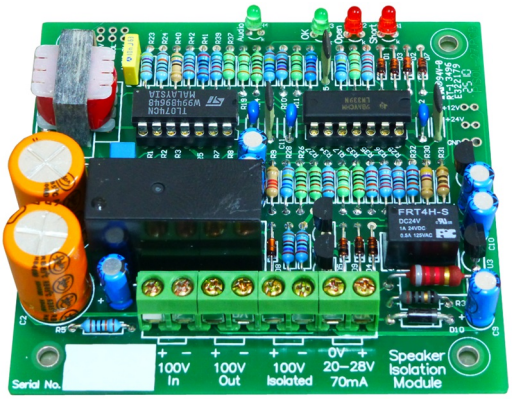
# Speaker Isolation Module for 100V PA lines

**Model: SIM-Mk1** **(formerly model PISOL)**




www.LeonAudio.com.au/SIM/
62 Edgeware Road, Aldgate
South Australia, 5154
Phone (08) 8339 3865
Intn'l Phone +61 8 8339 3865

---

To prevent PA loudspeakers in a secure area from being used as microphones, the Speaker Isolation Module SIM-Mk1 is installed within the secure area between an incoming 100V speaker circuit and the speakers to be secured.

The secure area speaker circuit is physically disconnected from the main 100V line by a double pole relay whenever it is not being used to broadcast announcements or warning tones. The relay also shorts out any AC signal on the secure speaker circuit by placing a capacitor across the secure 100V line.

The speaker circuit in the secure area is connected to the main 100V line by a Voice Operated Switch (VOX) whenever audio above a preset trigger threshold is present. The isolated output then reproduces all tones and PA announcements.

The secure speaker wiring is monitored for open and short circuits by the use of a 56k ohm end-of-line (EOL) resistor. Any faults are communicated to the Control Panel by the SIM's fault relay connecting an 8.2k ohm resistor in parallel with the input 100V line.

Multiple loudspeakers up to a maximum of 20 watts may be connected to the 100V Isolated Output of the module. Up to 2 speaker circuits may be connected.

The load presented by the secure speakers is driven by the amplifier driving the incoming 100V Input. The SIM does not have an inbuilt amplifier.

The module draws a maximum current of 70 milliamps and is supplied from the Control Panel. It does not need any additional power supplies or batteries.

The module can also be used on 70V systems. In this case, the secure speakers will also be driven at 70V.

Four diagnostic LEDs indicate the status of the module.

It is fully compliant with the functional requirements of AS2220, AS1670.1-2004 and AS1670.4-2004.

---

## Advantages of using the Speaker Isolation Module SIM-Mk2

1. Reduces AS1851 maintenance and inspection requirement within secure areas, as the module does not require a mains supply or back-up batteries.
2. Provides continuous monitoring of secure area speakers for fault conditions.
3. Easy to install on existing wiring.
4. Analogue technology. No RF emissions.
5. Compact circuit board unit that can be mounted anywhere within the secure area.
6. Four diagnostic LEDs on each module allow easy diagnosis of problems such as: loss of power, loss of audio and open/short circuit faults.
7. Any number of speakers up to 20 watts total load can be connected.
8. The isolation module utilises existing power supply from the Control Unit.
9. Not a significant heat source - requires no additional ventilation.

www.LeonAudio.com.au

# Speaker Isolation Module for 100V PA lines

## Model: SIM-Mk1 (formerly model PISOL)

### Description

The Speaker Isolation Module consists of two sections:
1: Voice Operated Switch (VOX)
2: Secure area speaker wiring monitor

### 1: Voice Operated Switch (VOX)

The speaker circuit in the secure area is connected to the main 100V line by a Voice Operated Switch (VOX) whenever audio on the main 100V line is above a preset trigger threshold.
The input to the VOX is fed via a bandpass filter which makes it less sensitive to signals outside the speech band. When the trigger threshold is exceeded, a double pole audio isolation relay is energized which connects the secure area speaker wiring to the main 100V line.
A 47uF 50V bi-polar capacitor in series with each 100V line isolates the fault monitoring circuit of the secure area speaker wiring from the main 100V line. Apart from these 2 x 47uF capacitors, there is no other circuitry to limit the pass-thru signal bandwidth.

