

CYL60X Linear Hall Effect Sensor ICs

The CYL60X Series are high performance small versatile linear Hall Effect devices which are operated by the magnetic field from a permanent magnet or an electromagnet. The ratio metric output voltage is set by the supply voltage and varies in proportion to the strength of the magnetic field. The CYL60X family has a quiescent output voltage that is 50% of the supply voltage and output sensitivity options from 1.2mV/G to 5.0mV/G. The integrated circuitry provides increased temperature stability and sensitivity. The CYL60X provides high accuracy and temperature compensation. These linear position sensors have an operating temperature range of -40°C to +150°C, appropriate for industrial and automotive environments. They respond to either positive or negative magnetic field, monitoring either or both magnetic poles. The sensor is available in 2 package styles, which are TO92 and SOT23.

Features

- 3.0 to 12.0 V operation
- Single current sourcing or current sinking output
- Precise sensitivity and temperature compensation
- Power consumption of 5mA at 5 VDC for energy efficiency
- Output voltage proportional to magnetic flux density
- Temperature range of -40°C to 150°C
- Highest ESD performance up to ± 4 kV
- Robust EMC protection
- React differently to the Antarctic and Arctic magnetic fields

Applications

- Current sensing
- Position sensing
- Magnetic code reading
- Motor control
- Weight and liquid level sensing
- Motion detection
- Proximity detection
- Speed detection

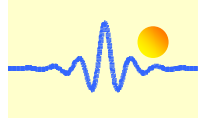
Absolute Maximum Ratings

Supply Voltage V_{DD}	15V
Supply Current I_{DD}	10mA
Output Sink Current, I_{OUT}	5mA
Operating Temperature Range, T_A	-40°C ~ +150°C
Storage Temperature Range, T_S	-40°C ~ +165°C
Maximum Junction Temperature, T_J	165°C

ESD Protection

Human Body Model (HBM) tests according to: standard EIA/JESD22-A114-B HBM

Parameter	Symbol	Min.	Max.	Unit
HBM ESD stress voltage	V_{ESD}	-4000	4000	V



Electrical Specifications

DC Operating Parameters $T_A = 25^\circ\text{C}$, $V_{DD} = 5\text{V}$ (unless otherwise specified)

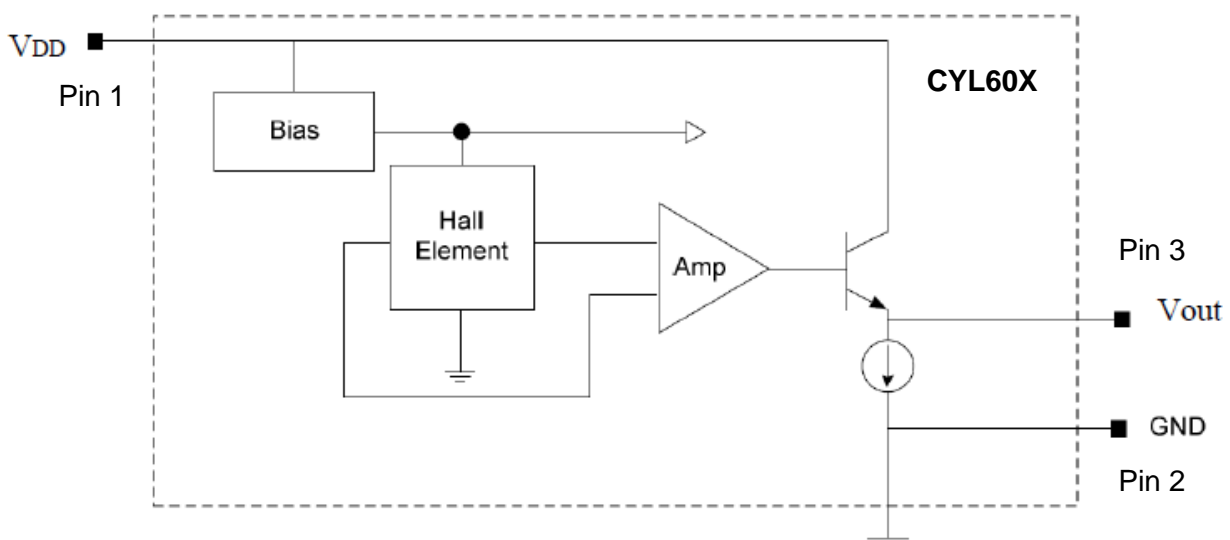
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage	V_{DD}	Operating	3.0	5.0	12	V
Supply Current	I_{DD}	$V_{DD} = 5\text{V}$, $T_A = 25^\circ\text{C}$	3.0	5.0	8.0	mA
Quiescent Output Voltage	V_{null}	$B = 0$, $T_A = 25^\circ\text{C}$, $V_{DD} = 5\text{V}$	2.25	2.5	2.75	V
Output Voltage	CYL601	$B = -1250\text{G} \sim 1250\text{G}$	1.0	2.5	4.0	V
	CYL602	$B = -600\text{G} \sim 600\text{G}$	1.0	2.5	4.0	V
	CYL603	$B = -460\text{G} \sim 460\text{G}$	1.0	2.5	4.0	V
	CYL605	$B = -300\text{G} \sim 300\text{G}$	1.0	2.5	4.0	V
Output Current	I_{out}	$B \rightarrow 0$			1.5	mA
Step response time	t_r	Output signal reaching 90%		3		μs
Output load resistance	R_L	$ \Delta V_{OUT} < 15\text{mV}$	200			k Ω
Frequency bandwidth (-3dB)	f_B		0	200	250	kHz

Magnetic Specifications

DC Operating Parameters $T_A = 25^\circ\text{C}$, $V_{DD} = 5\text{V}$ (unless otherwise specified)

Parameter	Symbol	Part Name	Min	Typ	Max	Units
Sensitivity	Sens	CYL601	0.9	1.2	1.5	mV/G
		CYL602	2.2	2.5	2.8	mV/G
		CYL603	2.95	3.25	3.55	mV/G
		CYL605	4.7	5.0	5.3	mV/G
Linearity	Lin	CYL60X Series			± 1.0	%
Thermal drift of zero offset		CYL60X Series		300		ppm/ $^\circ\text{C}$
Radiometry, V_{null}	V_{null} (V)	CYL60X Series			± 2.0	%

