STRUCTURE : Silicon Monolithic Integrated Circuit

PRODUCT SERIES : High Frequency Modulation IC for Semiconductor Laser

TYPE : BU7680G

PACKAGE OUTLINES : Figure.1 (Plastic Mold)

BLOCK DIAGRAM : Figure.2

APPLICATION : Figure.3

TEST CIRCUIT : Figure.4

◎FUNCTION : ○High frequency modulation IC for 2λ semiconductor laser (cathode common type).

○Adjustable modulation frequency from 250MHz to 500MHz (common to 2 outputs).

○Adjustable modulation amplitude from 0mA to 100mA (common to 2 outputs).

○Built-in power save circuit. Holding down circuit current when saving power (0.75mA(Typ.)).

◎ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Limits	Unit
Power supply voltage	VDD	7	V
Modulation amplitude	AMP	120	mApp
Power dissipation	Pd	370 #	mW
Operating temperature range	Topr	-35~85	℃
Storage temperature range	Tstg	-55~125	℃

PCB (70mm×70mm×1.6mm glass epoxy) mounting.
Reduce power by 3.7mW for each degree above Ta=25℃.

◎RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	VDD	4.5	5.0	5.5	V

Application example
The application circuit is recommended for use. Make sure to confirm the adequacy of the characteristics.
When using the circuit with changes to the external circuit constants, make sure to leave an adequate margin for external components including static and transitional characteristics as well as dispersion of the IC.
Note that ROHM cannot provide adequate confirmation of patents.

The product described in this specification is designed to be used with ordinary electronic equipment or devices (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys).
Should you intend to use this product with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

ROHM assumes no responsibility for use of any circuits described herein, conveys no license under any patent or other right, and makes no representations that the circuits are free from patent infringement.

DESIGN	CHECK	APPROVAL	DATE : Oct./22/'03	SPECIFICATION No. : TSZ02201-BU7680G-1-2
21 Oct/22/'03		24/Oct/'03	REV. A	ROHM CO., LTD.

◎ELECTRICAL CHARACTERISTICS
(Unless otherwise noted, Ta=25℃, VDD=5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	Circuit
Circuit current							
Circuit current when saving power	IDD-PS	0.40	0.75	1.10	mA	VLDO1=VLDO2=0V or 2V Rfreq=12kΩ, Ramp=15kΩ	Fig.4
Circuit current when driving	IDD-DRV	15.0	21.5	28.0	mA	VLDO1(2)=2V, VLDO2(1)=0V Rfreq=12kΩ, Ramp=15kΩ	Fig.4
Oscillator block							
Modulation frequency	FREQ	250	—	500	MHz		Fig.4
Setting range of external resistor to adjust modulation frequency	RFREQ	3.3	—	—	kΩ		Fig.4
Setting error of modulation frequency	FERR	-10	0	10	%		Fig.4
Delay time of oscillation when turning power supply on	TVDD-ON	—	—	5	μsec	VLDO1(2)=2V, VLDO2(1)=0V Rise time of VFREQ when VDD=0V→5V	Fig.4
Driver block							
Modulation amplitude	AMP	0	—	100	mApp		Fig.4
Setting range of external resistor to adjust modulation amplitude	RAMP	5.6	—	—	kΩ		Fig.4
Setting error of modulation amplitude	AERR	-10	0	10	%		Fig.4
Output offset current 1	IOFF1	-7.5	-5.0	-2.5	mA	VLDO1=2V, VLDO2=0V Rfreq=12kΩ, Ramp=27kΩ	Fig.4
Output offset current 2	IOFF2	-8.4	-5.9	-3.4	mA	VLDO1=0V, VLDO2=2V Rfreq=12kΩ, Ramp=27kΩ	Fig.4
Power Save block							
Threshold voltage when power save ON	VTH	1.05	1.20	1.35	V	VLDO2(1)=0V VLDO1(2) when VFREQ='H'→'L'	Fig.4
Start time of oscillation	TPS-OFF	—	—	5	μsec	VLDO2(1)=0V Rise time of VFREQ when VLDO=0V→2V	Fig.4
Stop time of oscillation	TPS-ON	—	—	5	μsec	VLDO2(1)=0V Fall time of VFREQ when VLDO=2V→0V	Fig.4

Note : Output terminal is high impedance when saving power (VLDO1,2<1.2V(Typ.)).
＊This product is not designed for protection against radioactive rays.

