

Tektronix®

NEW TDS3000C SERIES DIGITAL PHOSPHOR OSCILLOSCOPES

Performance in an affordable package, with bandwidths ranging from 100MHz to 500MHz, and with up to 5GS/s sample rates for accurate representation of your signal. The TDS3000C Series combines unique digital real-time (DRT) sampling technology with sin(x)/x interpolation to allow you to accurately characterise a wide range of signal types on all channels simultaneously.

- 10k standard record length on all channels
  - 3600wfms/s continuous waveform capture rate
  - Suite of advanced triggers
  - 25 automatic measurements
- Front panel USB port
  - Easy to setup and use
  - Lightweight design, only 3.2kg



	TDS3012C	TDS3014C	TDS3032C	TDS3034C	TDS3052C	TDS3054C
Bandwidth	100MHz	100MHz	300MHz	300MHz	500MHz	500MHz
Input Channels	2	4	2	4	2	4
Sample Rate	1.25GS/s	1.25GS/s	2.5GS/s	2.5GS/s	5GS/s	5GS/s
Rise Time	3.5ns	3.5ns	1.2ns	1.2ns	0.7ns	0.7ns
Stock No.	463-004	462-984	462-988	462-978	462-994	462-990
Price Each	£2,280.00	£2,740.00	£3,310.00	£3,960.00	£4,760.00	£5,690.00
+RS Cal	£2,354.00	£2,814.00	£3,384.00	£4,034.00	£4,834.00	£5,764.00
+UKAS Cal	£2,384.00	£2,844.00	£3,414.00	£4,064.00	£4864.00	£5,794.00

Lock your settings at the touch of a button !



\* Example: An engineer is developing a circuit to operate from four NiMh cells. They use V-Span to set a Vmax of 5.8 volts (to prevent over-voltage damage) and a Vmin of 3.6 volts (so that the circuit doesn't reset). They now have high-resolution analog control over the exact voltage range they need.

Despite the growing prevalence of digital controls, most engineers still prefer analog control when it comes to adjusting voltage and current on a power supply. That's why the New PL Series retains the true analog controls of it's best-selling predecessor. But far from ignoring the benefits of digital technology, it applies them in new and practical ways. S-Lock enables the settings to be locked at the touch of a button, moving control of voltage and current to a high resolution DAC for ultimate stability and security. V-Span allows the 300° span of the voltage control potentiometer to be set to cover any voltage range.\*

- ▶ Linear regulation with ultra-low output noise
- ▶ 90 watts power from an ultra-compact case
- ▶ Precision metering & easy-switch remote sense
- ▶ Current control & metering to 0.1mA resolution
- ▶ Three models - 15V/5A, 30V/3A or 60V/1.5A

To see just how TTI has re-invented the bench power supply - go to the web address below:

New PL Series

Analog control for a digital world

www.tti.co.uk/go/rsnpl



1/4 rack width



Measurably better value

155-383	PL155	15V, 5A Laboratory Power Supply	£260.00
155-399	PL303	30V, 3A Laboratory Power Supply	£260.00
155-440	PL601	60V, 1.5A Laboratory Power Supply	£260.00

**Terms and conditions:** All products sold in this issue are subject to the terms and conditions of sale set out in the current RS Catalogue. Offers are available while stocks last and where stated must be used in conjunction with the promotion code at point of order. Only one promotion code can be redeemed per order, order quantity restrictions may apply. Should the customer breach these terms and conditions, RS reserves the right to retrieve and/or render an invoice for the products delivered under the promotional code/offer. Promotion code offers are not open to employees of RS Components. No cash alternative is available. Prices are valid at time of print, but may be changed by RS at any time, and exclude VAT which will be charged at the current rate. This issue is valid from 1st May 2008 to 30th June 2008.

**Published by:** RS Components Limited. Registered office: Birchington Road, Weldon, Corby, Northamptonshire NN17 9RS. Registered No. 1002091. RS Components Ltd 2008. RS are trademarks of RS Components Limited. An Electrocomponents Company.

INSIDE...

- NEW PRODUCTION PACKAGING

04
- euroLED 2008

07
- EMBEDDED CONTROL

14
- THERMAL MANAGEMENT

26

12 Switch technology complements Morgan craftsmanship



# Our 10% discounts are rolling out the door



Order online today at  
**rswww.com** to get yours

**3%** discount on orders over **£100**  
**5%** discount on orders over **£300**  
**10%** discount on orders over **£800**

TO GET YOUR DISCOUNT USE PROMOTION CODE: **WEB1**

**For orders over £1500**  
please contact our large order team (details online)

Promotion code discounts will be shown on your invoice only, they will not be shown on your online order. The promotion code must be added at the time of order placement. The promotion code WEB1 cannot be used in conjunction with any other promotions or discounts. Go online to rswww.com for full terms & conditions.

ONLY AVAILABLE ONLINE

**rswww.com**



WELCOME

## CONTENTS

What's inside this issue...

