FEATURES

The EA driver IC ML015A15 is designed for a 10Gb/s optical communication system.Output Swing ,Output Offset and Output X-point are adjustable.Differential outputs are provided to drive an external modulator or laser diode.
The hermetically sealed metal-ceramic package guarantees high reliability.

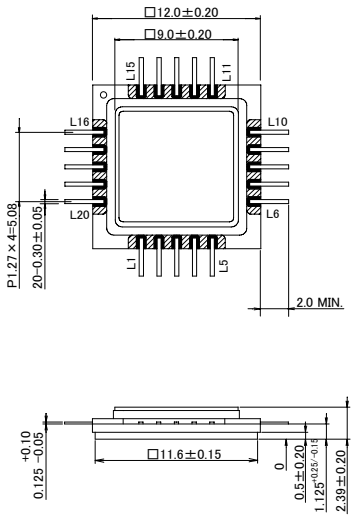
DESCRIPTION

- Operation DC to 10Gb/s,NRZ
- Built-in D-FF
- Internal Input / Output 50Ω Termination
- Output Voltage Swing :
  Vo-pp(Max.)=2.7 Vp-p min. @RL=50Ω
- Single -5.2V Power Supply
- Output Reflection Coefficient : S22＜-10dB @DC to 10GHz
- Output Swing Control Adjustment
- Output Offset Control Adjustment
- Output X-Point Control Adjustment
- 20-pin Hermetic Package

APPLICATION

10Gb/s High-speed Optical Transmitter

OUTLINE Unit:mm



ABSOLUTE MAXIMUM RATINGS (Ta = 25±3 ℃)

Symbol	Parameter	Ratings		Unit
		Min.	Max.	
Vss	Supply Voltage	-6.0	0	V
Voff	Output Offset Voltage Control Voltage	Vss	Vss+1.4	V
Vcrs	X-point Control Voltage	Vss	Vss+1.4	V
Vin , VinB	Input Voltage	-4.0	0	V
Vout , VoutB	Output Voltage	-4.1	+0.5	V
Iout	Output Current	—	100	mA
Ig2	Prebuffer Output Swing Control Current	—	4.5	mA
IM	Output Swing Control Current	—	4.5	mA
Tc	Operating Case Temperature	—	+100	℃
Tstg	Storage Temperture	-40	+125	℃

RECOMMENDED OPERATING CONDITIONS

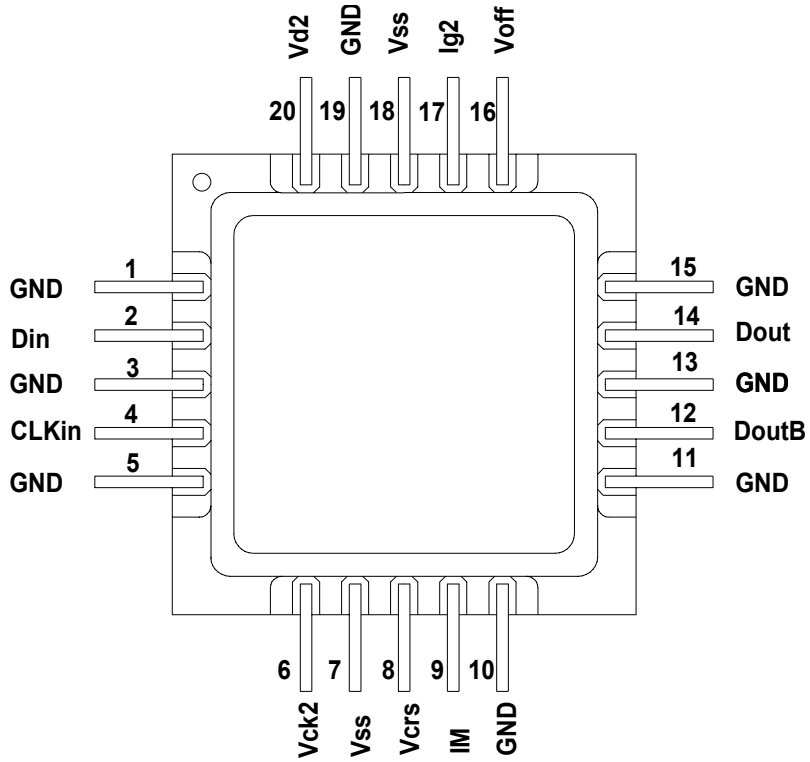
Symbol	Parameter	Test Conditions	Ratings			Unit
			Min.	Typ.	Max.	
Vss	Supply Voltage	—	-5.72	-5.2	-4.68	V
Vd2	Data Input Threshold Voltage		-0.7	-0.5	-0.4	V
Vck2	CLK Input Threshold Voltage		-0.7	-0.5	-0.4	V
Voff	Output Offset Voltage Control Voltage	—	Vss	—	Vss+1.2	V
Vcrs	X-point Control Voltage	—	Vss	—	Vss+1.2	V
VinH	Input Level High	—	-0.35	-0.25	-0.0	V
VinL	Input Level Low	—	-1.2	-0.75	-0.65	V
Ig2	Prebuffer Output Swing Control Current	—	2.5	3.5	4.0	mA
IM	Output Swing Control Current	—	0.7	2.0	3.5	mA

