

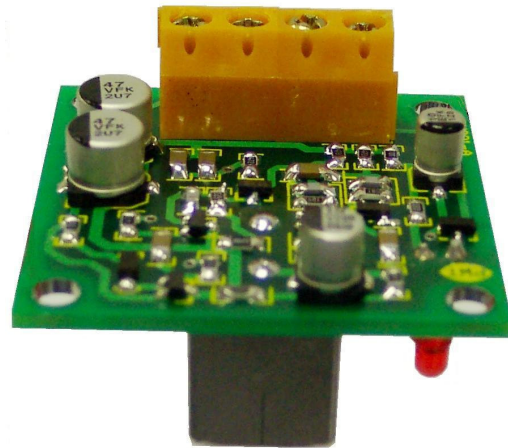
## **SDV1003B MAGNETIC INK DETECTOR MODULE**

### **FEATURES**

- **HIGH SENSITIVITY**
- **HIGH SPATIAL RESOLUTION**
- **LOW NOISE**
- **WIDE TRACK WIDTH: 9.3mm**
- **COMPLETE DETECTOR SOLUTION FOR MAGNETIC FEATURE DETECTION**
- **ABLE TO DETECT MAGNETIC FEATURES ON US DOLLARS  
EUROS  
UK STERLING  
ROUBLES etc.**
- **IR LED FOR DOCUMENT PRESENCE SENSING**
- **COMPACT**
- **WIDE SUPPLY VOLTAGES: +12V TO +24V**
- **LOW CURRENT 12mA typ @ 24VDC**
- **LOW OUTPUT IMPEDANCE 2K $\Omega$**
- **LOW COST**
- **SUITABLE FOR HIGH VOLUME MANUFACTURE**

### **APPLICATIONS**

- **CURRENCY VALIDATION**
- **CHEQUE VALIDATION**
- **SECURITY DOCUMENT VALIDATION**
- **TICKET VALIDATION**



### **DESCRIPTION**

The SDV1003B is a complete magnetic feature detector that has been designed to detect magnetic ink and other magnetic security features on bank notes and security documents. The module is a cost-effective replacement for existing discrete component detector designs. Sensitivity of the detector has been optimised such that all major currencies with magnetic features can be authenticated.

The sensor element is a high sensitivity inductive sensor. The sensor coils are wound onto a high permeability core, which has a 25 $\mu$ m gap for sensing localised magnetic fields. Affixed directly to the rear of the sensor is the amplifier and signal conditioning PCB. This circuitry consists of three separate gain stages, a noise cancellation stage, a dc level restorer and output buffer stages. Included on the circuitry are a number of levels of power supply filtering to reduce the effects of power supply coupled noise.

Please contact EcoTec Systems for a confidential discussion of your requirement and further application information.

# SPECIFICATIONS



## Absolute maximum ratings

Supply voltage, $V_{CC}$	30 V
Total current into $V_{CC}$	20 mA
Operating free air temperature, $T_A$	0°C to 50°C
Storage temperature range, $T_{stg}$	-40°C to 70°C
PCB solder pad temperature for 60 secs	260°C

Stresses beyond 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 “recommended operating conditions” is not implied. Shorting the output of the device may induce irreparable damage.

## Recommended operating conditions

	MIN	MAX	UNIT
SUPPLY VOLTAGE, $V_{CC}$	12	24	V
ENLED CNOTROL	4.5	12	V
OPERATING FREE AIR TEMPERATURE, $T_A$	10	40	°C

## Electrical characteristics at a free air temperature of 25°C

PARAMETER	TEST CONDITIONS	VALUE			UNIT
		$V_{CC} = 24 V$			
		MIN	TYP	MAX	
$I_{CC}$ SUPPLY CURRENT	HEAD SENSING USS100 NOTE SPEED 1200/min. NOTE TO HEAD 0.2mm		12	15	mA
$V_{OO}$ OUTPUT DC OFFSET	NO NOTE PRESENT		2	5	mV
$\alpha V_{OO}$ TEMP COEFFICEINT OF OUTPUT DC OFFSET	NO NOTE PRESENT		0.05		mV/°C
$r_o$ OUTPUT RESISTANCE	NO NOTE PRESENT	2.1	2.2	2.3	K $\Omega$
SN SIGNAL TO NOISE RATIO	HEAD SENSING USS100 NOTE SPEED 1200/min. NOTE TO HEAD 0.2mm		5000		
SR SLEW RATE	HEAD SENSING USS100 NOTE SPEED 1200/min. NOTE TO HEAD 0.2mm		0.3		V/ $\mu$ s
$t_r$ RISE TIME	$R_L = 50K\Omega$		60		$\mu$ s
$t_f$ FALL TIME	$R_L = 50K\Omega$		57		$\mu$ s
VOM+ MAXIMUM PEAK OUTPUT VOLTAGE SWING	$R_L = 50K\Omega$		17	18	V
ENLED LED enable		4.5	12	30	V
$\lambda$ LED WAVELENGTH			880		nm
$\theta_r$ BEAM ANGLE	FULL WIDTH AT HALF MAX.		40		°

