■Description

The WD9247 is an ultra-sensitive Hall-effect switch with digital latched output, mainly designed for battery operation, handheld equipments.

Special CMOS process is used for low-voltage and low-power requirement. A chopper stabilized amplifier improves stability of magnetic switch points. A sleep-awake logic controls the IC in sleep time or awake time. This function will reduce the average operating current of the IC. During the awake time, the output is changed with the magnetic flux density. During the sleep time, the output is latched in its previous state and the current consumption will reduce to some μA.

The IC switching behaviour is omnipolar, either north or south pole sufficient strength will turn the output on. If the magnetic flux density is larger than operating point (B_{OP}), the output will be turned on; if it is less than releasing point (B_{RP}), the output will be turned off.

The WD9247 is available in TO-92S-3 and SOT-23-3 packages which are optimized for most applications.

■Features and Benefits

- Micropower Operation
- 2.5 to 5.5V Power Supply
- Switching for Both Poles of a Magnet (Omnipolar)
- Stabilized Chopper
- Superior Temperature Stability
- Digital Output Signal
- Open-drain Output
- ESD (HBM) 6000V

■Applications

- Cover Switch in Notebook PC/PDA
- Handheld Wireless Application Awake Switch
- Magnet Switch in Low Duty Cycle Applications

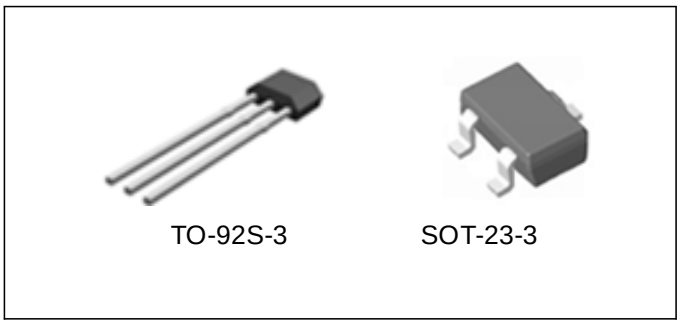
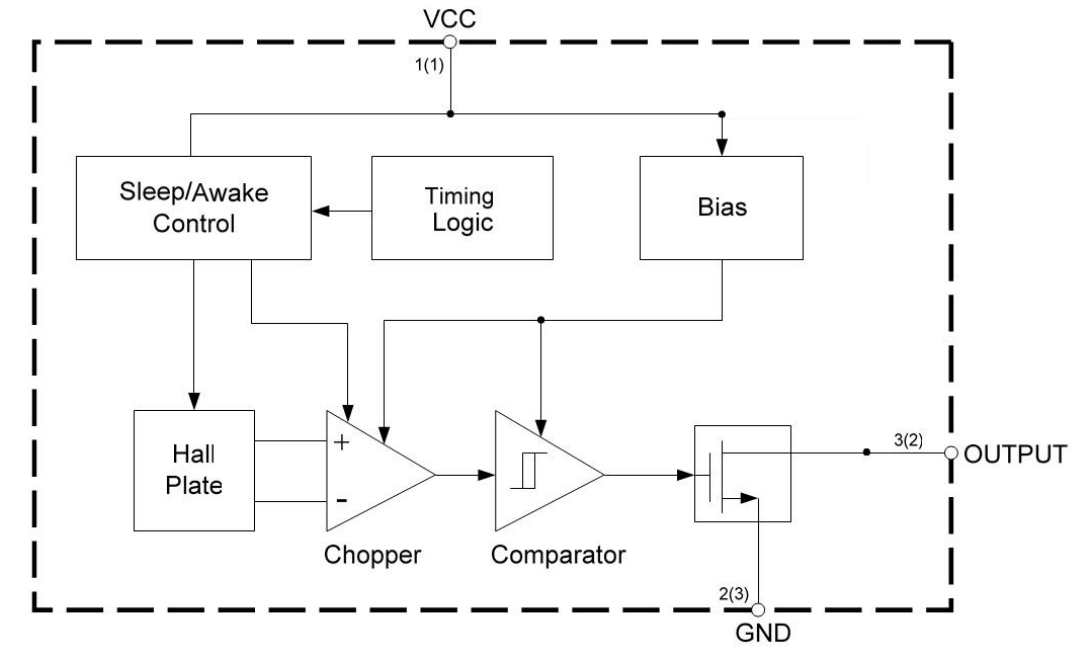