When the audio signal drops below the trigger threshold, the double pole relay is de-energized after a delay (typically 6 seconds). This physically disconnects the secure area speaker circuit from the main 100V line whenever it is not being used to broadcast announcements or warning tones. The audio isolation relay also shorts out any AC signal on the secure speaker circuit by placing a 10uF capacitor across the secure area 100V line.
A green ***AUDIO*** LED (Fig 3) lights whenever the audio isolation relay is energized (secure area connected).
If the 24V power supply is interrupted, the audio isolation relay will be de-energized and hence disconnect the secure area speaker wiring. The Fault relay (see below) is also de-energized, communicating a fault condition.

### 2: Secure area speaker wiring monitor

The secure area speaker wiring is monitored for open and short circuits by the use of a 56k ohm end-of-line (EOL) resistor. Two speaker runs can be connected, in which case each run is terminated with a 110k ohm EOL resistor.
Secure speakers require a DC blocking capacitor to be fitted to each speaker. Typical capacitor size is 1uF (50V bi-polar) per watt of speaker load.

Any faults are communicated to the Control Panel by the Speaker Isolation Module's fault relay connecting an 8.2k ohm resistor in parallel with the input 100V line. The Fault relay is de-energized when a fault is detected.

Two red LEDs (Fig 3) indicate ***Open*** and ***Short*** circuit faults on the secure area speaker wiring.

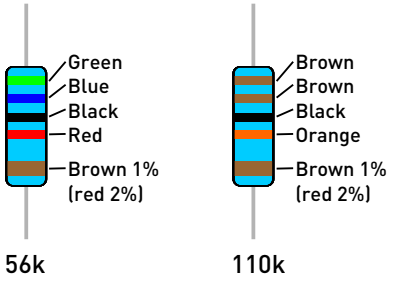
When a short circuit is detected on the secure area speaker wiring, the audio isolation relay is held de-energized so that the main 100V line is not shorted out should the VOX be triggered.

A green ***OK*** LED (Fig 3) lights whenever the fault relay is energized indicating that there are no faults on the secure area speaker wiring.
There is no separate ***Power*** LED as the ***OK*** LED or one of the two ***Fault*** LEDs will always be lit.

### End-of-line (EOL) Resistors

Suitable resistors are supplied.
56k ohms 2% 0.5 watt metal film resistor.
e.g. Altronics R7600 (Pk of 10)
or Element 14 (Farnell) 9340742

110k ohms 2% 0.5 watt metal film resistor.
e.g. Altronics R7607 (Pk of 10)
or Element 14 (Farnell) 9339868



www.LeonAudio.com.au

## Absolute Maximum Ratings

# Speaker Isolation Module SIM-Mk1

Supply Voltage 30 volts
100V Input 130V AC
Operating Temperature Range 0-50 deg C
Storage Temperature Range 0-90 deg C

## Electrical Characteristics

0dB = 0.775V RMS

| Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Supply Voltage | | 18 | 24 | 28 | Volts |
| Supply Current (Max) | Supply = 28V. Audio and OK LEDs on | 50 | 55 | 70 | mA |
| Supply Current (Idle) | Supply = 28V. No audio, OK LED on | 20 | 25 | 35 | mA |
| Power dissipation | Supply = 28V | | 0.8 | 2.0 | Watts |
| 100V line Input | 100V AC audio line from power amp | | 100 | 120 | Volts |
| 100V Line Output | In parallel with 100V input. For connection of additional unsecured speakers. | Same as 100V Line input | | | Volts |
| 100V Isolated Output | 100V signal to secure area speakers. Powered from main 100V line | Same as 100V Line input | | | Volts |
| End Of Line resistance | EOL at end of Isolated speaker wiring | 54k | 56k | 58k | Ohms |
| Time to respond to change of EOL resistance | | | 8 | 40 | Seconds |
| Short Circuit detection | Must trip. EOL value | 31k | | | Ohms |
| Open Circuit detection | Must trip. EOL value | | | 83k | Ohms |
| VOX trigger threshold | Must not trigger. 1kHz sine wave | | | 10 | Volts AC |
| | | | | -20 | dB below 100V |
| | Must trigger. 1kHz sine wave | | | 20 | Volts AC |
| | | | | -14 | dB below 100V |
| | Low frequency -3dB corner frequency | 65 | 80 | 110 | Hz |
| | High frequency -3dB corner frequency | 3 | 3.8 | 5 | kHz |
| VOX trigger response time | 20V 1kHz sine wave | | 5 | 15 | mS |
| VOX Release time | 1kHz sine wave less than 10V Recovery time until isolation relay opens | 4 | 6 | 8 | Seconds |
| Fault signalling | DC resistance switched in parallel with the input 100V line under fault conditions | 7.7k | 8.2k | 8.9k | Ohms |
| Secure Area Audio Isolation | 50Hz to 1kHz | | 125 | | dB |
| | 50Hz to 20kHz | 100 | > 110 | | dB |

