

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

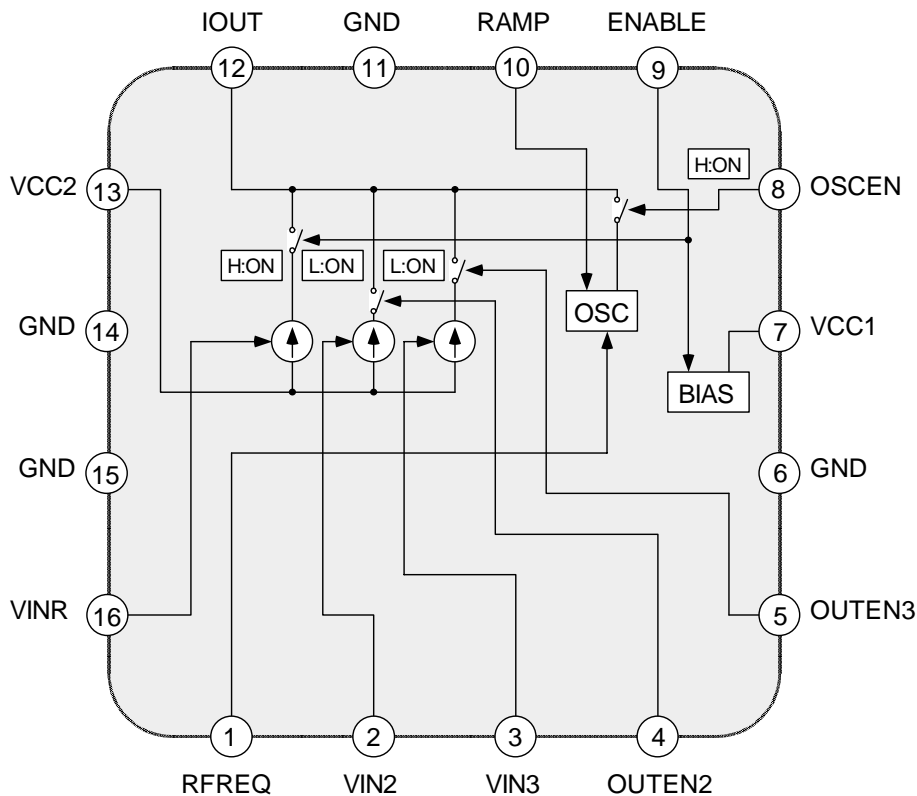


NJW4702SE8

■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 _D	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_{CC}=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 _{CC1}	ENABLE≤0.5V	-	0	10	μA
Supply Current 2	I _{CC2}	VINR/2/3=0V	-	5	7	mA
Supply Current 3	I _{CC3}	OSCEN=H,RAMP=1kΩ,RFREQ=3.6kΩ	-	55	75	mA
Supply Current 4	I _{CC4}	VINR=0V,VIN2=0.3V,VIN3=0.3V	-	20	30	mA
Supply Current 5	I _{CC5}	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 _{IH}		-	-	100	μA
Low Level Input Current	I _{IL}		-100	-	-	μA
Shutdown Voltage	Vshut	VINR=0.8V,VIN2/3=0.3V, OUTEN=L,OSCEN=H,V _{CC} at I _{CC} ≤1mA	3.4	-	3.7	V

●Laser Amp DC CHARACTERISTICS

(V_{CC}=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 _{OS}	CHR/2/3 *1	-2	-	+8	mA
Output Current Linearity	I _{lin}	CHR/2/3 *1	-3	-	+3	%
Input Voltage Range	V _{refR}	CHR/2/3	0	-	5	V
Maximum Output Current 1	I _{OMAX1}	CHR	100	150	-	mA
Maximum Output Current 2	I _{OMAX2}	CH2/3	200	250	-	mA
Iout Series Resistance	R _O		-	6	-	Ω
Input Resistance	R _{in}		6	9	12	kΩ
Output OFF Current 1	I _{OFF1}	OUTEN=H,VINR/2/3=0V,Total for All Channels	-	-	1.0	mA
Output OFF Current 2	I _{OFF2}	OUTEN=L,VINR/2/3=0V,Total for All Channels	-	-	3.0	mA
Supply Voltage Alternation of Output Current 1	V _{C1}	V _{CC} =4.5 to 5.5V,VINR=0.8V,CHR only	-	10	15	%/V
Supply Voltage Alternation of Output Current 2	V _{C2}	V _{CC} =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_{CC}=5.0, T_a=25°C unless otherwise specified)

