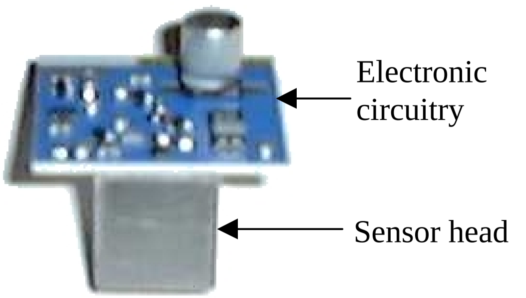
SDV1003 MAGNETIC INK DETECTOR MODULE

FEATURES

- HIGH SENSITIVITY
- HIGH SPATIAL RESOLUTION
- LOW NOISE
- WIDE TRACK WIDTH: 8mm
- COMPLETE DETECTOR SOLUTION FOR MAGNETIC FEATURE DETECTION
- ABLE TO DETECT MAGNETIC FEATURES ON
  US DOLLARS
  DEUTSCHEMARKS,
  UK STERLING
  ROUBLES etc.
- INTEGRAL BIAS MAGNET OPTION
- COMPACT
- WIDE SUPPLY VOLTAGES: +12V TO +24V
- LOW CURRENT 12mA typ @ 24VDC
- LOW OUTPUT IMPEDANCE 2KΩ
- LOW COST
- SUITABLE FOR HIGH VOLUME MANUFACTURE

APPLICATIONS

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



DESCRIPTION

The SDV1003 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 25µm 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 Semelab plc 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
OPERTING FREE AIR TEMPERATURE,, T_A	10	40	°C

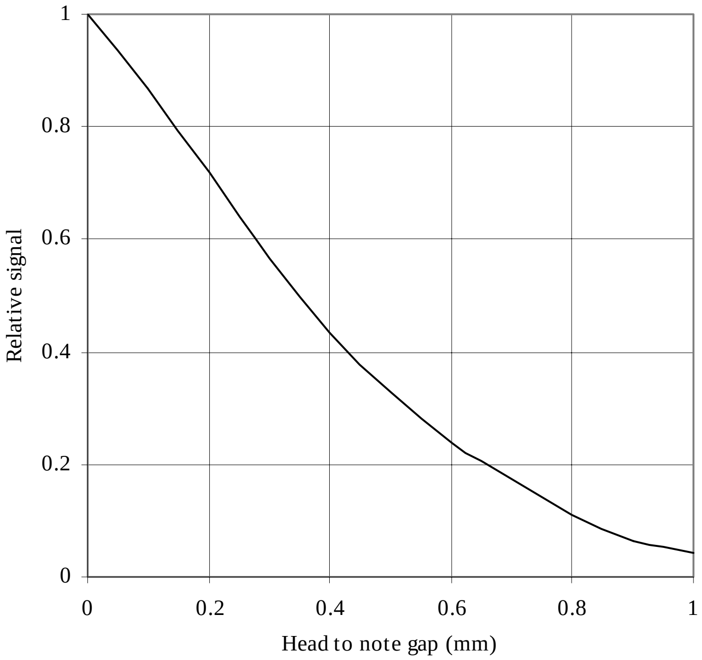
Electrical characteristics at a free air temperature of 25°C

	PARAMETER	TEST CONDITIONS	VALUE V_{CC} = 24 V			UNIT
			MIN	TYP	MAX	
I_{CC}	SUPPLY CURRENT	HEAD SENSING US$100 NOTE SPEED 1200/min. NOTE TO HEAD 0.2mm		12	15	mA
V_{OO}	OUTPUT DC OFFSET	NO NOTE PRESENT		2	5	mV
αV_{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	KΩ
SN	SIGNAL TO NOISE RATIO	HEAD SENSING US$100 NOTE SPEED 1200/min. NOTE TO HEAD 0.2mm		5000		
SR	SLEW RATE	HEAD SENSING US$100 NOTE SPEED 1200/min. NOTE TO HEAD 0.2mm		0.3		V/µs
t_r	RISE TIME	R_L = 50KΩ		60		µs
t_f	FALL TIME	R_L = 50KΩ		57		µs
VOM+	MAXIMUM PEAK OUTPUT VOLTAGE SWING	R_L = 50KΩ		17	18	V