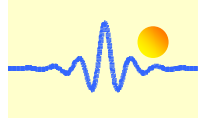
Functional Diagram



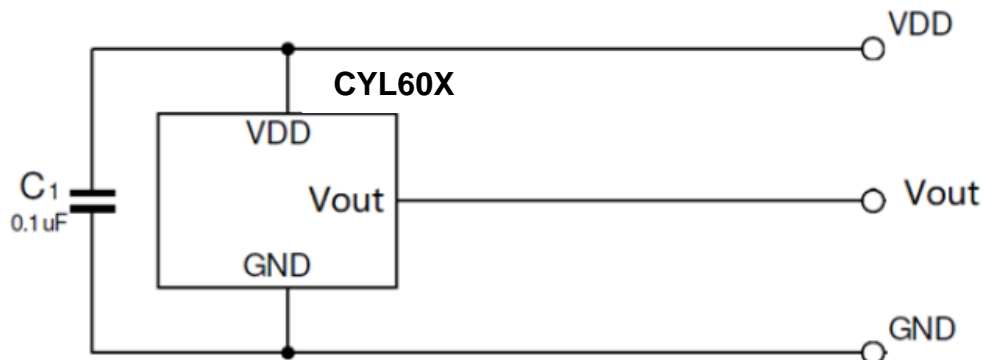
Pin 1: VDD (Voltage Supply),

Pin 2: GND (Ground),

Pin 3: Vout (Signal Output)



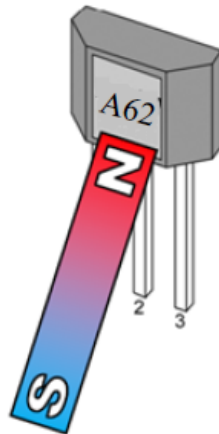
Typical Application Connection



Application example: VDD =5V

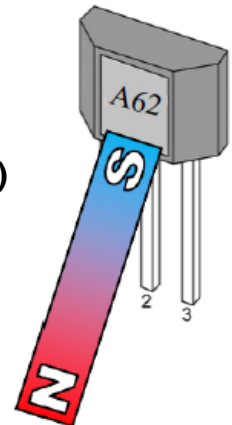
TO92S Package:

CYL601UA
CYL602UA
CYL603UA
CYL605UA



$V_{OUT} = 1.0 \text{ to } 2.5 \text{ V}$

TO92S (CYL602UA)



$V_{OUT} = 2.5 \text{ to } 4 \text{ V}$

SOT23 Package:

CYL601SU
CYL602SU
CYL603SU
CYL605SU



SOT23 (CYL602SU)

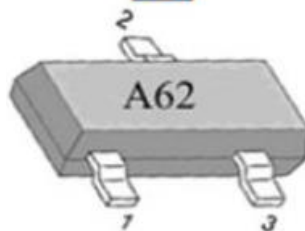


Marking:

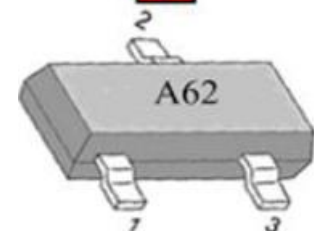
CYL601: A61
CYL602: A62
CYL603: A63
CYL605: A65

Pin Arrangement:

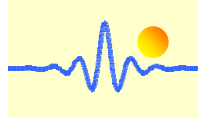
Pin 1: VDD (Voltage Supply)
Pin 2: GND (Ground)
Pin 3: Vout (Signal Output)



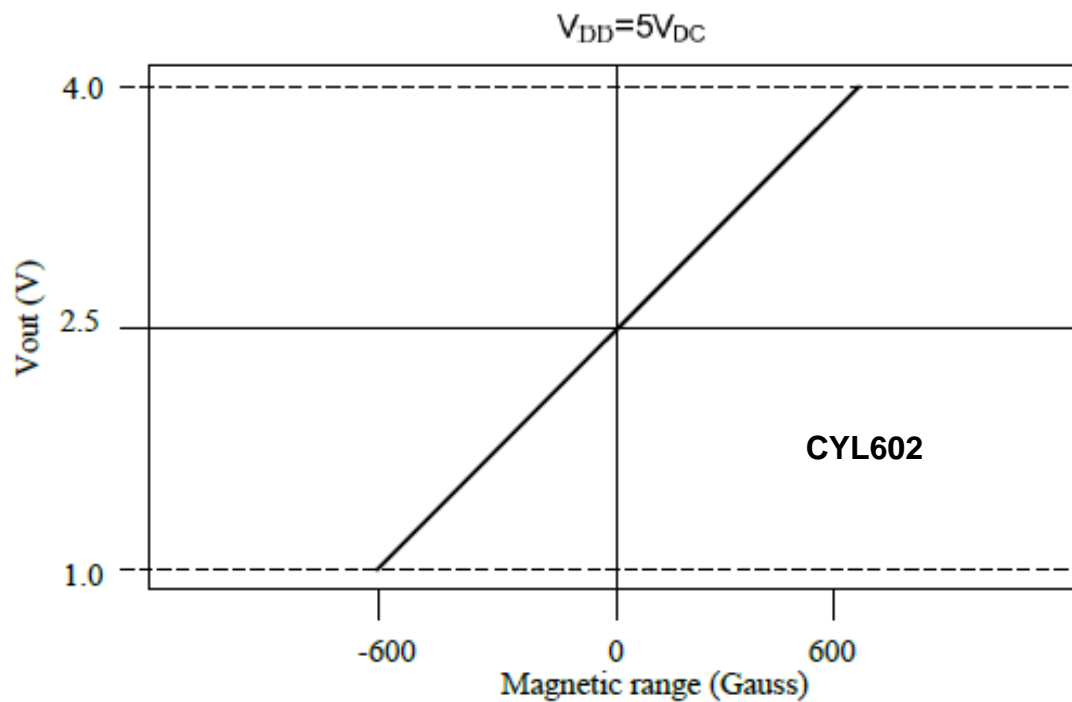
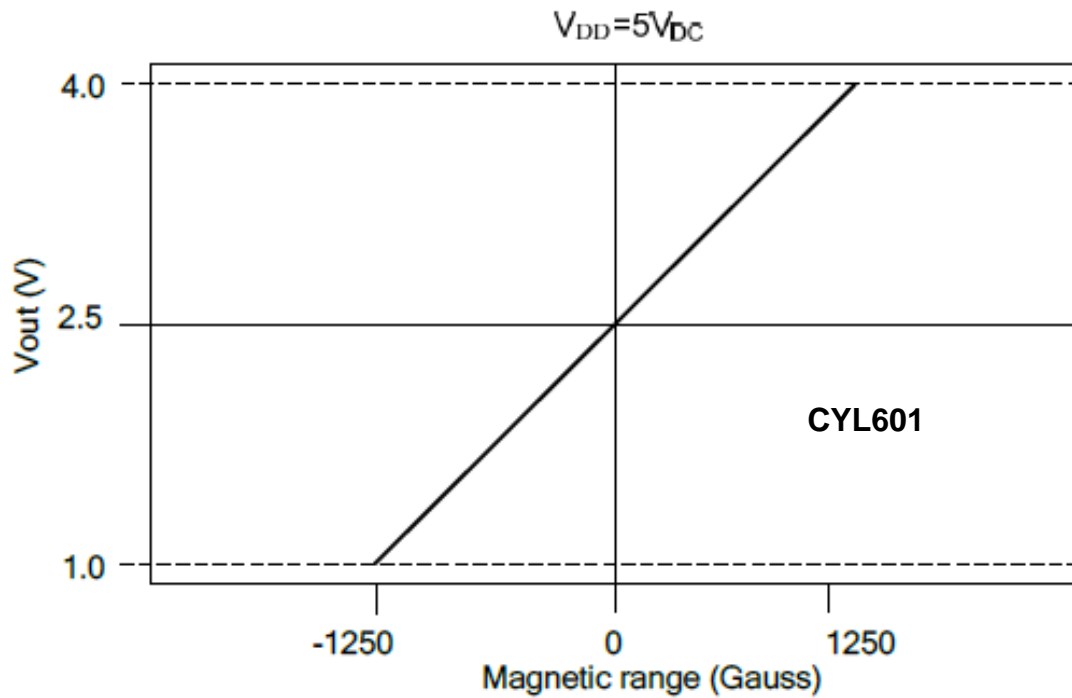
$V_{OUT} = 1.0 \text{ to } 2.5 \text{ V}$