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

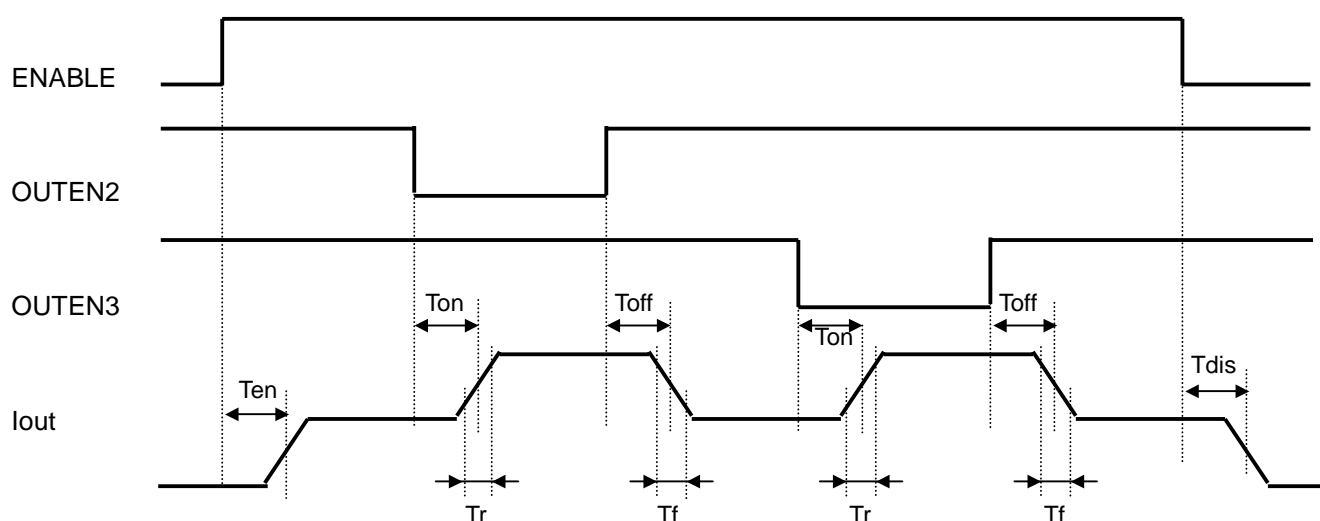
■I_{out} Control

ENABLE	OUTEN2	OUTEN3	I _{out}
L/OPEN	X	X	OFF
H	H/OPEN	H/OPEN	I _{out} =VINR*Gi1
H	L	H/OPEN	I _{out} =VINR*Gi1+VIN2*Gi2
H	H/OPEN	L	I _{out} =(VINR+VIN3)*Gi1
H	L	L	I _{out} =(VIN2+VIN3)*Gi1+VIN2*Gi2

■Oscillator Control

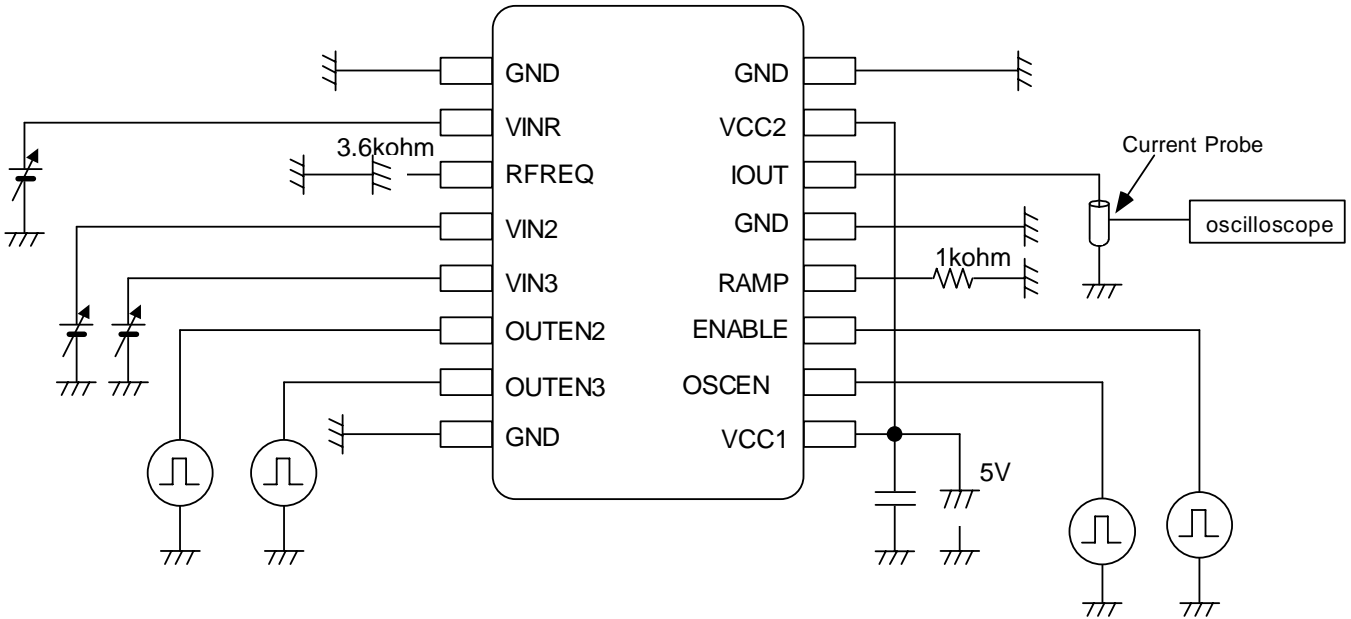
ENABLE	OSCEN	OUTEN2	OUTEN3	OSCILLATOR
L/OPEN	X	X	X	OFF
H	L/OPEN	X	X	OFF
H	H	X	X	ON