TYPICAL CHARACTERISTICS

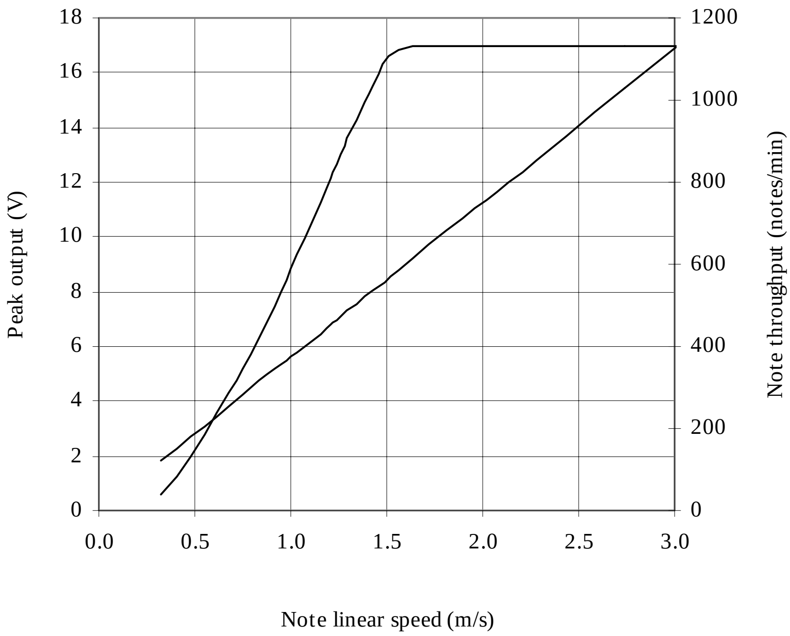
(T_A =25°C, V_{cc} = 24V)

Detector peak output signal versus head to note gap



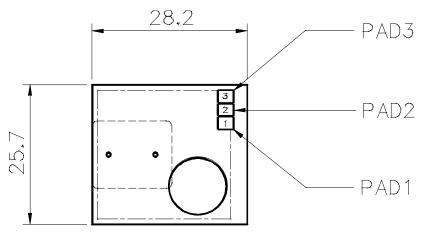
Conditions:
A test strip cut from a US$1 bill was affixed to a motor driven drum. Detector mounted vertically above drum on a micrometer height adjuster.

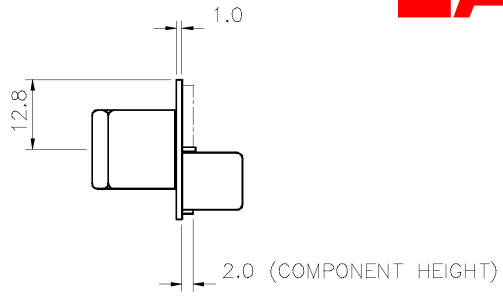
Detector peak output signal versus note speed

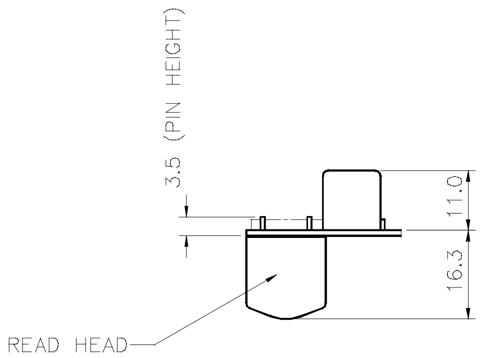


Conditions:
A test strip from a US$1 bill was affixed to a motor driven drum. Detector mounted vertically above drum 0.2mm from drum surface. Rotation speed of drum varied.

MECHANICAL INFORMATION







Connections

(REFERRED TO PLAN DRAWING ABOVE)

PAD3	**V_{CC}**
PAD2	**SIGNAL OUTPUT**
PAD1	**GND**

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. The solder pads and substrate have been designed to accept discrete wires, multi-core or ribbon cable cableforms.

2. To suppress radiated noise an EMC screen is available, this fits over the component side of the substrate and effectively screens the electronic circuitry from radiated electrical interference.

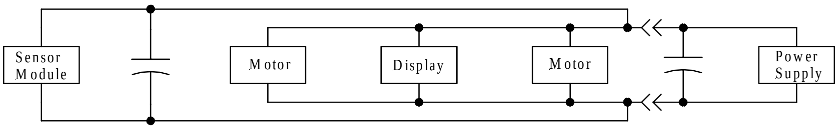
For more details on these options contact Semelab plc.

APPLICATION INFORMATION

Single supply operation

The SDV1003 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. It is not normally necessary to have a separate dedicated supply for the module. The device has been successfully operated from the same supply as DC motors used inside currency counters. 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. 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.

2. 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.

3. When routing the cableform attached to the detector, keep away from switching sources such as motors, displays and motor control circuitry.

4. If high voltage or high frequency sources are used locally, then an earthed shield around the module circuitry will reduce electrostatic interference.

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).

Note Signatures

The SDV1003 has been tested on the magnetic features found on major currencies. Examples of the signatures from the currencies that can be detected are not shown on the web-site for obvious reasons. Customers who wish to use the detector should contact Semelab plc. for a confidential discussion of their application. Interested parties should contact Dr. Richard Pulham (rpulham@semelab.co.uk).