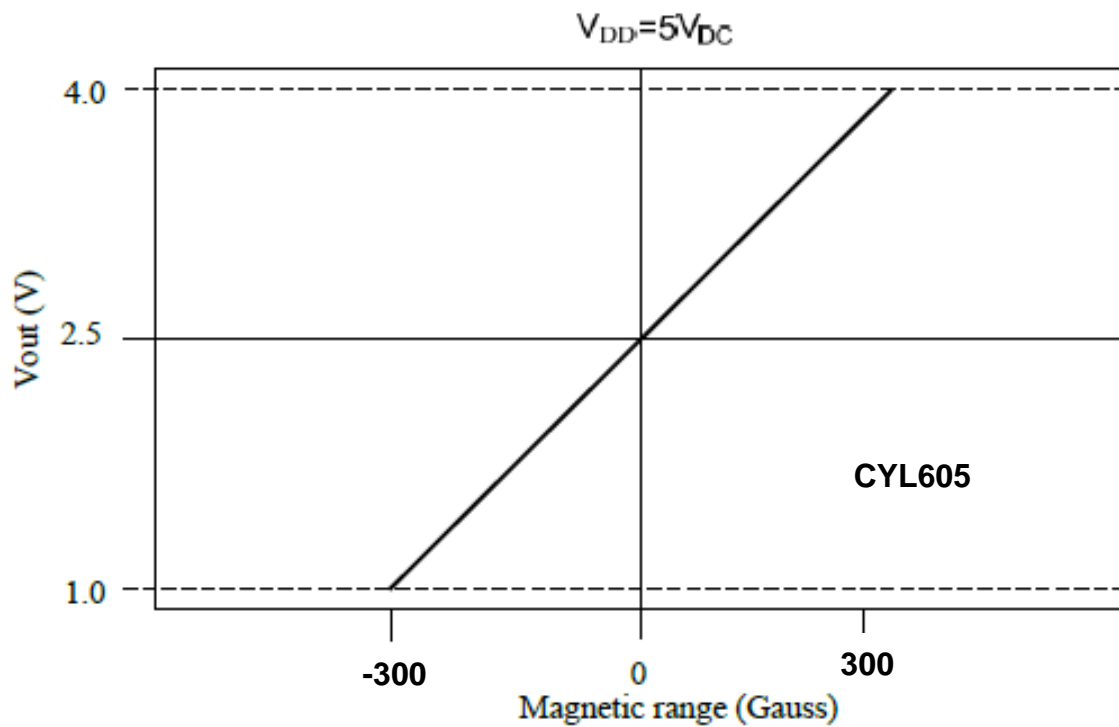
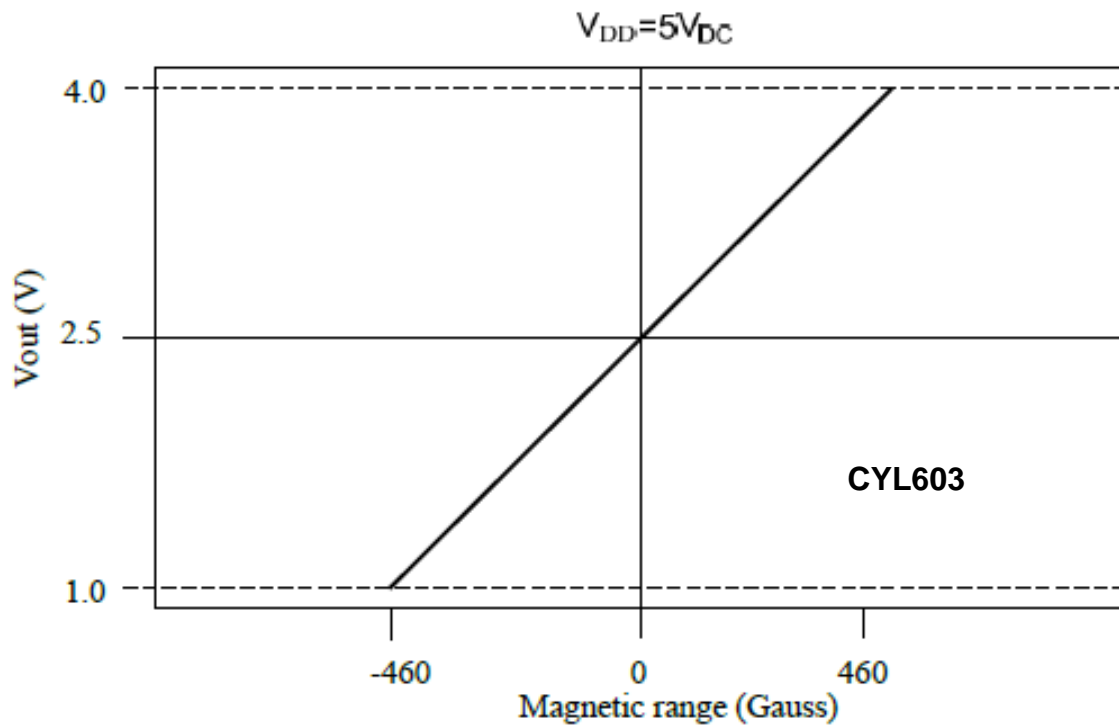
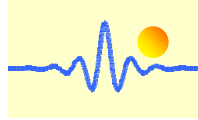