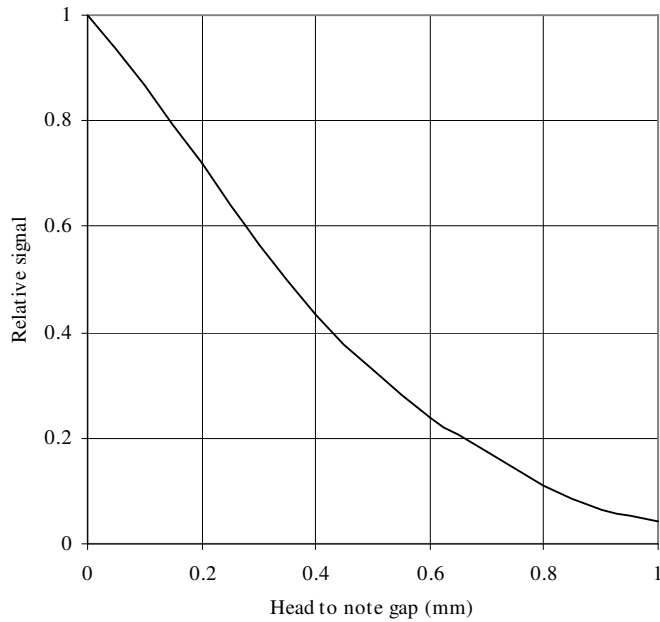
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# TYPICAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$ ,  $V_{cc} = 24\text{V}$ )

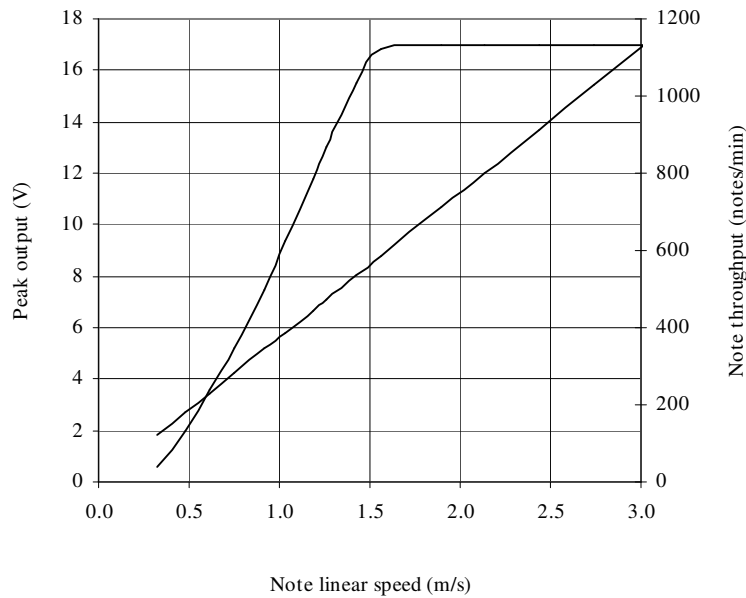


## Detector peak output signal versus head to note gap



Conditions:  
A test strip cut from a US\$1 bill was affixed to a motor driven drum.  
Detector mounted vertically above drum on a micrometer height adjuster.