■Timing Diagram

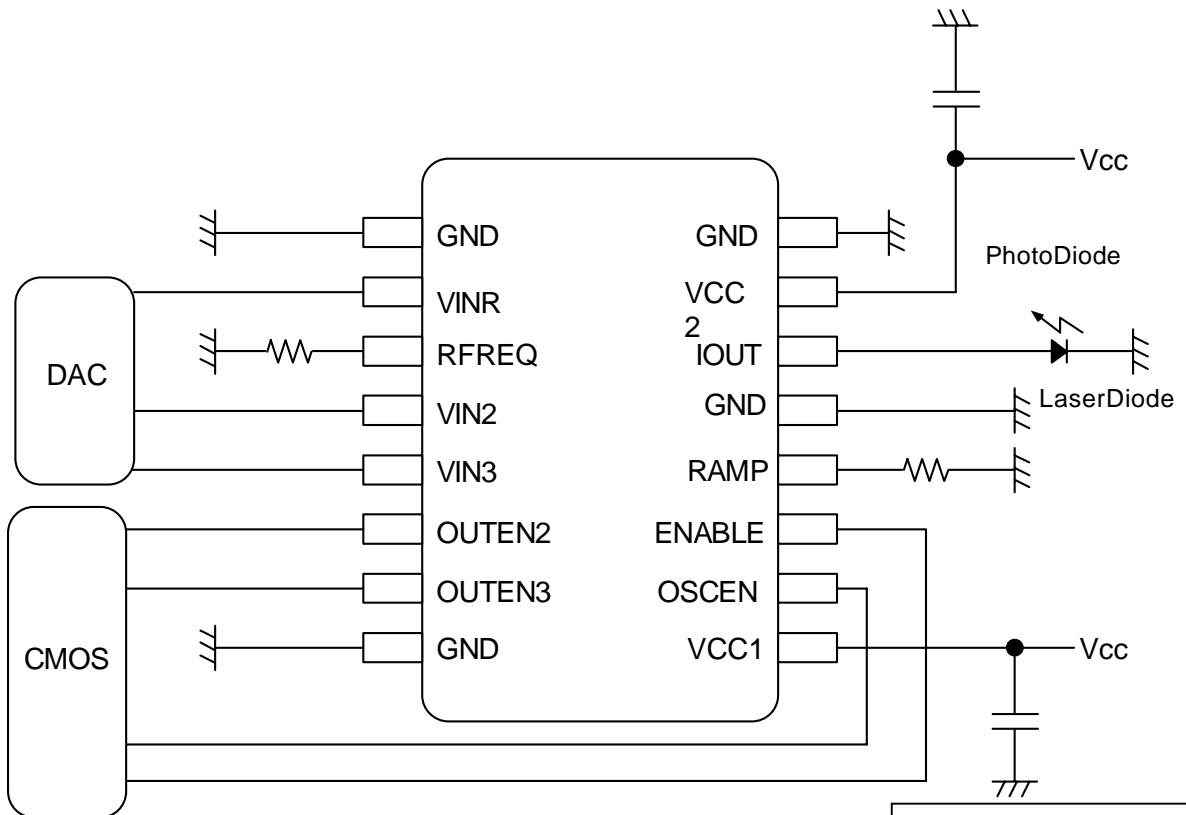


NJW4702

TEST CIRCUIT



APPLICATION CIRCUIT



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