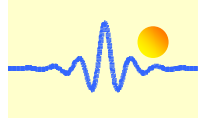
$V_{OUT} = 2.5 \text{ to } 4 \text{ V}$



Transfer Characteristics at $V_{DD}=5.0V_{DC}$

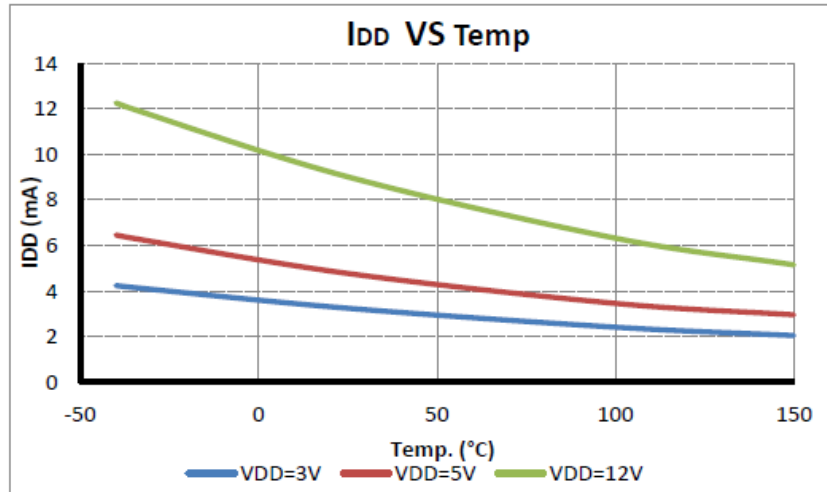




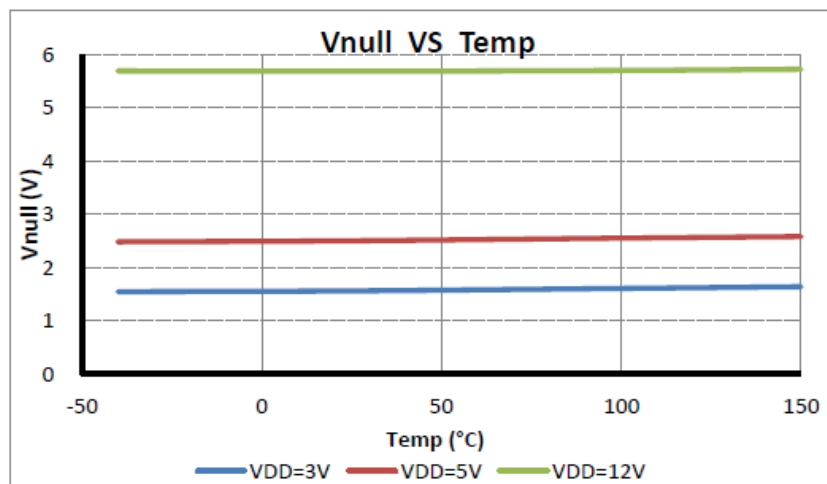


Typical characteristic Curves

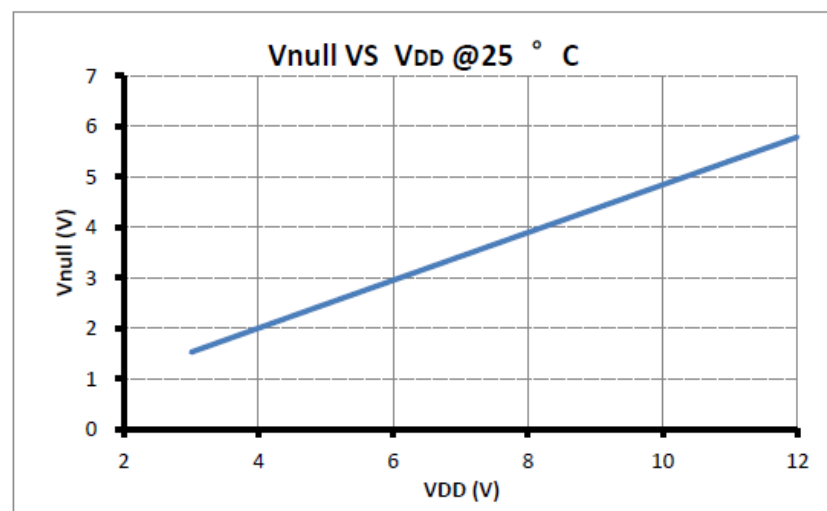
CYL601
CYL602
CYL603
CYL605

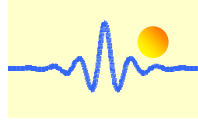


CYL601
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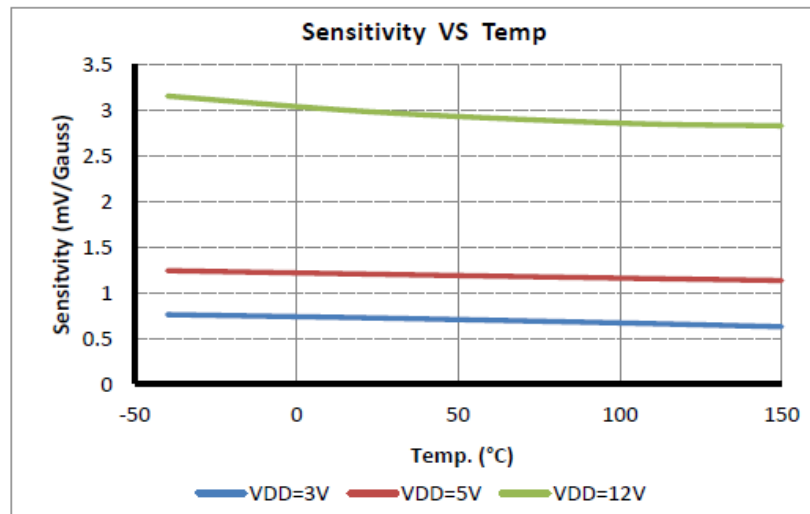