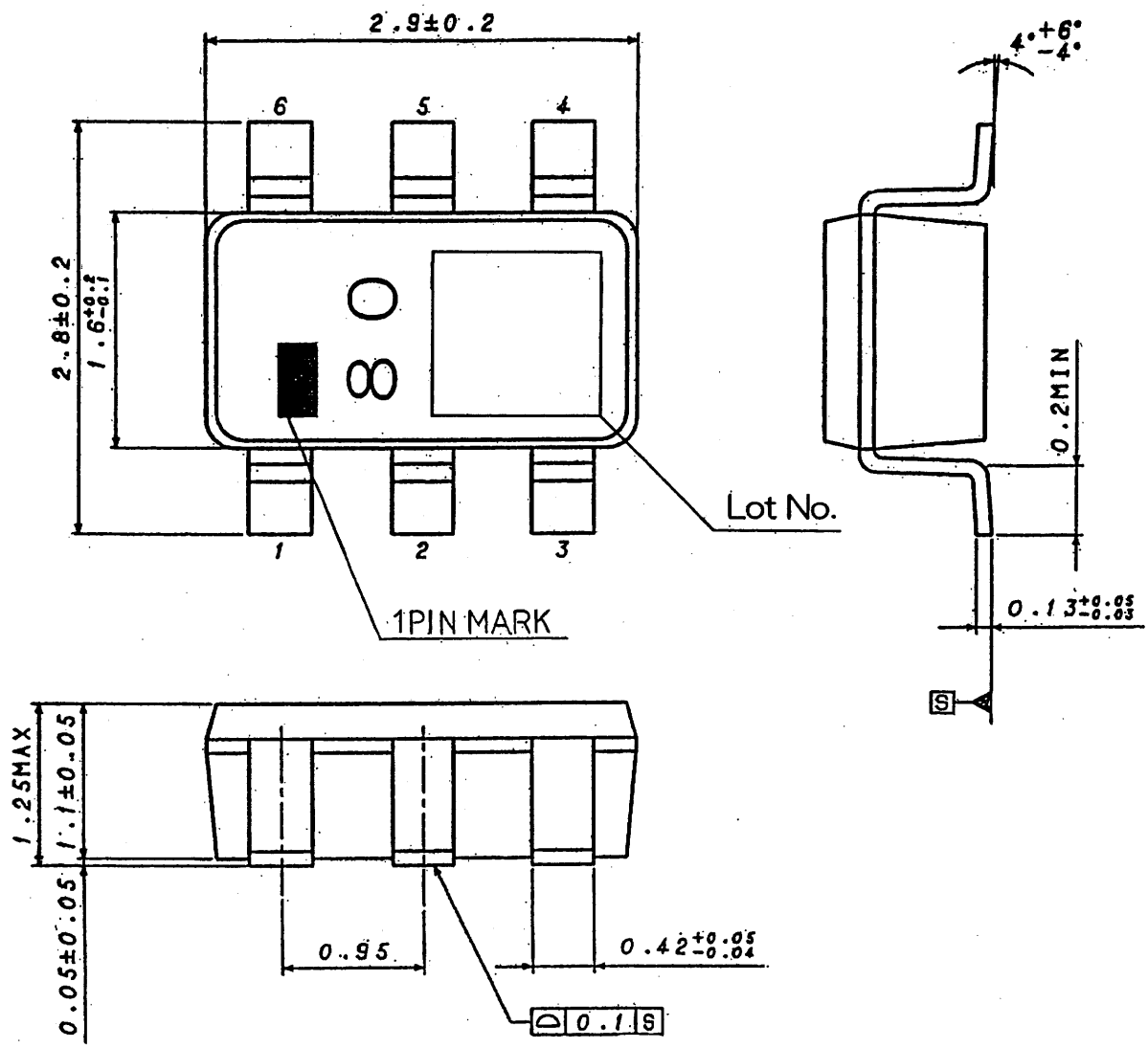


Fig.1 PACKAGE OUTLINES

(UNIT : mm)

