

## 3ch Laser Diode Driver

### ■GENERAL DESCRIPTION

**NJW4702** is a laser diode driver for the operation of a grounded laser diode for CD-R and CD-RW drivers.

It includes three channels current amplifiers for three different optical power levels. Reference inputs are voltage input, and voltage control is possible without external resistors. An on-chip RF oscillator is provided to reduce laser mode noise during read mode. Oscillation frequency and oscillation amplitude are defined by two external resistors.

### ■PACKAGE OUTLINE

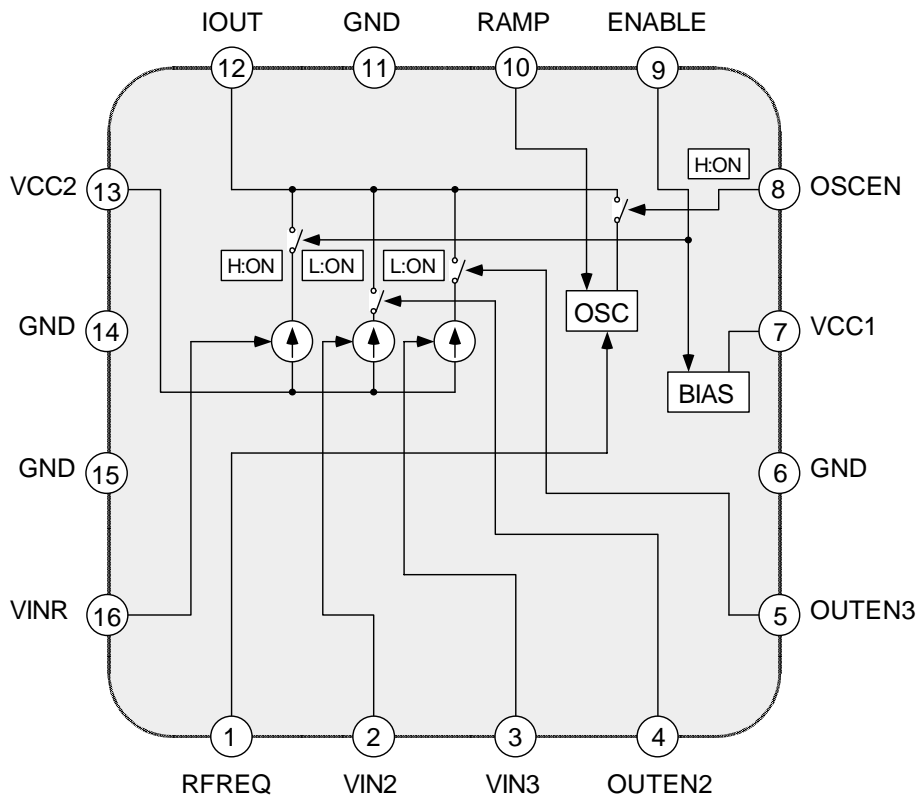


**NJW4702SE8**

### ■FEATURES

- Operating Voltage           4.5V to 5.5V
- On-chip RF Oscillator       200MHz to 500MHz
- Rise-time/Fall-time         1.0ns typ.
- Maximum Output Current   250mA typ.
- Bi-CMOS Technology
- Package Outline             PCSP16(3.5mm 0.65mm pitch)

### ■BLOCK DIAGRAM



# NJW4702

## ■ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETERS	SYMBOL	RATINGS	UNIT
Supply Voltage	V*	6.0	V
Power Dissipation	P <sub>D</sub>	860 *	mW
Operating Temperature Range	Topr	-40 to +85	°C
Storage Temperature Range	Tstg	-40 to +125	°C

\*EIA/JEDEC STANDARD Test Board(76.2x114.3x1.6mm,4layers,FR-4)mounting

## ■RECOMMENDED OPERATING CONDITION (Ta=25°C)

PARAMETERS	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	Vopr		4.5	5.0	5.5	V

## ■ELECTRICAL CHARACTERISTICS

### ●DC CHARACTERISTICS (V<sub>CC</sub>=5.0V,ENABLE=H,OUTEN=H,OSCEN=L, H:5V,L:GND,2V to Iout, Ta=25°C unless otherwise specified)

