

Technical Report: Low Profile Reader

Part 1 (of 2): Non-confidential

PAC International Ltd

Issue 1

Oct 4, 1999

1. Introduction

This report describes the KeyPAC Low Profile reader. This unit produces an unmodulated 125 KHz field which inductively couples to passive tags in close proximity (approx 4 inches). The passive tag cycles through a unique identification number, which is detected by the Low Profile Reader and is passed back to a controller unit using a serial line.

A technical description is provided in this report.

The PCB and components in a Low Profile reader is potted in a hard epoxy to prevent particle and water ingress. There are additional confidential sections in part 2 of this report that provide specific details that are not evident from examination of the unit due to concealment by the potting.

There are two KeyPAC Low Profile variants: the only difference between them is the colour of the casing:

Dark grey Low Profile. Part numbers: 20476 or K3001

Off white Low Profile. Part numbers: 20475 or K3001W

2. Contact Details

The KeyPAC Low Profile reader is designed and manufactured by:

PAC International Ltd
1 Park Gate Close
Bredbury
Stockport
Cheshire
SK6 2SZ
United Kingdom
Tel: +44 (0)161 406 3400
Fax: +44 (0)161 430 8658

Technical and non-technical contacts at this address are:

Shaun Byrne Controller Team Leader shaun_byrne@pac.co.uk

Mark Vaughan Development Manager mark_vaughan@pac.co.uk

3. References

FCC ID OQL-PAC-LP

Testing was undertaken at FCC registered test house:

SGS United Kingdom Ltd.

South Industrial Estate

Bowburn

Co. Durham

DH6 5AD

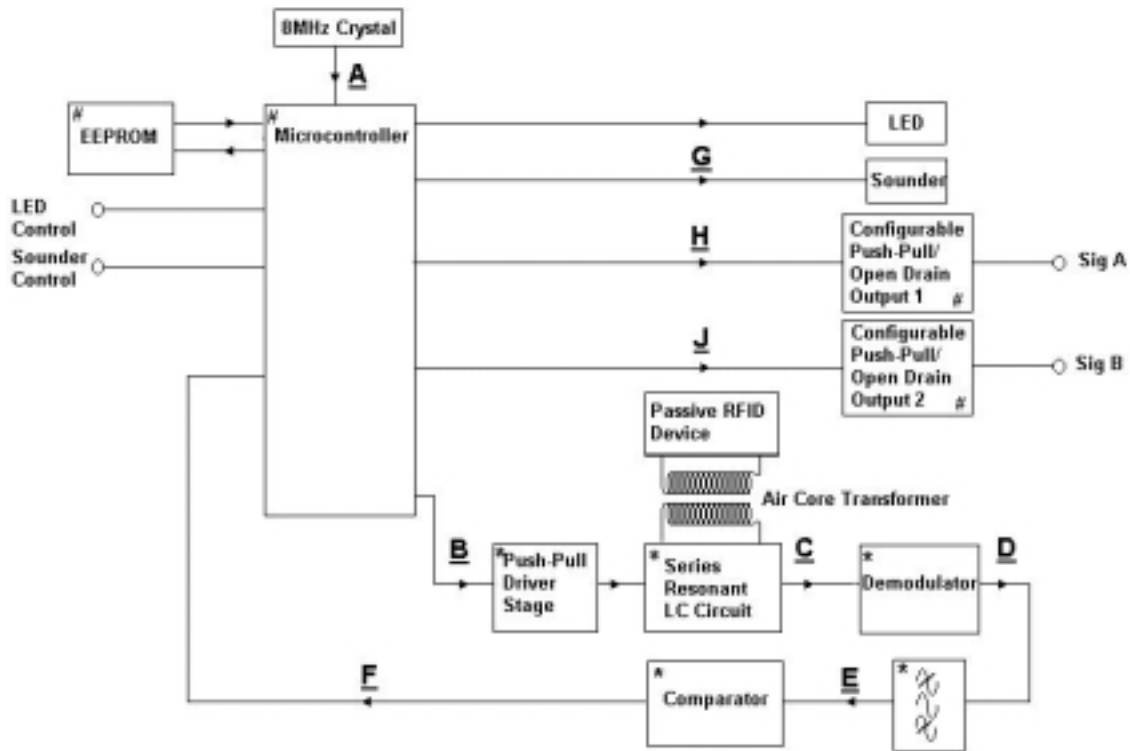
Tel: +44 (0)191 377 2000

Fax: +44 (0)191 377 2020

Contact: Alan Reynard areynard@sgsgroup.com

Test report number: 21561

4. Block Diagram



- A = 8.000 MHz local oscillator
B = 125 KHz output from microcontroller's PWM
C = 125 KHz signal with inductively coupled RFID code
D = Raw demodulated RFID signal
E = Filtered data at 3.9 KBaud
F = Digital data at 3.9 KBaud
G = Microcontroller generated 3 KHz square wave
H = Data output at 4800 Baud
J = Data output at 4800 Baud