*1 : No AC inputs

ELECTRICAL CHARACTERISTICS (Ta = 25±3 ℃ ,Vss=-5.2V,Ig2=3.0mA,f=9.95328Gbps,PRBS 2^{31}-1,RL=50Ω)

Symbol	Parameter	Test Conditions	Ratings			Unit
			Min.	Typ.	Max.	
Iss	Power Supply Current	Voff=Vcrs=-5.2V , $Vo\text{-}_{pp}$=2.7Vp-p	—	570	720	mA
Vo-pp (Max.)	Output Voltage Swing(Max.)	Voff=Vcrs=-5.2V , IM=3.0mA	2.7	—	—	Vp-p
Vo-pp (Min.)	Output Voltage Swing(Min.)	Voff=Vcrs=-5.2V , IM=0.5mA	—	—	1.8	Vp-p
Iout	Modulation Current Output	Voff=Vcrs=-5.2V,	35		60	mA
VOH	Ouput Voltage High	Vcrs=-5.2V , Voff=Vss to Vss+1.2V , $Vo\text{-}_{pp}$=2.7Vp-p	-1.0	—	-0.2	V
VOL	Output Voltage Low	Vcrs=-5.2V , Voff=Vss to Vss+1.2V , $Vo\text{-}_{pp}$=2.7Vp-p	-3.0	—	—	V
CP	X-point Control Range	Voff=-5.2V , Vcrs=Vss to Vss+1.2V , $Vo\text{-}_{pp}$=2.7Vp-p	50	—	80	%
tr	Rise Time	Voff=Vcrs=-5.2V , $Vo\text{-}_{pp}$=2.7Vp-p , 20-80%	—	25	30	ps
tf	Fall Time	Voff=Vcrs=-5.2V , $Vo\text{-}_{pp}$=2.7Vp-p , 20-80%	—	25	30	ps
JITp-p	Jitter P-P	Voff=Vcrs=-5.2V , $Vo\text{-}_{pp}$=2.7Vp-p	—	—	10	ps
S22	Output Reflection Coefficient	Voff=Vcrs=-5.2V , $Vo\text{-}_{pp}$=2.7Vp-p ,DC to 10GHz	—	—	-10	dB
PM	CLK/DATA phase margin	Voff=Vcrs=-5.2V, $Vo\text{-}_{pp}$=2.7Vp-p	200			deg.

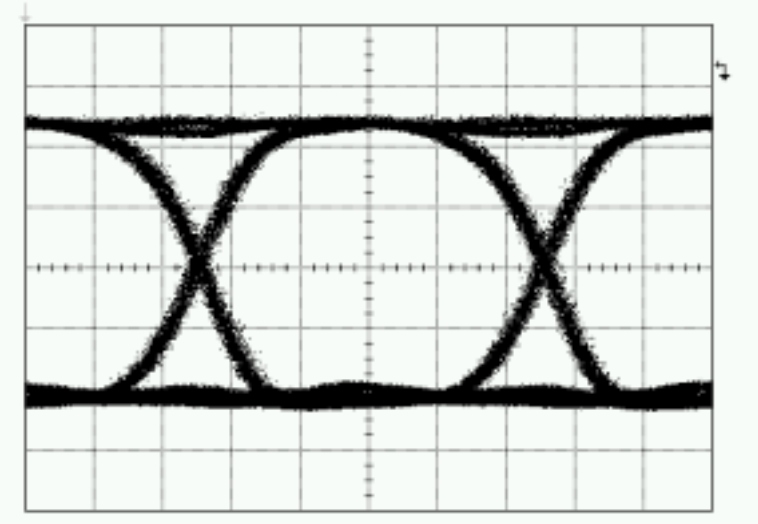
Pin Assignment



Pin Description

Pin No.	Pin name	Description	Pin No.	Pin name	Description
1	GND	Ground	**11**	GND	Ground
2	Din	Data Input	**12**	DoutB	Data Output Complementary to Dout (for Laser Diode)
3	GND	Ground	**13**	GND	Ground
4	CLKin	Clock Input	**14**	Dout	Data Output (for EA Modulator)
5	GND	Ground	**15**	GND	Ground
6	Vck2	CLK Input Threshold Voltage	**16**	Voff	Output Offset Voltage Control Voltage
7	Vss	Supply Voltage	**17**	Ig2	Prebuffer Output Swing Control Current
8	Vcrs	X-point Control Voltage	**18**	Vss	Supply Voltage
9	IM	Output Swing Control Current	**19**	GND	Ground
10	GND	Ground	**20**	Vd2	Data Input Threshold Voltage