PARAMETERS	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current 1	I <sub>CC1</sub>	ENABLE≤0.5V	-	0	10	μA
Supply Current 2	I <sub>CC2</sub>	VINR/2/3=0V	-	5	7	mA
Supply Current 3	I <sub>CC3</sub>	OSCEN=H,RAMP=1kΩ,RFREQ=3.6kΩ	-	55	75	mA
Supply Current 4	I <sub>CC4</sub>	VINR=0V,VIN2=0.3V,VIN3=0.3V	-	20	30	mA
Supply Current 5	I <sub>CC5</sub>	VINR=0.8V,VIN2/3=0.3V	-	80	110	mA
High Level Input Voltage	VIH		3.5	-	-	V
Low level Input Voltage	VIL		-	-	1.5	V
High Level Input Current	I <sub>IH</sub>		-	-	100	μA
Low Level Input Current	I <sub>IL</sub>		-100	-	-	μA
Shutdown Voltage	Vshut	VINR=0.8V,VIN2/3=0.3V, OUTEN=L,OSCEN=H,V <sub>CC</sub> at I <sub>CC</sub> ≤1mA	3.4	-	3.7	V

### ●Laser Amp DC CHARACTERISTICS

(V<sub>CC</sub>=5.0V,ENABLE=H,OUTEN=H,OSCEN=L, H:5V,L:GND,2V to Iout, Ta=25°C unless otherwise specified)

PARAMETERS	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Convert Gain 1	Gi1	CHR *1	35	50	65	mA/V
Current Convert Gain 2	Gi2	CH2/3 *1	80	120	160	mA/V
Output Offset Current	I <sub>OS</sub>	CHR/2/3 *1	-2	-	+8	mA
Output Current Linearity	I <sub>lin</sub>	CHR/2/3 *1	-3	-	+3	%
Input Voltage Range	V <sub>refR</sub>	CHR/2/3	0	-	5	V
Maximum Output Current 1	I <sub>OMAX1</sub>	CHR	100	150	-	mA
Maximum Output Current 2	I <sub>OMAX2</sub>	CH2/3	200	250	-	mA
Iout Series Resistance	R <sub>O</sub>		-	6	-	Ω
Input Resistance	R <sub>in</sub>		6	9	12	kΩ
Output OFF Current 1	I <sub>OFF1</sub>	OUTEN=H,VINR/2/3=0V,Total for All Channels	-	-	1.0	mA
Output OFF Current 2	I <sub>OFF2</sub>	OUTEN=L,VINR/2/3=0V,Total for All Channels	-	-	3.0	mA
Supply Voltage Alternation of Output Current 1	V <sub>C1</sub>	V <sub>CC</sub> =4.5 to 5.5V,VINR=0.8V,CHR only	-	10	15	%/V
Supply Voltage Alternation of Output Current 2	V <sub>C2</sub>	V <sub>CC</sub> =4.5 to 5.5V,OUTEN2or3=L,VINR=0.8V, VIN2/3=0.3V,CHR+CH2or3	-	10	15	%/V
Temperature coefficient of Output Current 1	TC1	VINR=0.8V,CHR only	-	-800	-	ppm/°C
Temperature coefficient of Output Current 2	TC2	OUTEN2or3=L,VINR=0.8V,VIN2/3=0.3V, CHR+CH2or3	-	-800	-	ppm/°C

\*1 The amplifier linearity is calculated using best fit method at three points. The output currents chosen 20mA, 40mA,and, 60mA.The transfer function for Iout is defined as follows: Iout =Gi\*VIN+Ios

●Laser Amp AC CHARACTERISTICS (V<sub>CC</sub>=5.0, T<sub>a</sub>=25°C unless otherwise specified)

PARAMETERS	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Enable Time	T <sub>en</sub>	ENABLE L→H 50% to I <sub>out</sub> 50%, I <sub>out</sub> =40mA	-	150	-	ns
Disable Time	T <sub>dis</sub>	ENABLE H→L 50% to I <sub>out</sub> 50%, I <sub>out</sub> =40mA	-	20	-	ns
ON Time	T <sub>on</sub>	OUTEN H→L 50% to I <sub>out</sub> 50%, I <sub>out</sub> =40mA+40mA	-	1	-	ns
OFF Time	T <sub>off</sub>	OUTEN L→H 50% to I <sub>out</sub> 50%, I <sub>out</sub> =40mA+40mA	-	1	-	ns
Rise Time	T <sub>r</sub>	CHR+CH2/3, I <sub>out</sub> 10-90%, I <sub>out</sub> =40mA+40mA	-	1	-	ns
Fall Time	T <sub>f</sub>	CHR+CH2/3, I <sub>out</sub> 10-90%, I <sub>out</sub> =40mA+40mA	-	1	-	ns
Over Shoot	OS		-	5	-	%
Oscillator Frequency	f <sub>OSC</sub>	R <sub>freq</sub> =3.6kΩ	380	470	560	MHz
Oscillator Temperature Coefficient	T <sub>cOSC</sub>	R <sub>freq</sub> =3.6kΩ	-	-300	-	ppm/°C
Output Current Noise	I <sub>no</sub>	I <sub>out</sub> =40mA, CHR only	-	3.5	-	nA/√Hz