Figure 1. Package Types of WD9247

■Function Blocks

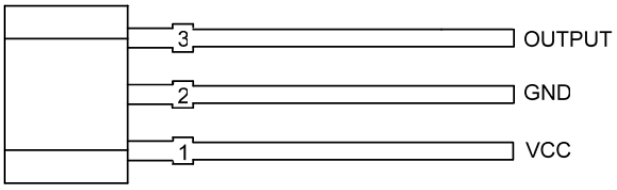


A (B):A for TO-92S-3;B for SOT-23-3.

Figure 2. Functional Block Diagram of WD9247

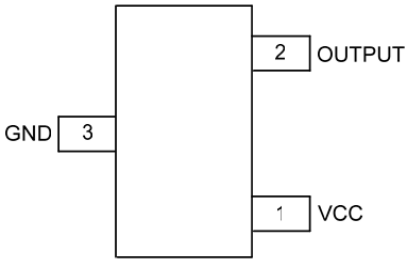
■Pin Descriptions

T3 Package (TO-92S-3)



(Front View)

N Package (SOT-23-3)



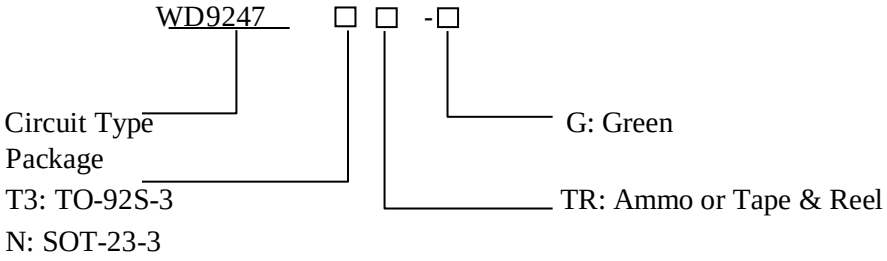
(Top View)

Figure 3. Pin Configuration of WD9247

■Pin Description

Pin Number		Pin Name	Function
TO-92S-3	SOT-23-3		
1	1	VCC	Power supply pin
2	3	GND	Ground pin
3	2	OUTPUT	Output pin

■Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
TO-92S-3	-40 to 85℃	WD9247T3-G	9247	Bulk
SOT-23-3		WD9247NTR-G	GX7	Tape & Reel

E-Push's Products with"G" suffix are available in green package. are RoHS compliant.

■Absolute Maximum Ratings (Ta= 25˚C, Note 1)

Parameter	Symbol	Value		Unit
Supply Voltage	V_{CC}	7		V
Supply Current (Fault)	I_{CC}	6		mA
Output Voltage	V_{OUT}	7		V
Output Current	I_{OUT}	2		mA
Magnetic Flux Density	B	Unlimited		Gauss
Power Dissipation	P_D	TO-92S-3	400	mW
		SOT-23-3	230	
Storage Temperature	T_{STG}	-55 to 150		℃
Junction Temperature	T_J	150		℃
ESD (Human Body Model) (Note 2)		6000		V
ESD (Machine Model) (Note 2)		600		V

Note 1: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Note 2: Electronic semiconductor products are sensitive to Electro Static Discharge (ESD). Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

■Recommended Operating Conditions (Ta= 25˚C)

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	2.5	5.5	V
Operating Temperature	T_{OP}	-40	85	℃