Figure No : EX-103-5001

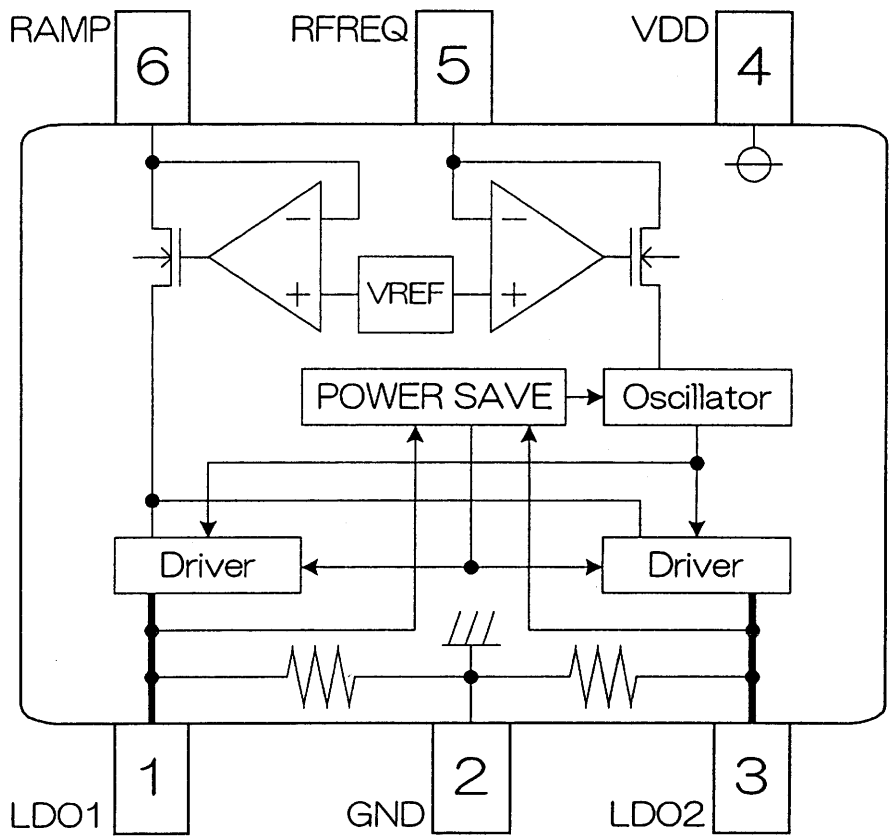
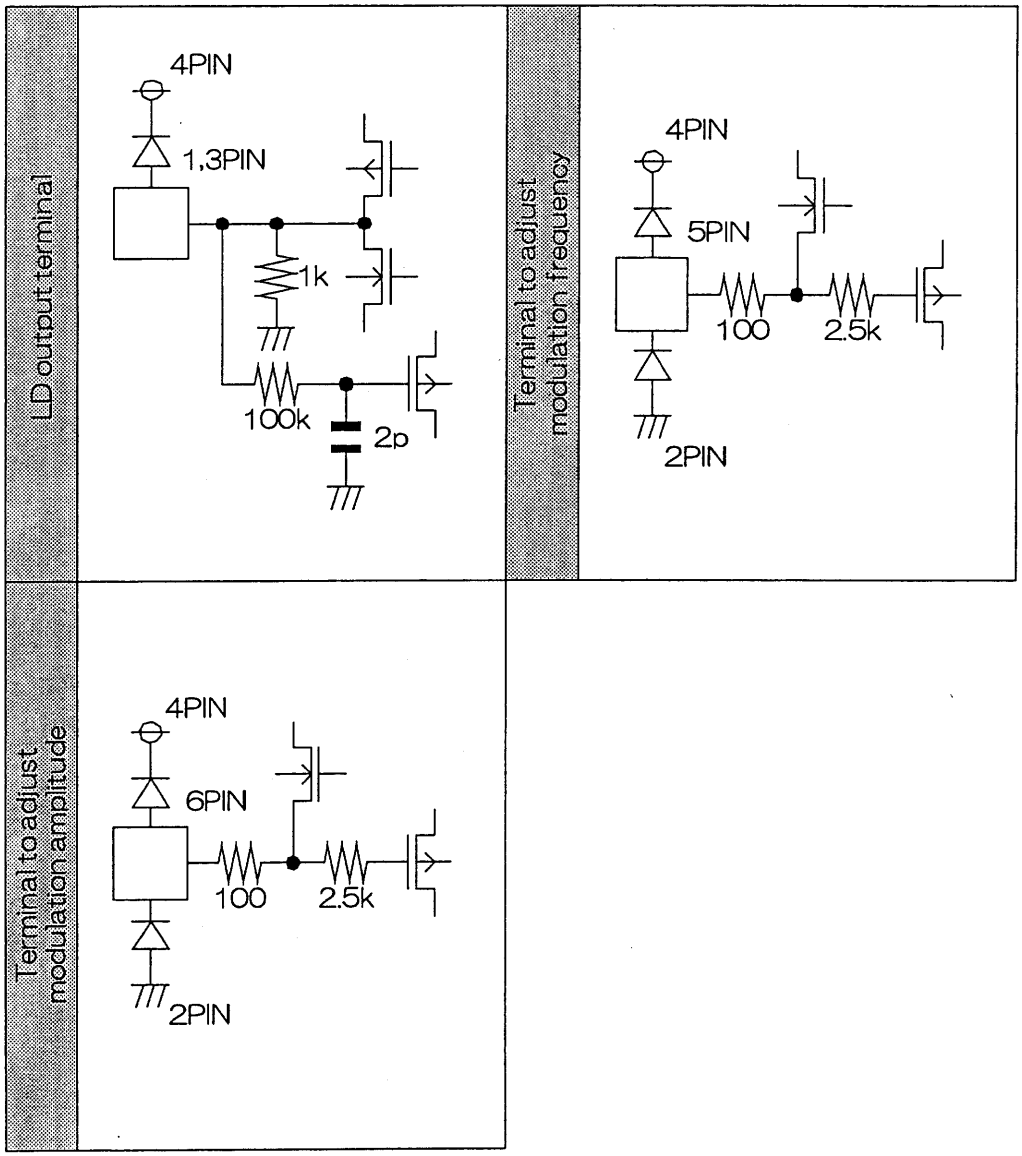