CYL601
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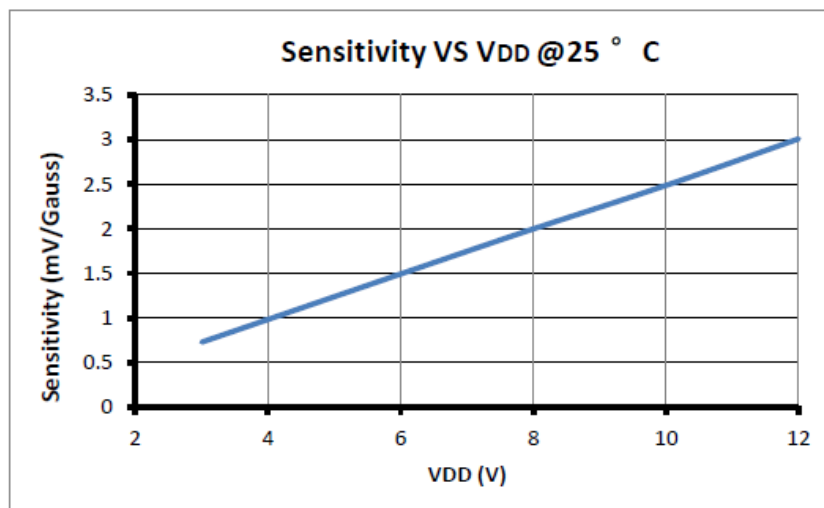




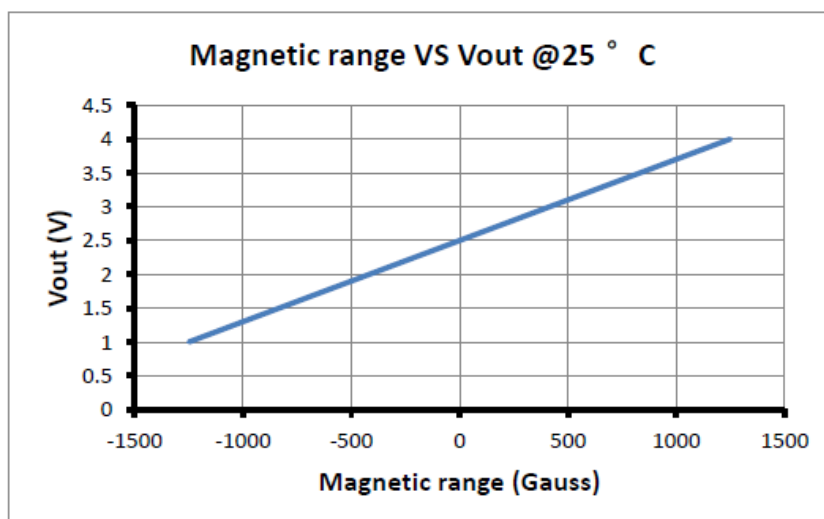
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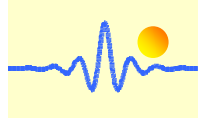


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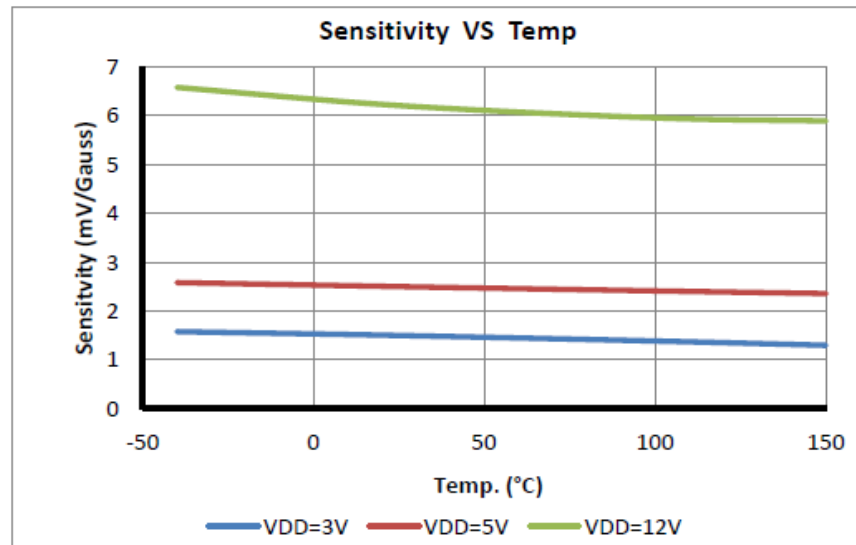


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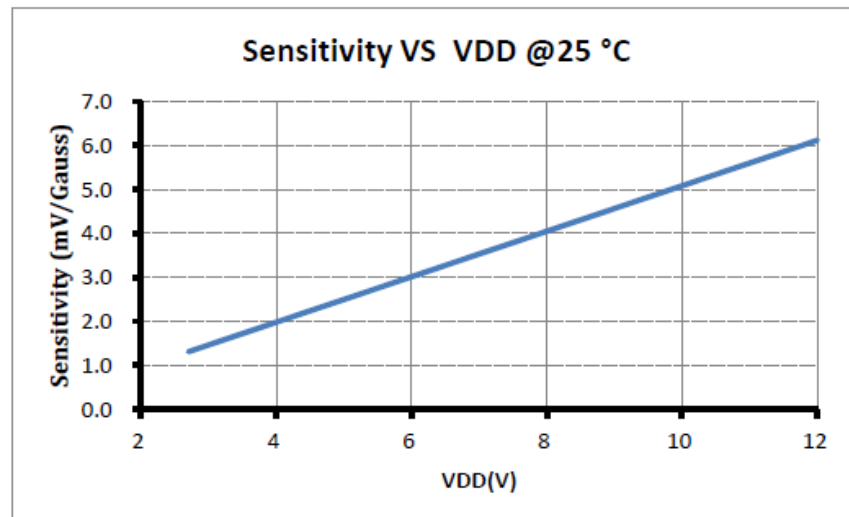