■ Electrical Characteristics

V_{CC}=3V, T_A=25 ℃, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage	V_{CC}	Operating	2.5	3	5.5	V
Supply Current	I_{AW}	Awake		1.8	3	mA
	I_{SL}	Sleep		4		μA
	I_{AVG}	Average		5	8	μA
Output Current	I_{OUT}				1.0	mA
Saturation Voltage	V_{SAT}	I_{OUT}=1.0mA			0.4	V
Awake Mode Time	t_{AW}	Operating		120		μs
Sleep Mode Time	t_{SL}	Operating		80	120	ms
Duty Cycle	D			0.15		%
Chopper Frequency	f_C			15		kHz

■ Magnetic Characteristics (Ta= 25˚C,Note 3)

V_{CC}=3V, T_A=25 ℃, unless otherwise specified. For TO-92S-3 Package

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating Point	B_{OPS}	South pole to branded side B>B_{OPS},V_{OUT}=low(output on)	15	30	55	Gauss
	B_{OPN}	North pole to branded side B>B_{OPN},V_{OUT}=low(output on)	-55	-30	-15	Gauss
Releasing Point	B_{RPS}	South pole to branded side B<B_{RPS},V_{OUT}=high(output off)	5	20	45	Gauss
	B_{RPN}	North pole to branded side B<B_{RPN},V_{OUT}=high(output off)	-45	-20	-5	Gauss
Hysteresis	B_{HYS}	$\lvert B_{OPX} - B_{RPX} \rvert$ (Note4)		10		Gauss

■ Magnetic Characteristics (Continued)

V_{CC}=3V, T_A=25 ℃, unless otherwise specified. For SOT-23-3 Packages

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating Point	B_{OPS}	South pole to branded side B>B_{OPS},V_{OUT}=low(output on)	20	30	40	Gauss
	B_{OPN}	North pole to branded side B>B_{OPN},V_{OUT}=low(output on)	-40	-30	-20	Gauss
Releasing Point	B_{RPS}	South pole to branded side B<B_{RPS},V_{OUT}=high(output off)	5	20	32	Gauss
	B_{RPN}	North pole to branded side B<B_{RPN},V_{OUT}=high(output off)	-32	-20	-5	Gauss
Hysteresis	B_{HYS}	| B_{OPX} - B_{RPX} | (Note4)		10		Gauss

Note 3: The specifications stated here are guaranteed by design. 1 Gauss=0.1mT

Note 4: B_{OPX}=operating point (output turns on); B_{RPX}=releasing point (output turns off)