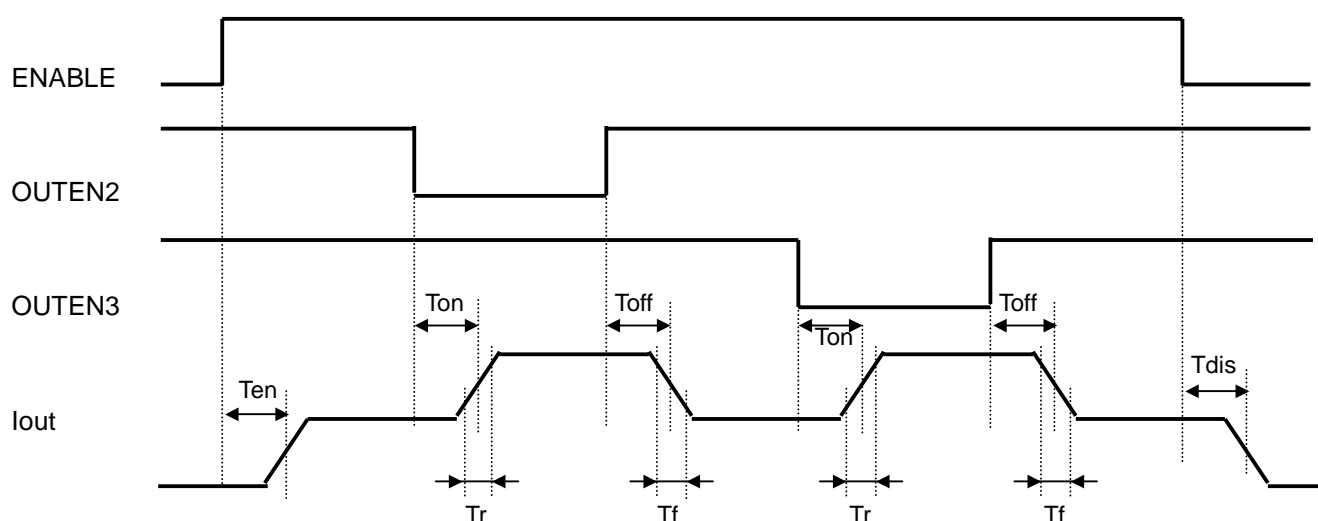
■I<sub>out</sub> Control

ENABLE	OUTEN2	OUTEN3	I <sub>out</sub>
L/OPEN	X	X	OFF
H	H/OPEN	H/OPEN	I <sub>out</sub> =VINR*Gi1
H	L	H/OPEN	I <sub>out</sub> =VINR*Gi1+VIN2*Gi2
H	H/OPEN	L	I <sub>out</sub> =(VINR+VIN3)*Gi1
H	L	L	I <sub>out</sub> =(VIN2+VIN3)*Gi1+VIN2*Gi2

■Oscillator Control

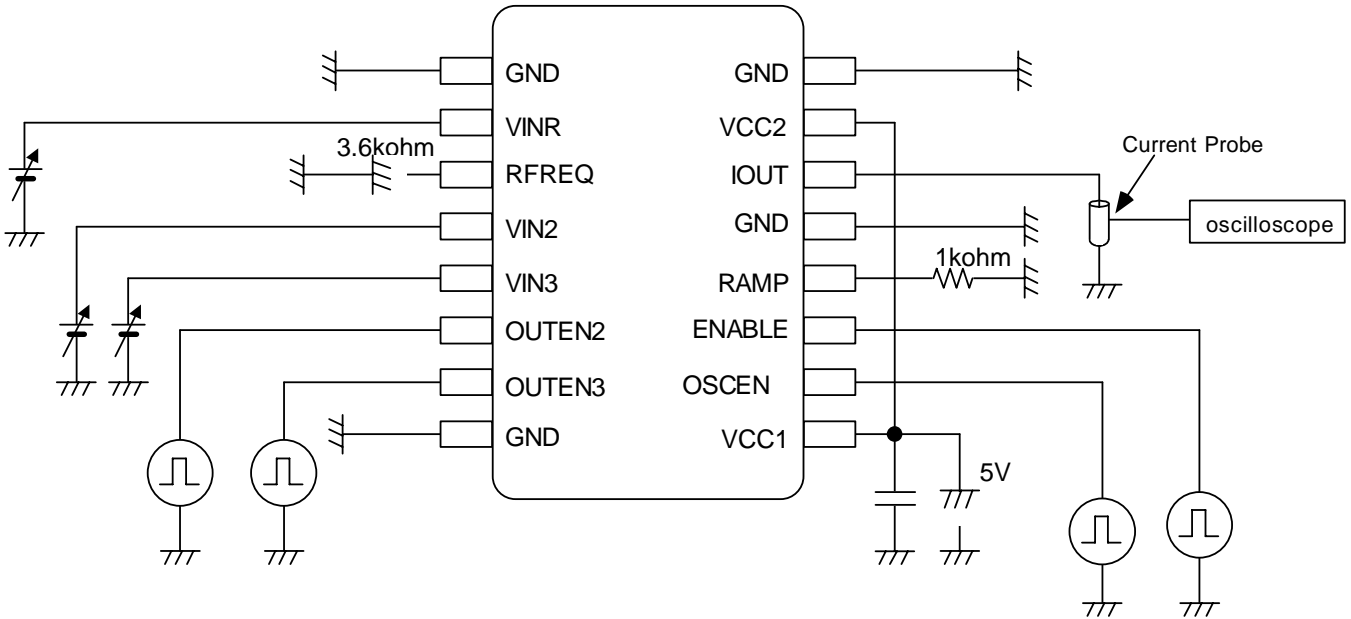
ENABLE	OSCEN	OUTEN2	OUTEN3	OSCILLATOR
L/OPEN	X	X	X	OFF
H	L/OPEN	X	X	OFF
H	H	X	X	ON