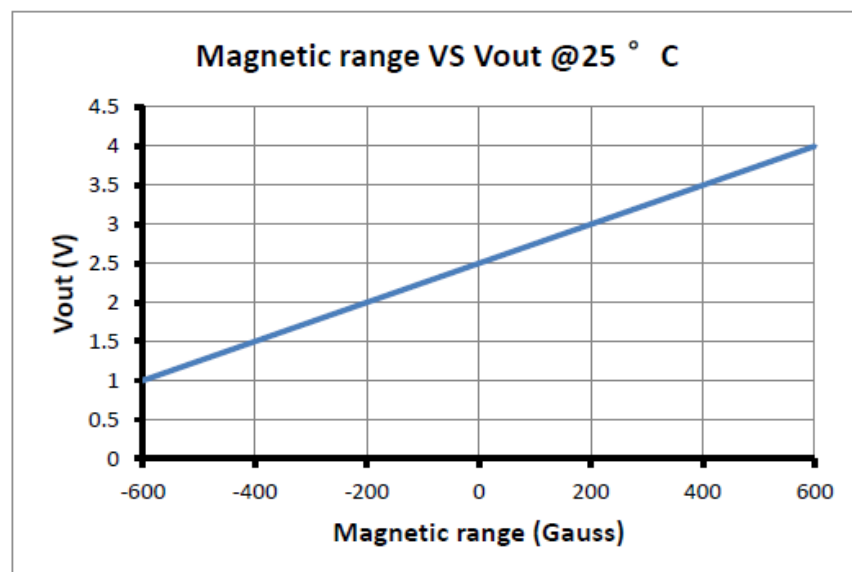
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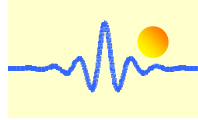


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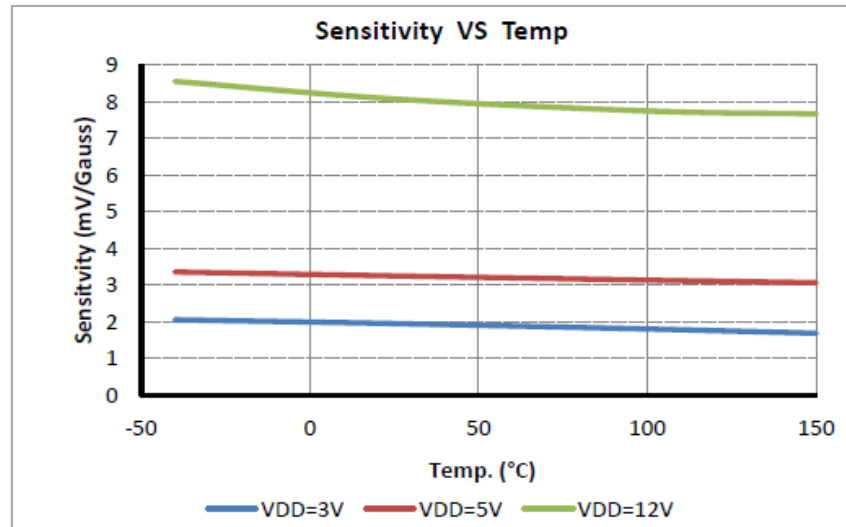


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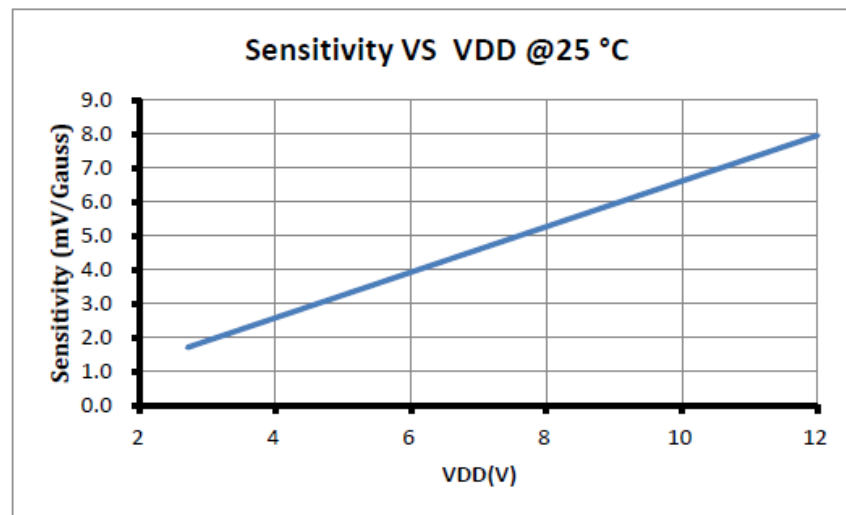