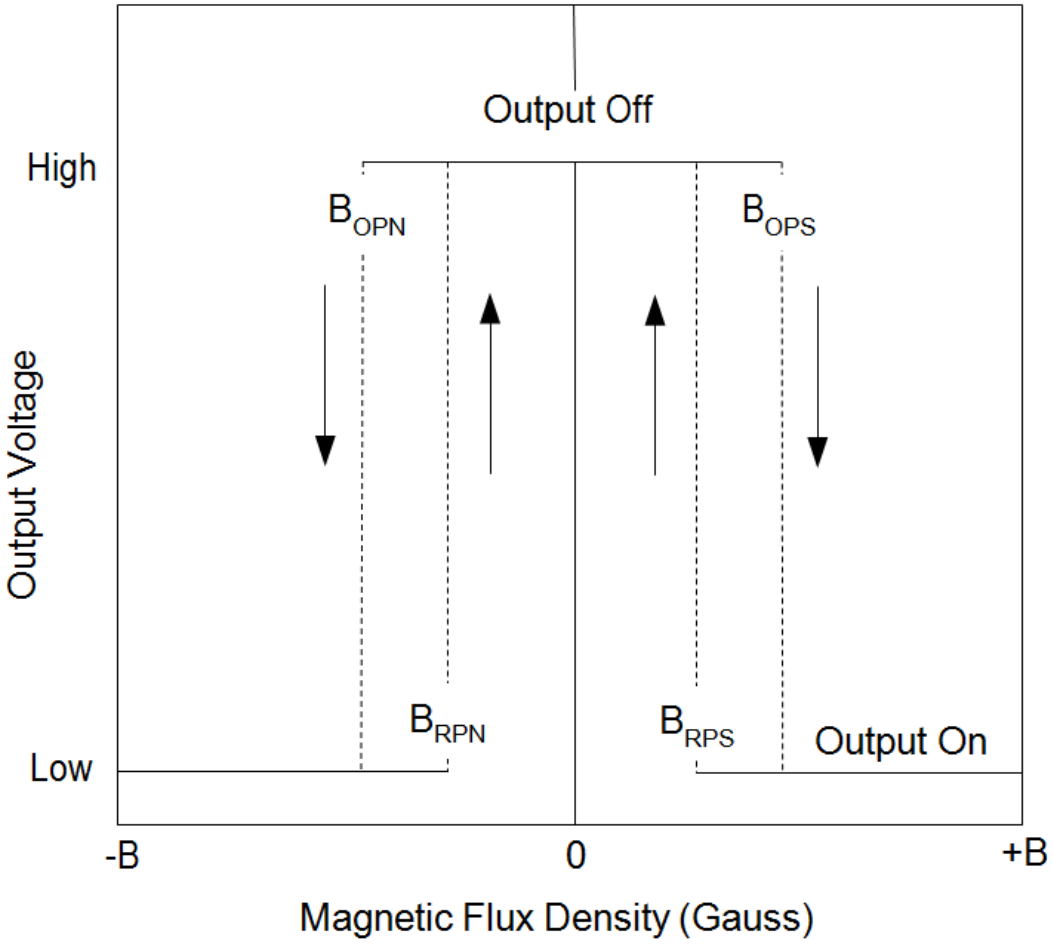


Figure 4. Output Voltage vs. Magnetic Flux Density

■ Test Circuit

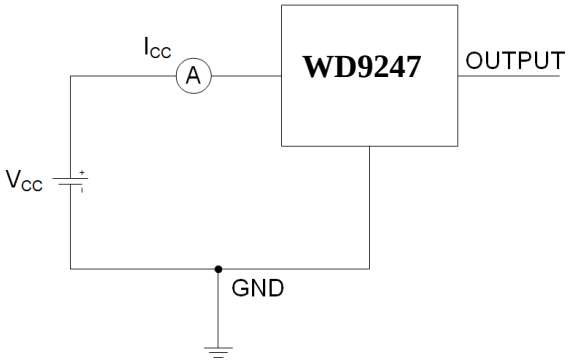


Figure 5. Average Supply Current (Note 5, Note 6)

Note 5: I_{CC} represents the average supply current. OUTPUT is open during measurement.
Note 6: The device is put under magnetic field with $B<B_{RP}$.

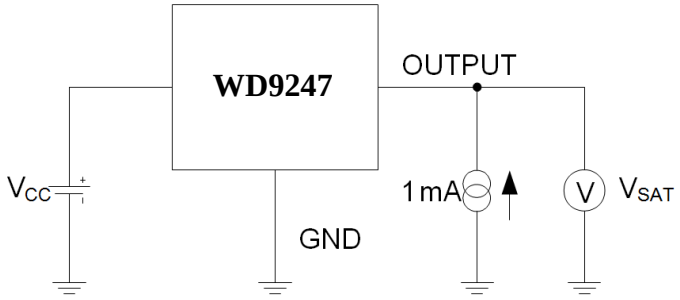


Figure 6. Output Saturation Voltage (Note 7, Note 8)

Note 7: The output saturation voltage V_{SAT} is measured at V_{CC}=2.5V and V_{CC}=5.5V
Note 8: The device is put under magnetic field with $B>B_{OP}$