Fig.2 Block diagram

◎Terminal Description

No.	Symbol	Description	No.	Symbol	Description
1	LDO1	LD output terminal 1	4	VDD	Power supply terminal
2	GND	GND terminal	5	RFREQ	Terminal to adjust modulation frequency
3	LDO2	LD output terminal 2	6	RAMP	Terminal to adjust modulation amplitude

©Equivalent circuit for terminal



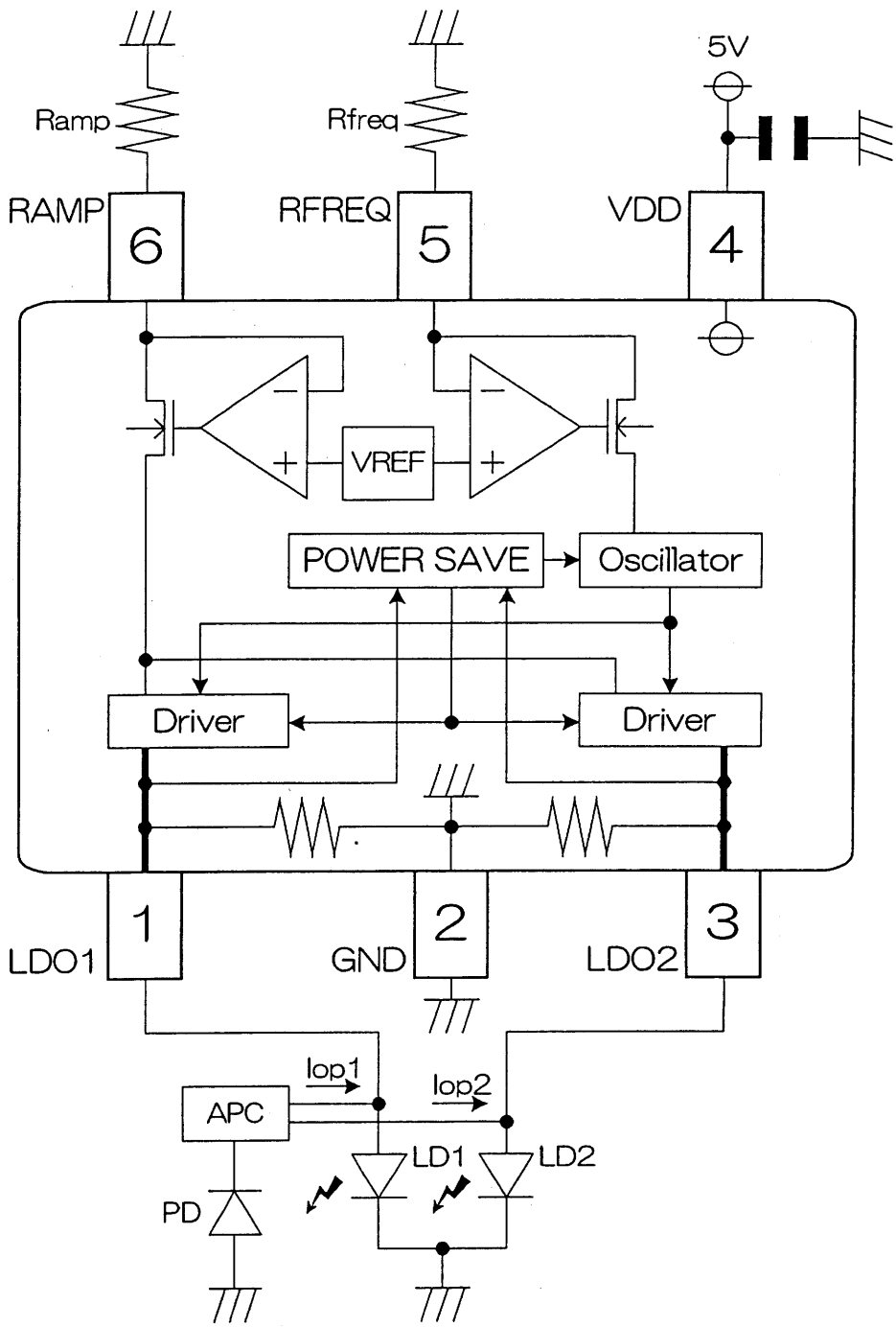


Fig.3 Application circuit

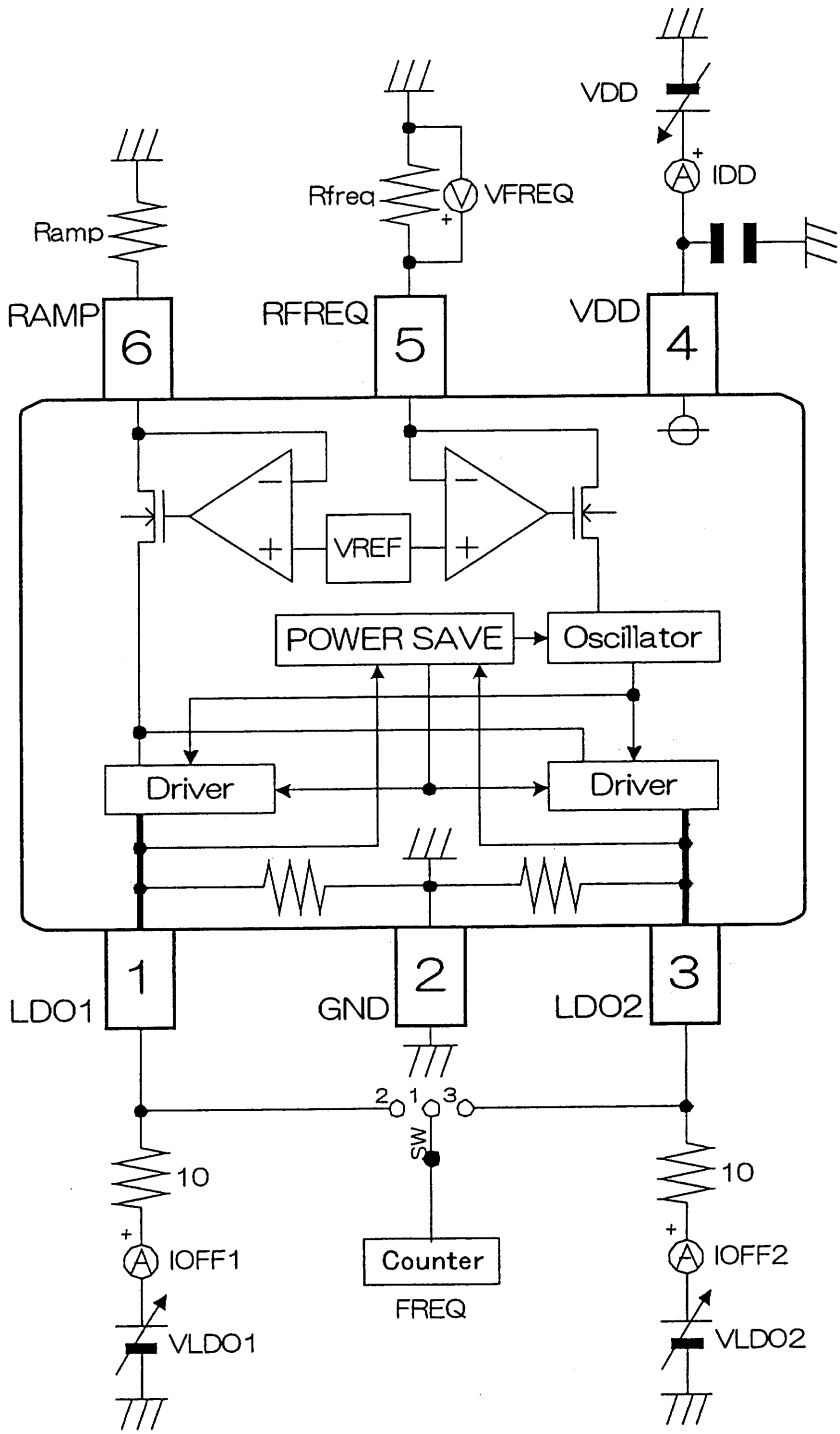


Fig.4 Test circuit

©Switch table for test circuit

Parameter	Switch	Input			Condition	Measurement point
	SW	VDD	VLDO1	VLDO2		
Circuit current						
Circuit current when saving power	1	5V	0V(2V)	0V(2V)	Rfreq=12kΩ Ramp=15kΩ	IDD
Circuit current when driving	↓	↓	2V(0V)	0V(2V)	↓	↓
Oscillator block						
Modulation frequency	2(3)	5V	2V(0V)	0V(2V)		FREQ
Setting error of modulation frequency	↓	↓	↓	↓		↓
Delay time of oscillation when turning power supply on	1	0V→ 5V	↓	↓	Rfreq=12kΩ Ramp=15kΩ	VFREQ
Driver block						
Modulation amplitude	1	5V	2V(0V)	0V(2V)		IDD
Setting error of modulation amplitude	↓	↓	↓	↓		↓
Output offset current 1/2	↓	↓	2V/0V	0V/2V	Rfreq=12kΩ Ramp=27kΩ	IOFF1/2
Power Save block						