# Typical speaker wiring

www.LeonAudio.com.au

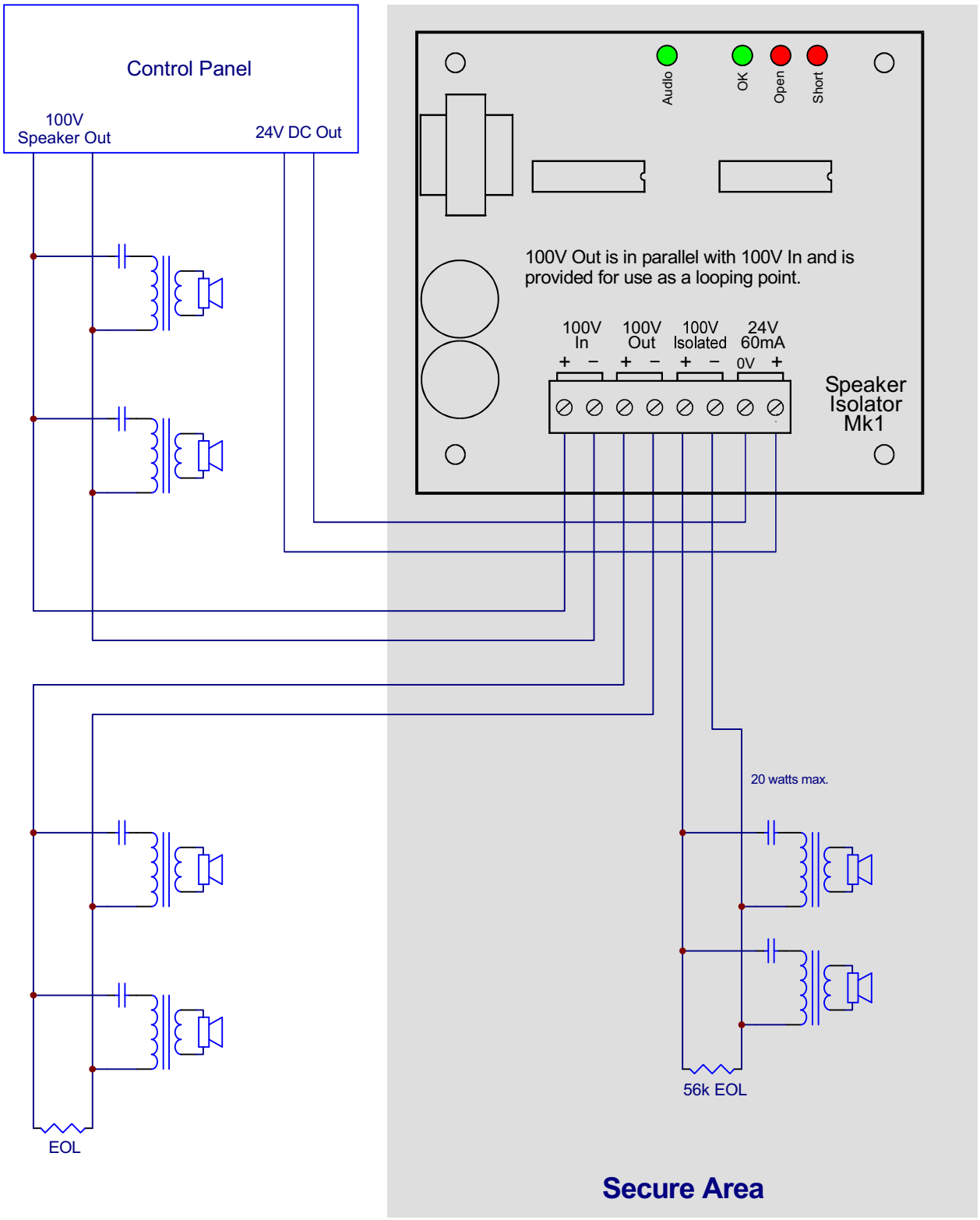



Fig 1.