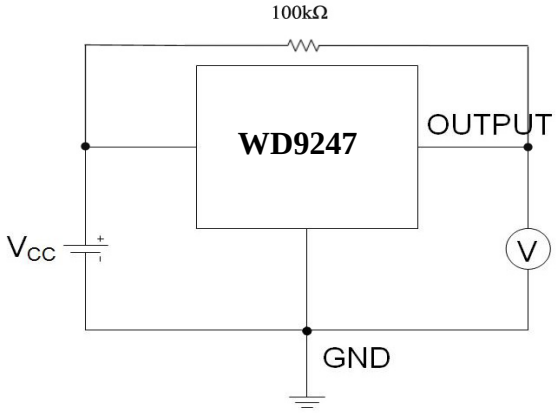


Figure 7. Magnetic Thresholds (Note 9, Note10)

Note 9: B_{OP} is determined by putting the device under magnetic field swept from $B_{RP(min)}$ to $B_{OP(max)}$ until the output is switched on.
Note 10: B_{RP} is determined by putting the device under magnetic field swept from $B_{OP(max)}$ to $B_{RP(min)}$ until the output is switched off.

■Typical Performance Characteristics

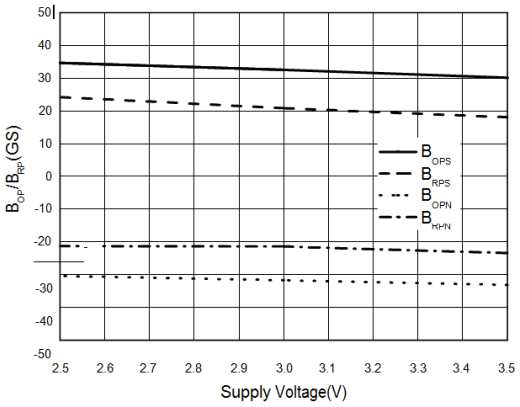