■Timing Diagram

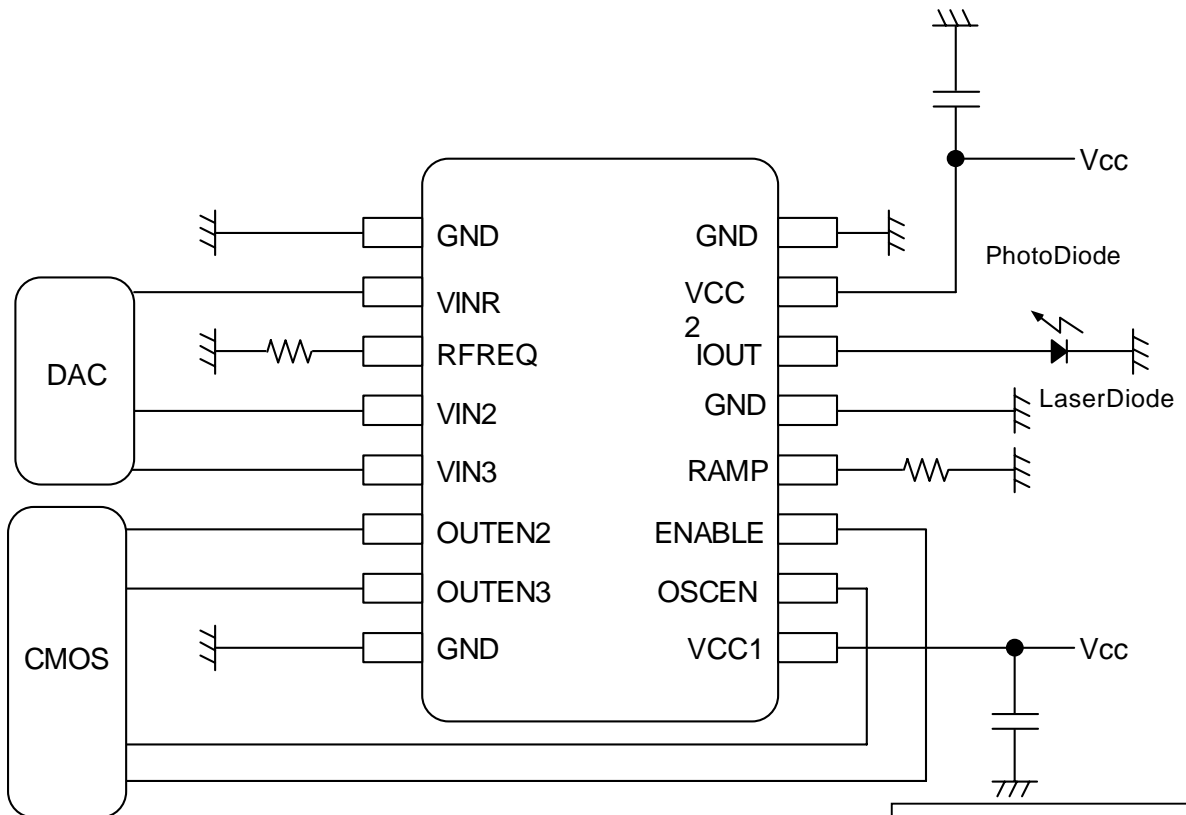


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## TEST CIRCUIT



## APPLICATION CIRCUIT



**[CAUTION]**  
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