TYPICAL CHARACTERISTICS



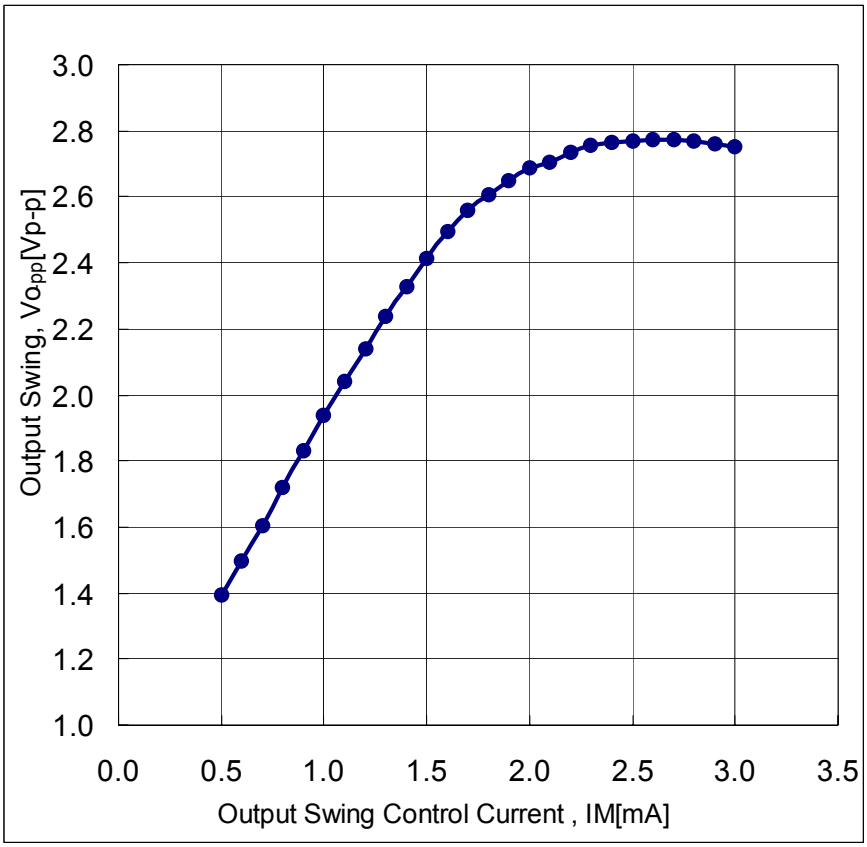
■Operating Condition:
Vss=Voff=Vcrs -5.2V
Vd2=-0.5V
Vck2=-0.55V
Ig2 = 3.0mA
Im= 2.0mA

■Input signal:
10Gb/s ,PRBS 2^{31}-1
Din =-0.5V$^{\pm 0.125V}$,
CLKin=-0.5V$^{\pm 0.125V}$