Figure 8. B_{OP}/B_{RP} vs. Supply Voltage

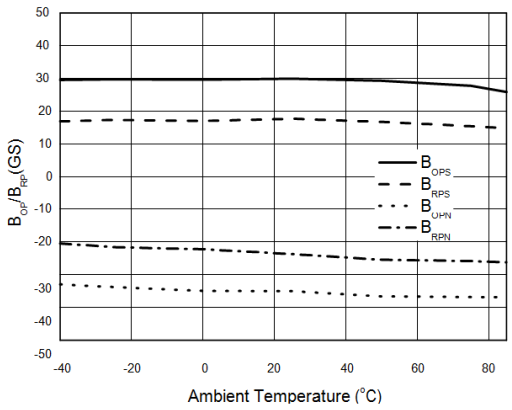


Figure 9. B_{OP}/B_{RP} vs. Ambient Temperature

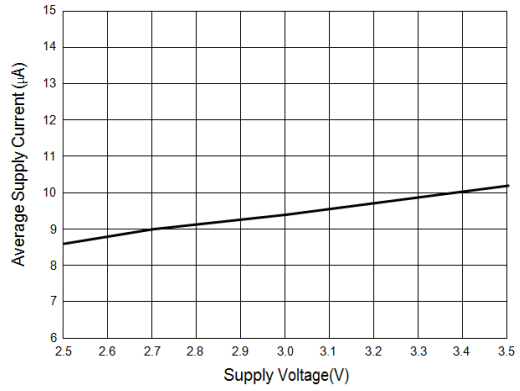


Figure 10. Average Supply Current vs. Supply Voltage

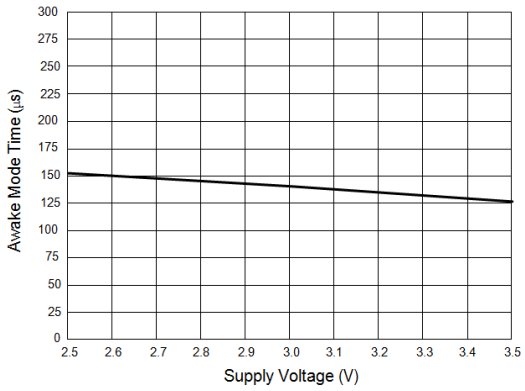


Figure 11. Awake Mode Time vs. Supply Voltage

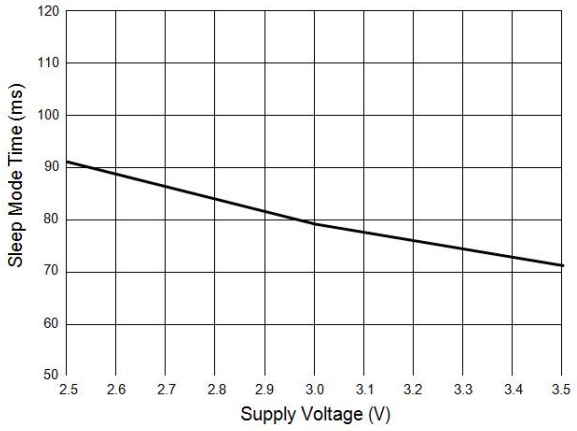


Figure 12. Sleep Mode Time vs. Supply Voltage

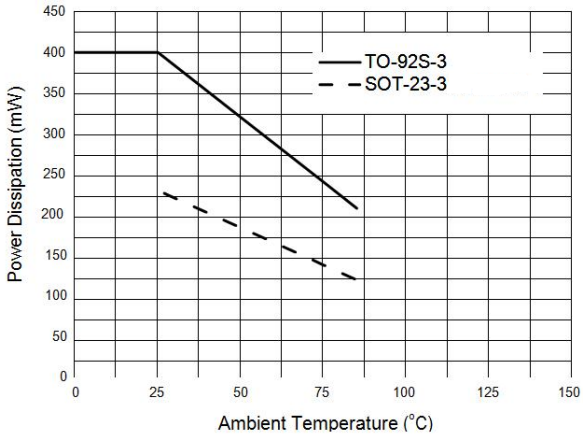


Figure 13. Power Dissipation vs. Ambient Temperature