Threshold voltage when power save ON	1	5V	SWEEP (0V)	0V (SWEEP)	Rfreq=12kΩ Ramp=15kΩ	VFREQ
Start time of oscillation	↓	↓	0V→2V (0V)	0V (0V→2V)	↓	↓
Stop time of oscillation	↓	↓	2V→0V (0V)	0V (2V→0V)	↓	↓

◎Functional Description

1. High frequency modulation function
   - Modulating high frequency current in order to control noise for LD.
   - Setting modulation frequency and amplitude voluntarily by external resistor Rfreq and Ramp (common to 2 outputs).

2. Power save function
   - In case both LDO1 terminal (pin1) and LDO2 terminal (pin3) are less than 1.2V(Typ.)
     ···Oscillator stops the operation, circuit consumes low power (power save mode).
   - In case LDO1 terminal is 1.2V(Typ.) or more, and LDO2 terminal is less than 1.2V(Typ.)
     ···LDO1 oscillates.
   - In case LDO1 terminal is less than 1.2V(Typ.), and LDO2 terminal is 1.2V(Typ.) or more
     ···LDO2 oscillates.
   - In case both LDO1 terminal and LDO2 terminal are 1.2V(Typ.) or more
     ···In order to protect LD, circuit operates on power save mode.

◎Cautions in using the IC

1. Bypass capacitor
   Connect bypass capacitor close by the pin of this IC in the space between the power sources.

2. Short circuit
   Be careful not to cause a short circuit between output pin and VDD. Also, pay attention to the normal direction of the IC when mounting the IC on the board. If mounted in the opposite direction, the IC could be damaged and may smoke as the case may be.

3. Noise measures(recommendation)
   Not to leak high frequency current out, recommend to connect chip bead of high impedance in wide range and capacitor of high resonant frequency in VDD line, APC current line of LD and monitor current line of LD, bypass high frequency current to ground by those decoupling effect. Also, there is possible to connect chip bead in GND line by environment, consider characteristics.

4. As to power save function
   In case GND of LD and GND of IC are common, it might influence threshold voltage when power save ON by the pattern on the board and modulation amplifier setting. As measures, recommend to connect bypass capacitor to the root of the pin of this IC or to evade GND pattern.
   Also, in case power save function does not operate, there is a method to improve by connecting resistor to pull down in LD output terminal, consider characteristics.