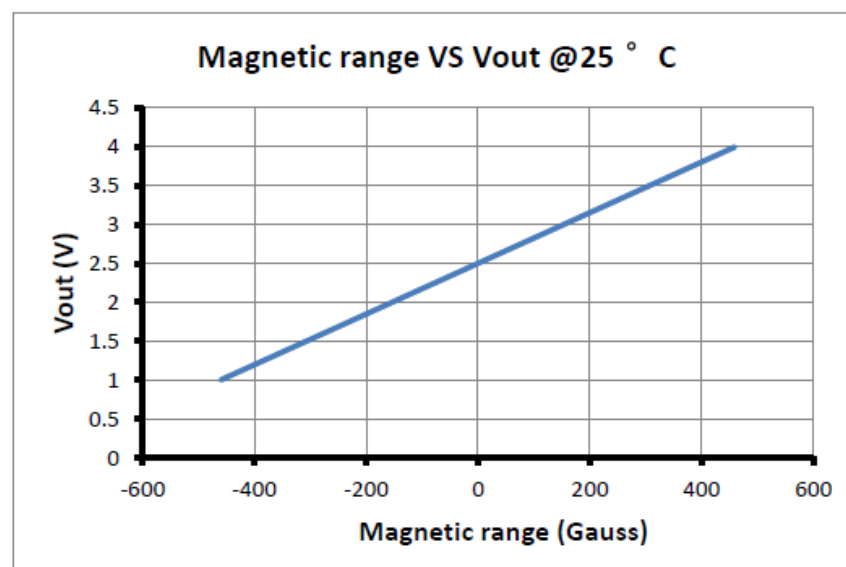
CYL603

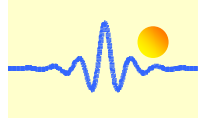


CYL603

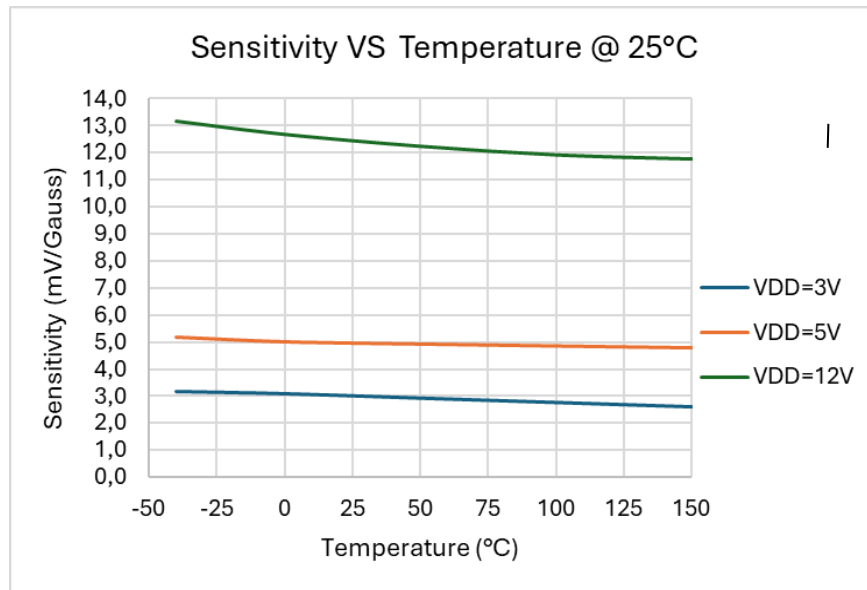


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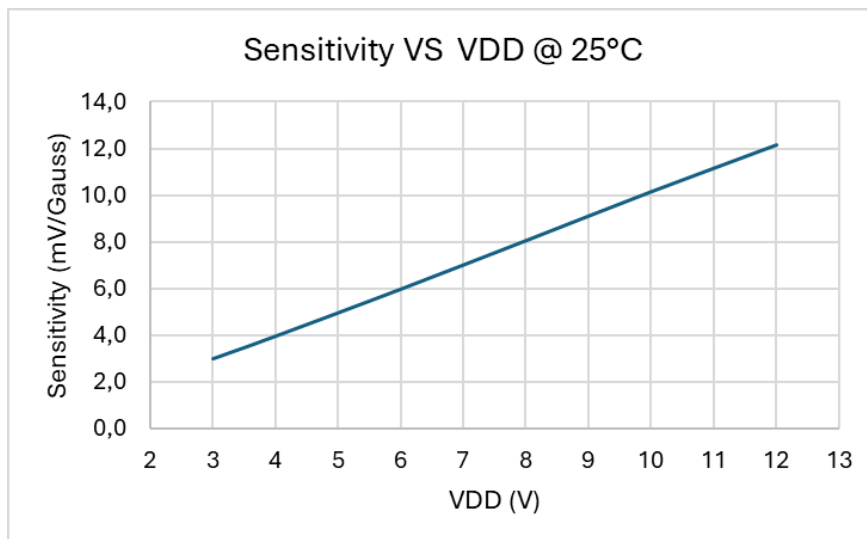




