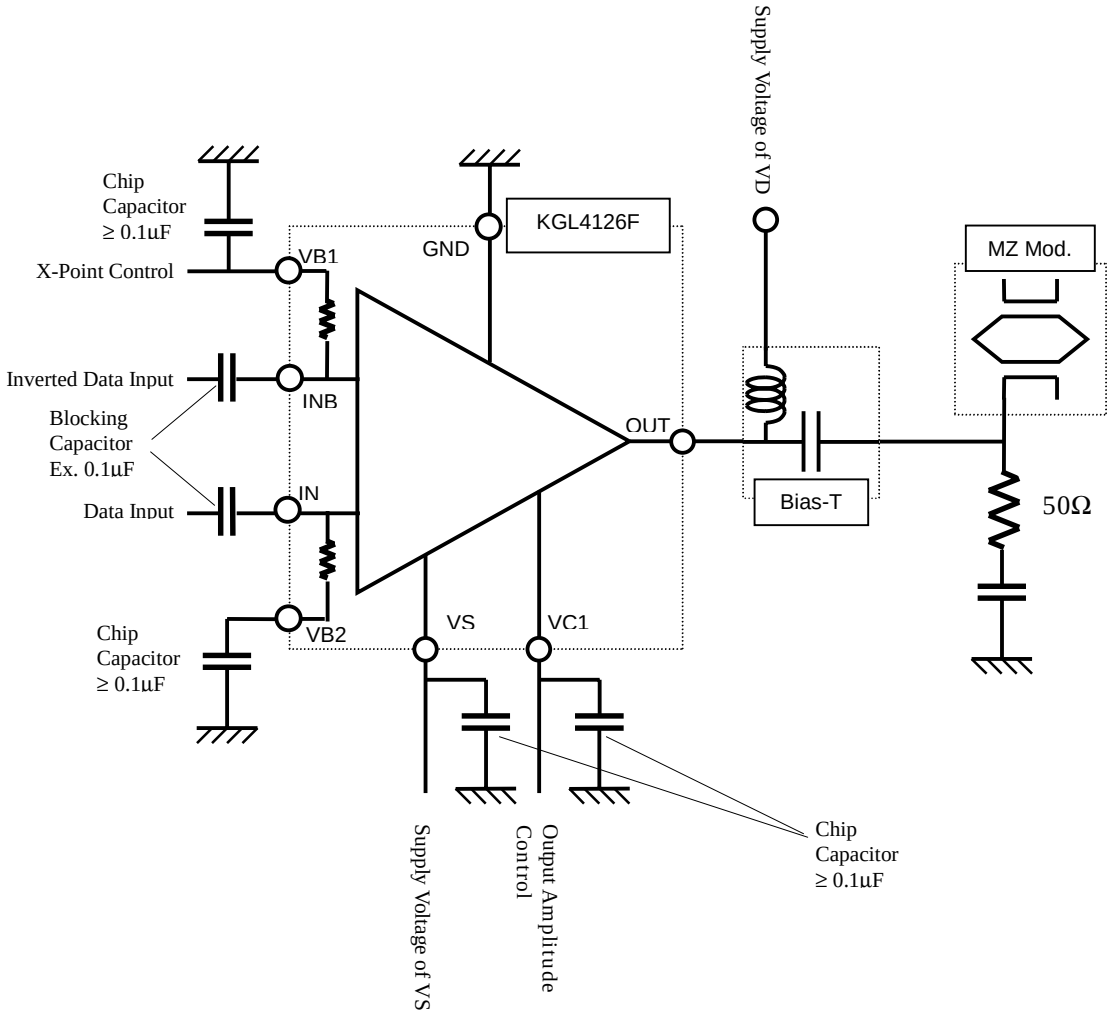








TYPICAL APPLICATION



APPLICATION NOTE

1. For stable operation;
 1-1. To prevent a dependence of “X-Point” on the supply voltage VS,
 (1) Use an external voltage source of –3.8V for “VB2”, or
 (2) Control the voltage of “VB1”, so that the voltage difference “VB1–VB2” is constant.

 1-2. To prevent a dependence of “Output amplitude” on the supply voltage VS,
 Control the voltage of “VC1”, so that the voltage difference “VC1–VS” is constant.

2. Power-up/shut-down sequence;
 For power-up, supply control voltages (VB1, (VB2), VC1) at first, next VS, then VD.
 For shut-down, VD at first, next VS, then control voltages.
 Customer does not need to care about the sequence for the control voltages (VB1,(VB2),VC1).

SAFETY AND HANDRING INFORMATION ON GaAs DEVICES

Arsenic Compound (GaAs Devices)
The product contains arsenic (As) as a compound.
This material is stable for normal use, however, its dust or vapor may be potentially hazardous to the human body.
Avoid ingestion, fracture, burning or chemical treatment to the product.

- Do not put the product in your mouth.
- Do not burn or destroy the product.
- Do not perform chemical treatment for the product.

Keep laws and ordinances related to the disposal of the products.

NOTICE

1. The information contained herein can change without notice owing to product and/or technical improvements. Before using the product, please make sure that the information being referred to is up-to-date.

2. The outline of action and examples for application circuits described herein have been chosen as an explanation for the standard action and performance of the product. When planning to use the product, please ensure that the external conditions are reflected in the actual circuit, assembly, and program designs.

3. When designing your product, please use our product below the specified maximum ratings and within the specified operating ranges including, but not limited to, operating voltage, power dissipation, and operating temperature.

4. Oki assumes no responsibility or liability whatsoever for any failure or unusual or unexpected operation resulting from misuse, neglect, improper installation, repair, alteration or accident, improper handling, or unusual physical or electrical stress including, but not limited to, exposure to parameters beyond the specified maximum ratings or operation outside the specified operating range.

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