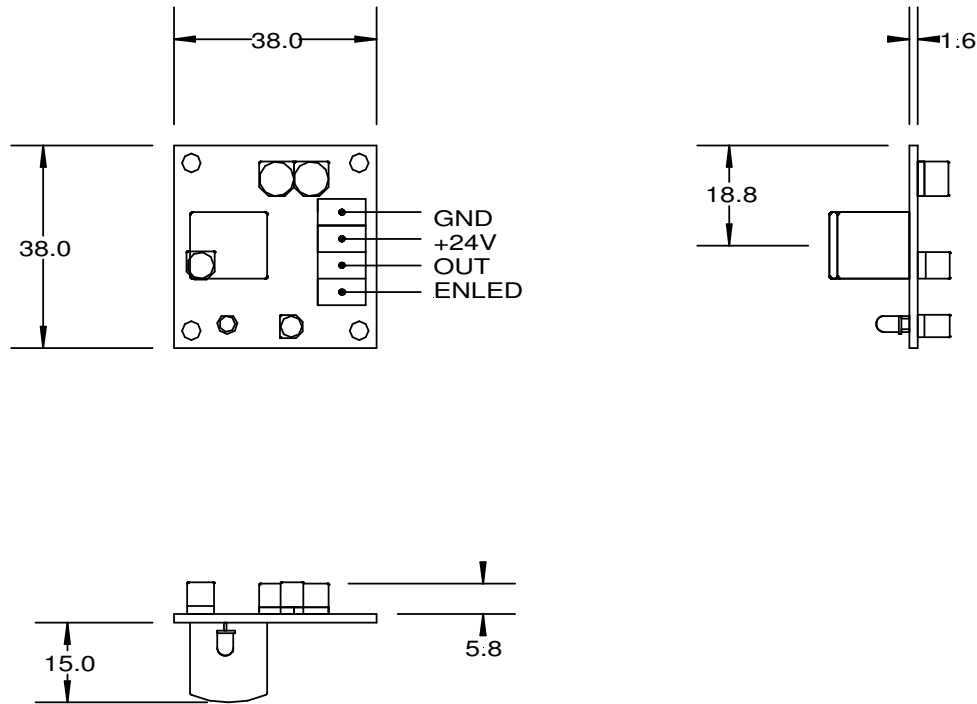
## Detector peak output signal versus note speed



Conditions:  
A test strip from a US\$1 bill was affixed to a motor driven drum. Detector mounted vertically above drum 0.2mm from drum surface. Rotation speed of drum varied.

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## MECHANICAL INFORMATION



All dimensions in mm

### Connections

(REFERRED TO PLAN DRAWING ABOVE)

<b>ENLED</b>	<b>Enable LED</b>
<b>OUT</b>	<b>Signal Output</b>
<b>+24V</b>	<b>Power</b>
<b>GND</b>	<b>Power Ground</b>

### Options:

1. The standard termination is via solder pads as shown above. However, we can affix a customer selected cableform to the above detector module. Alternatively, 5mm pitch terminal blocks can be fitted.
2. Dual channel sensing head SDV1033.

For more details on these options contact EcoTec Systems.

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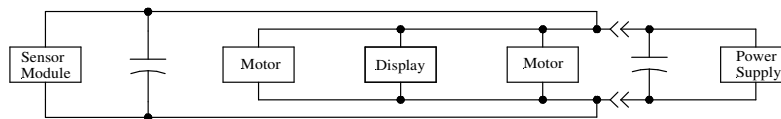
## APPLICATION INFORMATION



### Single supply operation

The SDV1003B has been optimised for single supply operation. The output from the detector module is clamped to 0V and the peak output will always be a few volts below the positive supply voltage. For highest sensitivity the device should be operated from a regulated, well filtered supply. For optimum performance in this situation a separate bypassed supply rail is recommended.

Separate By-passed Supply rails



Preferred option

### Interference

The SDV1003 is a high sensitivity localised magnetic field detector and hence is susceptible to localised stray magnetic fields. These stray magnetic fields can be produced by motors, transformers and inductors in the immediate vicinity of the detector. In addition, the electronic circuitry included in the detector module contains several high gain stages that will be susceptible to electrostatic interference. However, the effects of magnetic and electrostatic fields can be minimised if several simple guidelines are followed.

1. Use of the Infrared LED and an additional phototransistor to trigger and window the detector data capture to the document presence.
2. Do not position the detector close to a transformer, motor, inductor or other magnetic field. It is important to ensure that the sensing gap on the detector module does not point directly at a magnetic source.
3. If a separate bias magnet is used ensure that there is no relative motion between the magnet and the device. Vibrations inside the equipment could induce this motion. Either mount the two items together or position them sufficiently far apart such that any relative motion does not affect the detector operation.
4. When routing the cableform attached to the detector, keep away from switching sources such as motors, displays and motor control circuitry.
5. If magnetic interference is a problem due to close proximity of components in the host equipment, then consider the use of magnetic shields. When designing the shield bear in mind that the magnetic flux will emerge from any edge or hole in the shield. Hence, edges and fixing holes should be kept away from the module (for more guidance contact Semelab plc).

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## **Note Signatures**

The SDV1003 has been tested on the magnetic features found on major currencies. Examples of the signatures from these currencies can be provided on request.

**SDV1003**

**17/08/2008**

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