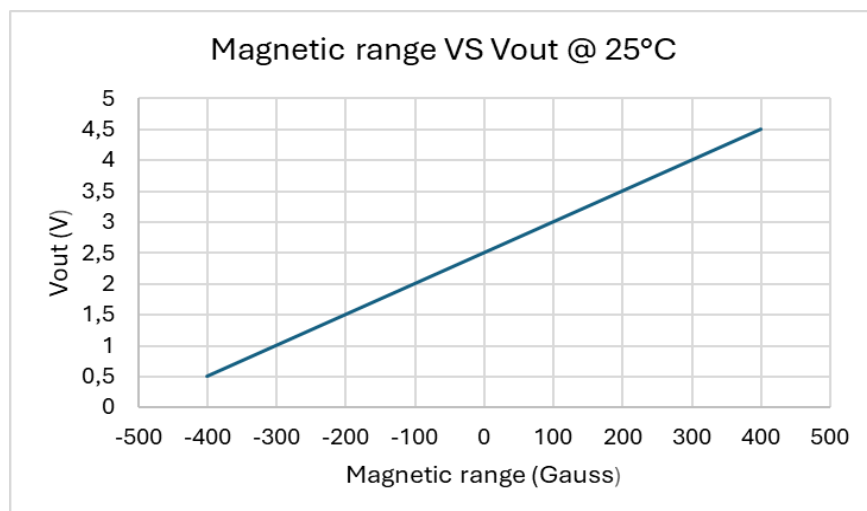
CYL605

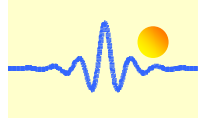


CYL605



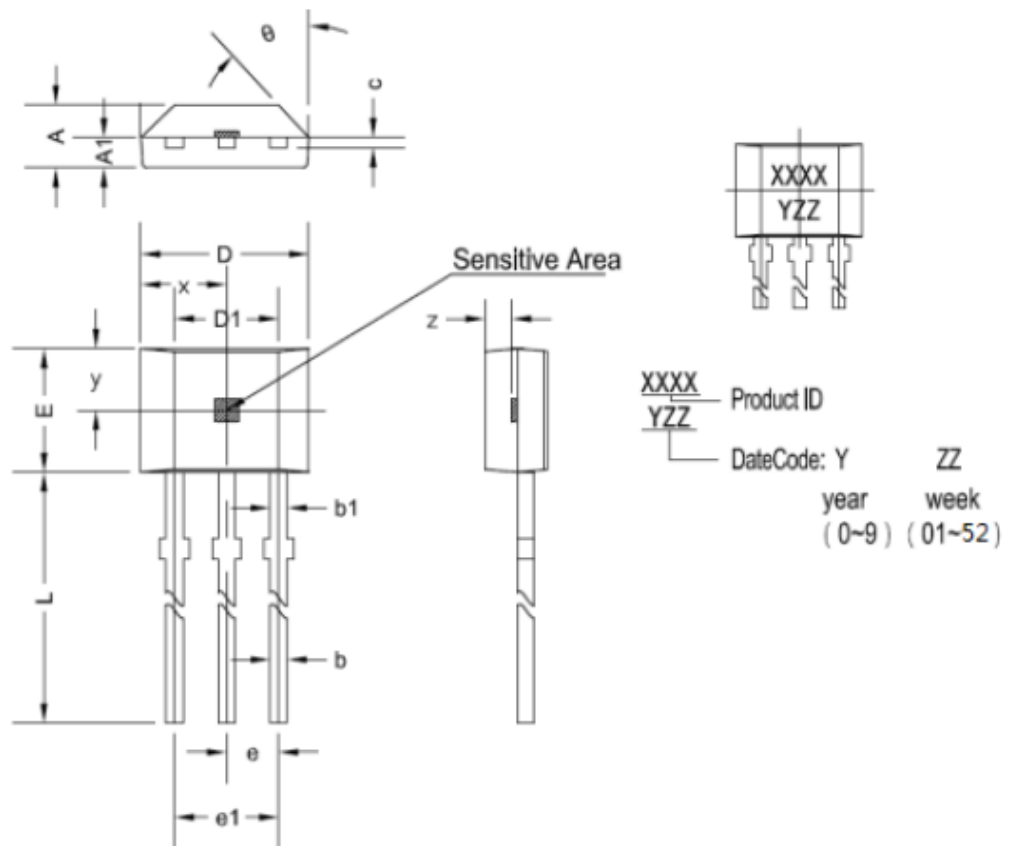
CYL605



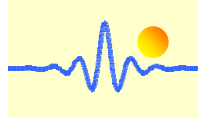


Package Dimensions

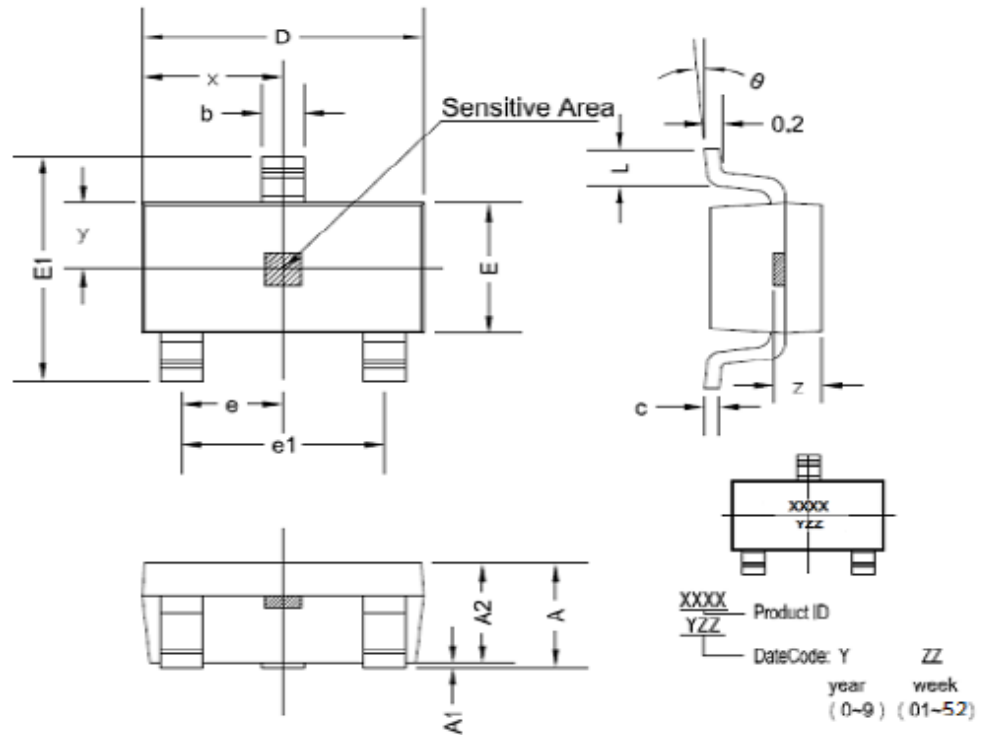
TO92S



symbol	Size (mm)		Size (in inches)	
	minimum	maximum	minimum	maximum
A	1.42	1.67	0.056	0.066
A1	0.66	0.86	0.026	0.034
b	0.35	0.56	0.014	0.022
b1	0.4	0.55	0.016	0.022
C	0.36	0.51	0.014	0.02
D	3.9	4.2	0.154	0.165
D1	2.97	3.27	0.117	0.129
E	2.9	3.28	0.114	0.129
e	1.270 TYP		0.050 TYP	
e1	2.44	2.64	0.096	0.104
L	13.5	15.5	0.531	0.61
x	2.025TYP		0.080TYP	
y	1.545TYP		0.061TYP	
z	0.500TYP		0.020TYP	
θ	45°TYP		45°TYP	

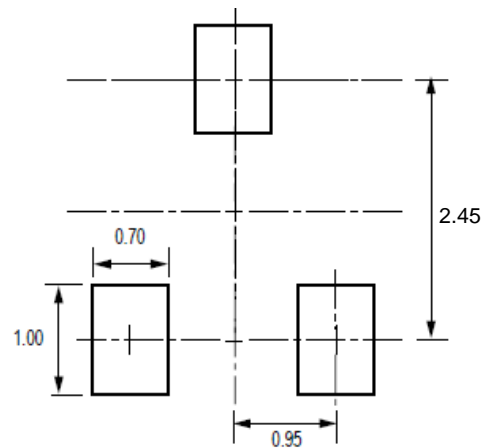


SOT23



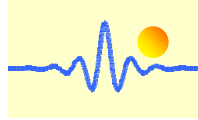
symbol	Size (mm)		Size (in inches)	
	minimum	maximum	minimum	maximum
A	1.05	1.25	0.041	0.049
A1	0	0.1	0	0.004
A2	1.05	1.15	0.041	0.045
b	0.3	0.5	0.012	0.02
c	0.100	0.2	0.004	0.008
D	2.82	3.02	0.111	0.119
E	1.5	1.7	0.059	0.067
E1	2.65	2.95	0.104	0.116
e	0.950 TYP		0.037 TYP	
e1	1.8	2	0.071	0.079
L	0.3	0.6	0.012	0.024
x	1.460TYP		0.057TYP	
y	0.800TYP		0.032TYP	
z	0.600TYP		0.024TYP	
θ	0°	8°	0°	8°

PCB Layout Reference View



Notes:

1. Exact body and lead configuration at vendor's option within limits shown
2. Height does not include mold gate flash
3. Where no tolerance is specified, dimension is nominal



Order Information:

Sensor	Part number	Package	Quantity per Packing
CYL601	CYL601UA	TO92S	500pcs or 1000pcs / bag
	CYL601SU	SOT23	3000pcs /reel
CYL602	CYL602UA	TO92S	500pcs or 1000pcs / bag
	CYL602SU	SOT23	3000pcs /reel
CYL603	CYL603UA	TO92S	500pcs or 1000pcs / bag
	CYL603SU	SOT23	3000pcs /reel
CYL605	CYL605UA	TO92S	500pcs or 1000pcs / bag
	CYL605SU	SOT23	3000pcs /reel

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