# Wiring with 2 secure area speaker runs

www.LeonAudio.com.au

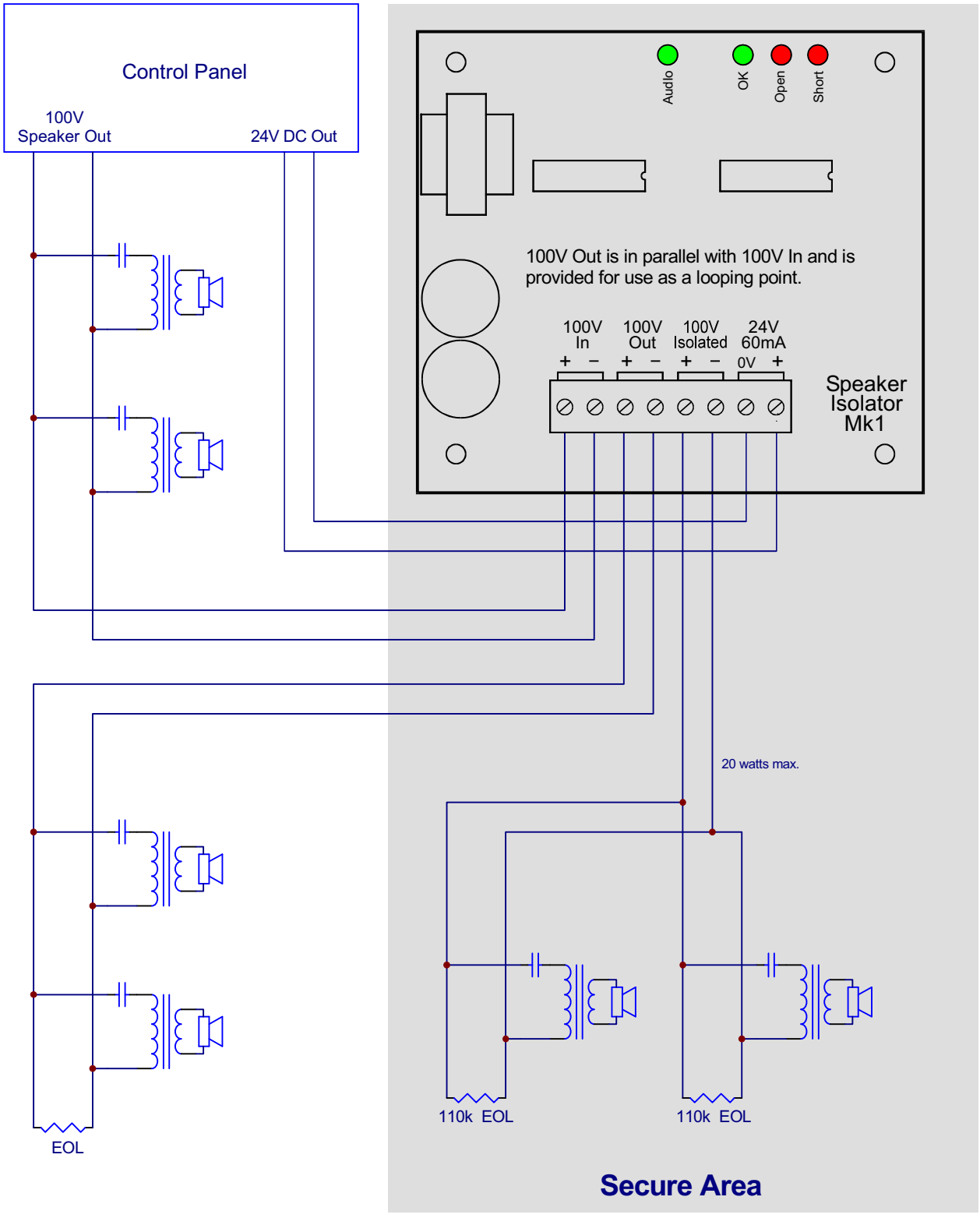



Fig 2.