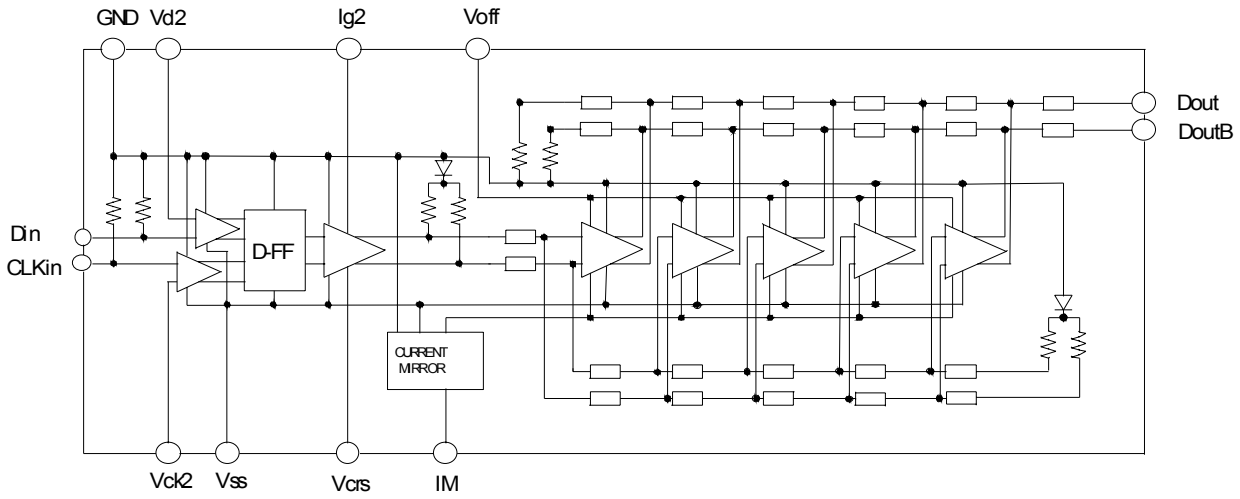
■Output Voltage Swing:
2.72Vp-p

■Rise Time(20-80%) :22.2ps
■Fall Time (20-80%) :20.4ps

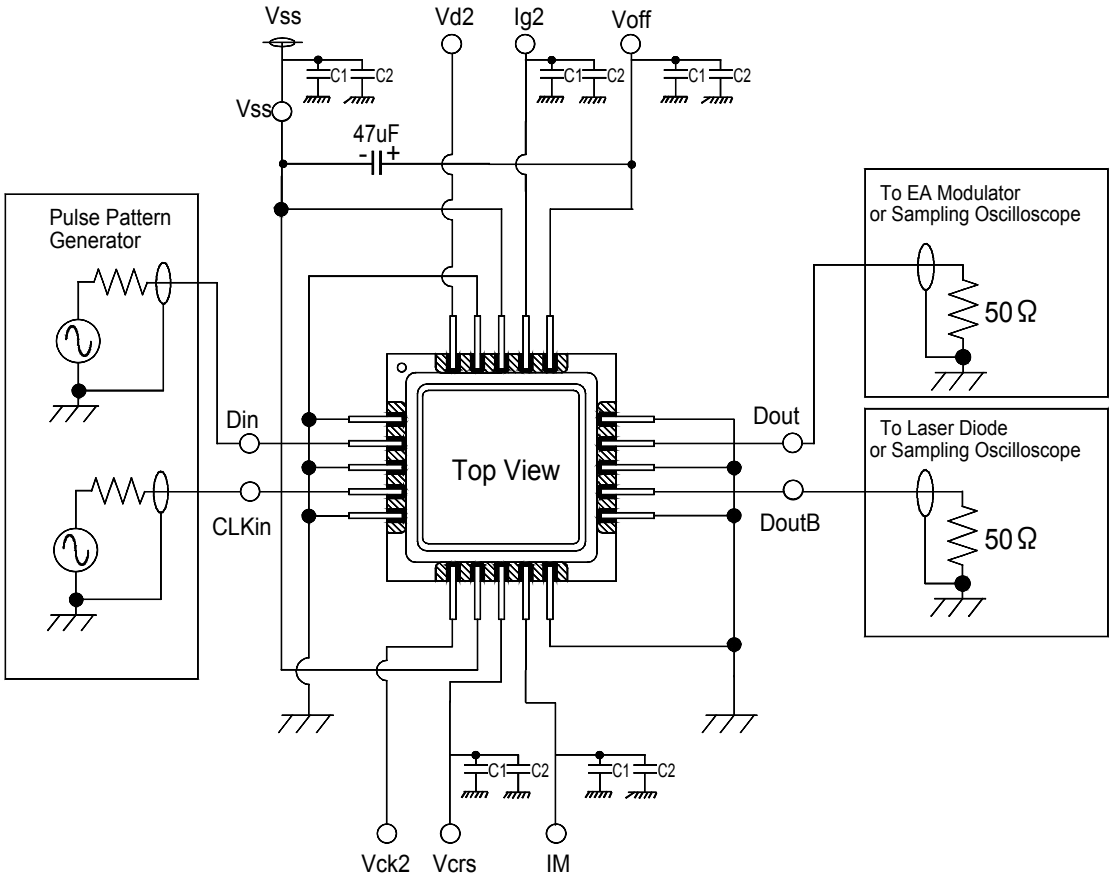
TYPICAL Vo-pp vs. IM (@Ta=25℃ , 50Ω Load with Modulation)



Block Diagram



Test Circuit



Note : C1=40pF,C2=10000pF

BIAS PROCEDURE AND CONDITIONS

The following procedure is recommended to bias the device.

<Power up sequence>

GND ⇒ Voff ⇒ Vcrs ⇒ Vss ⇒ Ig2 ⇒ IM ⇒ Vd2 ⇒ Vck2

(1) Adjust Voff, Vcrs from zero to desired value.
(2) Supply Vss from zero to specified value.
(3) Tune Ig2 from zero to around 3.0mA. By tuning Ig2, tr/tf can be adjusted. If Ig2<3.0mA , enough Vout swing may not be observed.
(4) By tuning IM, Vout swing can be adjusted.

<Power off sequence>

Vd2 ⇒ Vck2 ⇒ IM ⇒ Ig2 ⇒Vss ⇒Vcrs ⇒ Voff ⇒ GND

The reverse procedure is recommended to bias off .

Take care that devices are not operated under conditions exceeding absolute maximum ratings.