Power and Ground

Common 0v to all modules

Input Vcc of 18V, linearly regulated to:

- * 10v for series LC driver and analogue,
- # 5v for microcontroller and logic

10v to push-pull driver stage is RC filtered to reduce conducted disturbance

5. Circuit Description

The microcontroller generates a fixed frequency of 125 KHz (derived from its crystal clock of 8 MHz) which is then fed to the series LC resonant circuit via a

driver/buffer circuit. The resonant circuit is tuned during manufacture by selecting components on test.

The 'L' of the resonant circuit is the coil which is the inductive link with the passive identification tag. The passive ID tag (or card) is a very low power device, which is powered by the carrier field from the coil, and which modulates a tuned circuit with its unique ID code. The code picked up by the inductive link is detected by the demodulator. This is then amplified and band-pass filtered before being converted to a digital signal by the comparator.

The microcontroller takes the digital signal that has been detected from the passive ID device, and uses it to generate a 4800 Baud serial code via the outputs. For a PAC system, only output 'Sig A' is used, but other formats (namely Wiegand, barcode and magstripe) require both 'Sig A' and 'Sig B'.

The microcontroller also monitors the inputs 'LED Control' and 'Sounder'. These outputs are pulled up to 5V with a resistor. If the 'LED Control' input is pulled low by a peripheral device, then the LED colour will change from red to green. If the 'Sounder Control' input is pulled low by a peripheral device then the sounder will be activated.

6. Description of Peripherals

The Low Profile is typically connected to an access 'controller' unit (for example, the PAC 2200 controller). This unit provides power to the Low Profile, and monitors the signal line for user ID codes.

When an ID code is detected, the code is checked against access rights for the holder of the ID card, and access is granted if the holder is authorised, e.g. by removing power to a lock (not part of the Low Profile). When access is granted, the controller will generally pull the Low Profile 'LED Control' input low, so that the Low Profile LED changes from red to green – indicating to the user that the code has been validated.

Most installations have 4 connections to the Low Profile:

- 0v (-ve power and signal / LED reference)
- +ve power
- Signal
- LED

7. External Photos



Front view



Rear view

8. Labels

The labels below are fitted to the rear of the unit

FCC ID: OQL-PAC-LP
 This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

 INTERNATIONAL LTD															
Model No.: 796/2 FIX BARCODE HERE	<table border="1"> <tr> <td>+12V</td> <td>RED/ROUGE/ROT</td> </tr> <tr> <td>0V</td> <td>BLACK/NOIR/SCHWARZ</td> </tr> <tr> <td>D0/CLK</td> <td>GREEN/VERT/GRUN</td> </tr> <tr> <td>D1/SIG</td> <td>WHITE/BLANC/WEISS</td> </tr> <tr> <td>VCA</td> <td>BROWN/BRUN/BRAUN</td> </tr> <tr> <td></td> <td>BLUE/BLEU/BLAU</td> </tr> <tr> <td></td> <td>YELLOW/JAUNE/GLEB</td> </tr> </table>	+12V	RED/ROUGE/ROT	0V	BLACK/NOIR/SCHWARZ	D0/CLK	GREEN/VERT/GRUN	D1/SIG	WHITE/BLANC/WEISS	VCA	BROWN/BRUN/BRAUN		BLUE/BLEU/BLAU		YELLOW/JAUNE/GLEB
+12V	RED/ROUGE/ROT														
0V	BLACK/NOIR/SCHWARZ														
D0/CLK	GREEN/VERT/GRUN														
D1/SIG	WHITE/BLANC/WEISS														
VCA	BROWN/BRUN/BRAUN														
	BLUE/BLEU/BLAU														
	YELLOW/JAUNE/GLEB														
X Date Code: CEPT SRD9c GB Made in UK * 															

The model number is written in block capitals using a permanent pen next to the 'Model No.:' text.