## PCB Dimensions and monitoring LEDs

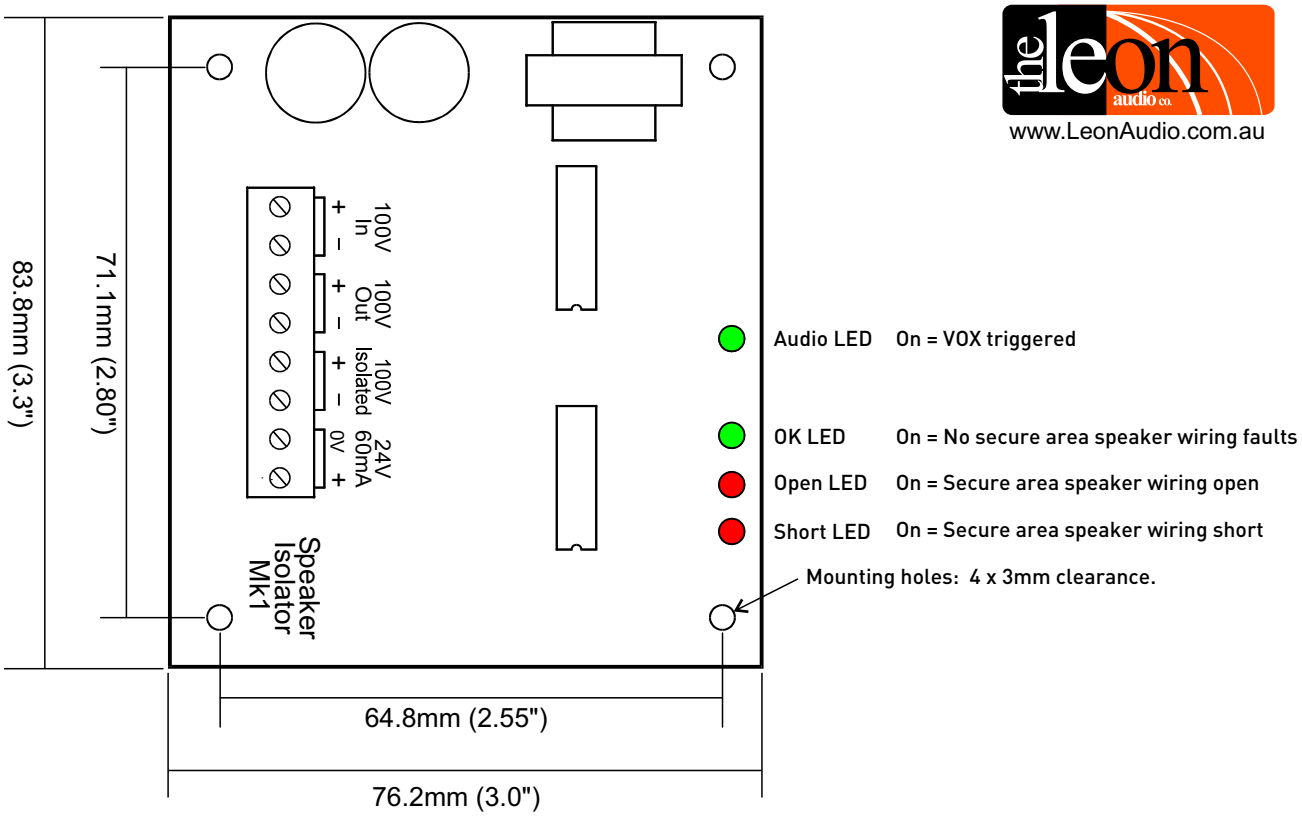



Fig 3.