■Typical Applications

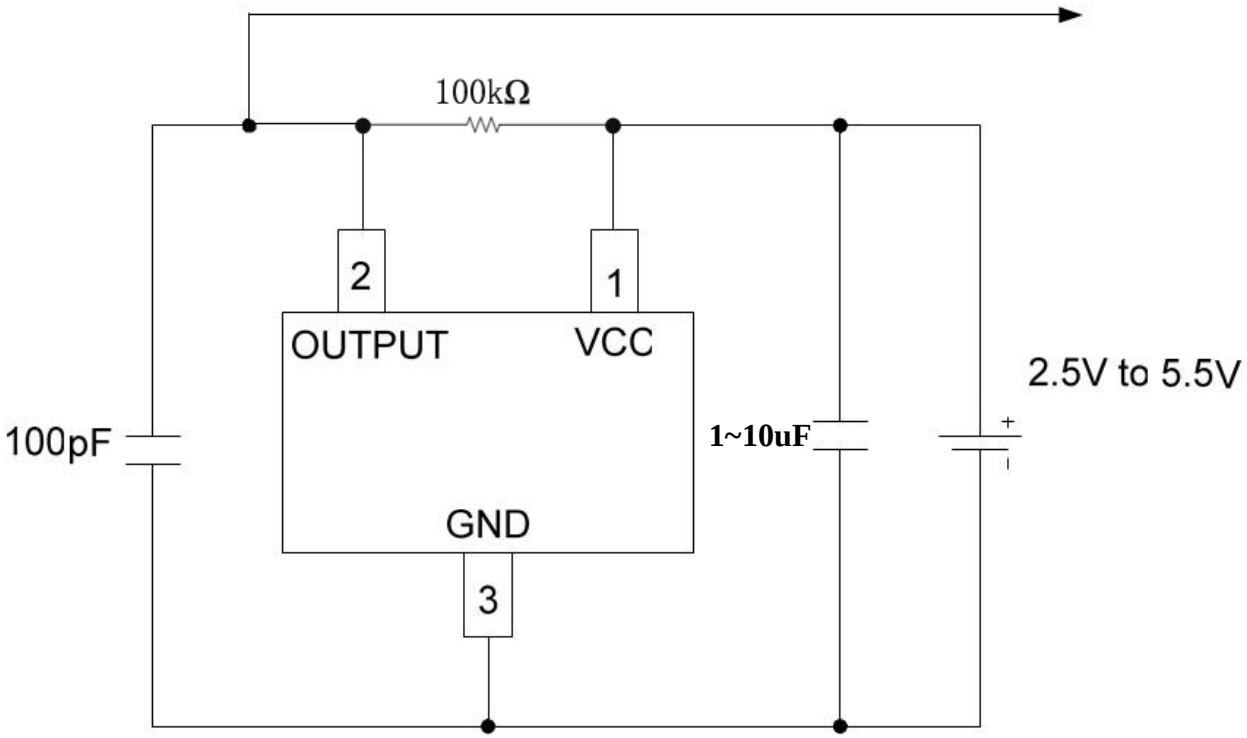
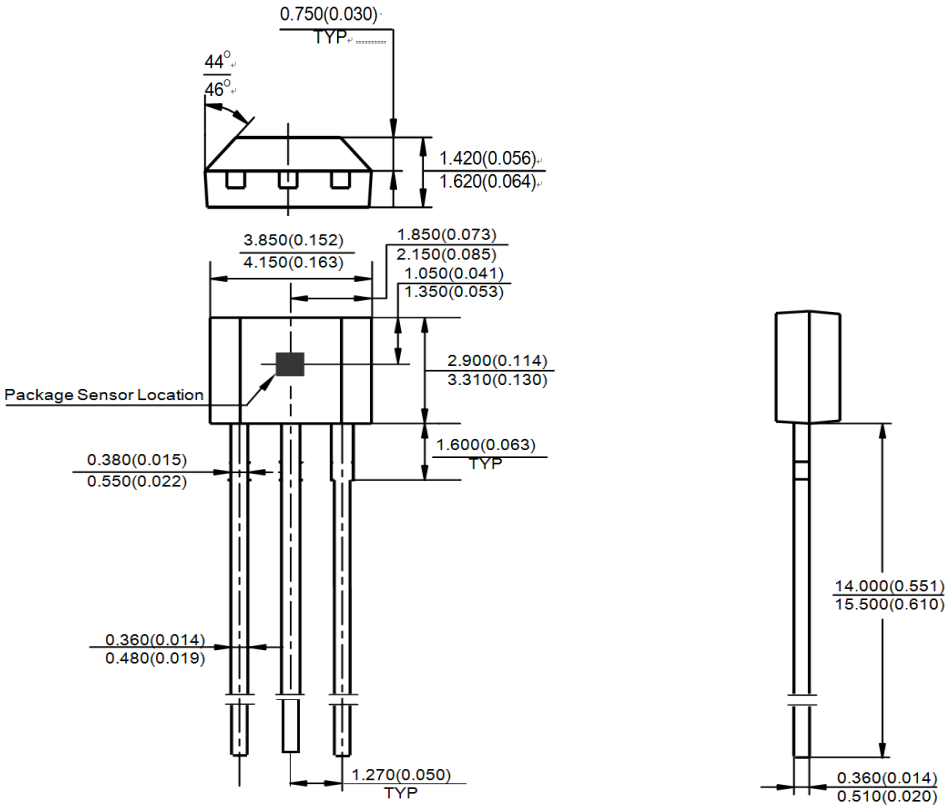


Figure 14. Typical Application Circuit of WD9247

Note 11: When WD9247 is used in the typical Vcc(3V), the smaller capacitors(0.1uF) can be used on Vcc When WD9247 is used in the higher Vcc(5V), the larger capacitors(1~10uF) need be used according the actual situation

Mechanical Dimensions

TO-92S-3 **Unit: mm(inch)**



SOT-23-3 **Unit: mm(inch)**