- 04 NEW PRODUCTION PACKAGING**  
40,000 products...
- 06 SOLID STATE LIGHTING**  
EuroLED'08 and Osram's Diamond Dragon
- 08 LEAD-FREE SOLDERING**  
Products from ITW Chemtronics
- 09 CONNECTORS**  
IP68-rated Buccaneer from Bulgin
- 10 PROTECTION**  
Enclosures, fuses, ferrites and transformers
- 11 INDICATORS**  
A panel mount LED indicator for every occasion
- 12 AUTOMOTIVE ELECTRONICS**  
Why Morgan chose EAO switches
- 14 NEW EMBEDDED CONTROL**
  - Developing Microchip PIC24F applications
  - 32-bit ARM Cortex-M3 processor core explained
  - Introducing the RS Embedded Development Platform
  - A selection of our new MCUs and development tools
- 21 ANTENNAS**  
Antenova antennas save space and time
- 23 NEW PASSIVES**  
The latest introductions
- 24 REPAIR & REWORK**  
These tools will help you fix it...
- 26 NEW THERMAL MANAGEMENT**  
How to select a fan
- 29 NEW SWITCHES**  
ActiveTouch switch technology
- 30 NEW TEST & MEASUREMENT**  
The latest from Tektronix, Fluke and Isotech

**Switch technology complements Morgan craftsmanship**  
Page 12

**Welcome to this new-look Electronics magazine - we hope you like the make-over.**

Our cover story features the Morgan Motor Company, a byword for craftsmanship and attention to detail. These values are shared with switch manufacturer EAO, so their illuminated pushbuttons were Morgan's choice for dash panels in the new Aeromax. Find out more on page 12.

This month sees a huge change in the way RS supports Electronics manufacturing. We have listened to your requests for components in packaging suitable for use on automated PCB assembly equipment: tape & reel, tubes, trays, etc. If you produce small production runs and want components in sub-MPQ quantities, we've made virtually our entire PCB-mounting range (SMT and leaded) available. Also, production packaging is for production volumes, so you'll want production pricing - we've lowered volume prices for everything as well. See page 4 or go on-line for details.

Another exciting introduction is the "Embedded Control" Technology Solution. We've launched 680 new microcontrollers, peripherals and development tools from twelve leading manufacturers. Going further than ever to help design engineers, RS have developed the "Embedded Development Platform" or EDP, a general purpose development motherboard with space for four plug-in modules. Check out pages 14 - 20.



euroLED 2008 is now Europe's leading event for LED and solid state lighting technologies. RS has a stand to demonstrate our latest SSL and LED products.

See page 7 or follow the link from rswww.com/electronics

Regards

Richard Eden

**This month's picks from the UK's best electronics website...**

Latest Products

ITW's ActiveTouch Switches.

Our product of the month?

Embedded Control

Applications & Solutions

Production Packaging

**Visit rswww.com/electronics today**



**All the PCB-mounting products you want, in the packaging you need, to keep your production turning**

**Production Packaging is the biggest offer launch RS has implemented, with up to 40,000 products now also made available in industry standard packaging for same day despatch.**

**40,000 products across our Electronic  
& Electromechanical range...**

- Just about everything in our range that needs production packaging now has it.

**Now packed in tape, reels, tubes, trays or boxes...**

- The same packaging that the manufacturer recommends



**In quantities that you need...**

- Frustrated by buying Manufacturers' Pack Quantities for small volume jobs?
- Is your money tied up in stock that might last for months?
- Now you can order however many you need, in small RS Standard Order Multiple quantities
- If you order more than 150 pieces of taped SMT devices, we'll put them on a reel with leader and trailer tapes AT NO EXTRA CHARGE
- Once ordered, we pick and pack the products into the correct packaging format for next day delivery.

## Competitively priced...

- Production purchasing of production-packaged items needs production prices
- Across Europe, RS has added over 500,000 price breaks for production quantities, with reductions of up to 35% on existing prices.

**All available from stock...**

- All of these extras are on top of the standard next day delivery service you expect from RS

**For automated insertion on your production line...**

- Production packaging makes products easier to handle, increasing reliability and reducing defects and waste ... and your costs

## Easy to find and order online...



- Click the **P** button to order  
– P for Production

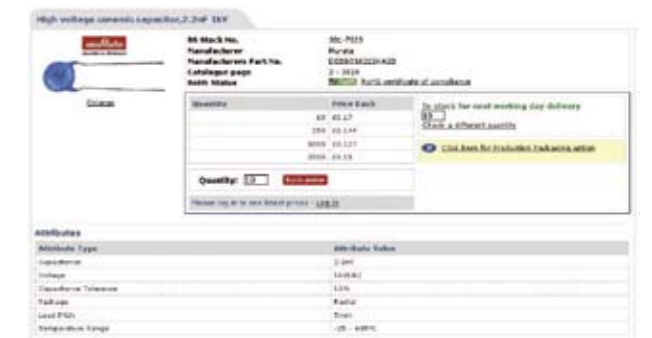
## In search results

- A **P** highlights products with a production packaging option. As normal, click to link from the search results to see the product.

HC Name	Description	Current Quantity	Issued to	Availability	Date Rec'd	Serial Number	Manufacturer	HC#s
421008	One disc document scanner 421008f 532	10	Each 101-131025 100-131032 200-131037 1000-131022	Washed Stock Clean Use Available	10/11	7555	Perceptron	EC0008
2811002	High resolution scanner 2811002 f 530	10	Each 101-131031 200-131044 1000-131037 2500-131031	Washed Stock Clean Use Available	10/11	7555	Huawei	EC0001
	Available in Production Package							
	Disc document scanner 4200P 3000	10	Each	Washed Stock Clean Use Available	10/11	7555	AMS	SA0001

### At the product range

- A **P** highlights where a production packaging option is also available. Click the link to be taken to the production packaging option.



- Packaging type is clearly indicated. Enter the quantity required and check stock, before placing an order.



- Products can also be ordered directly by adding a P suffix to the standard RS stock number, e.g. 301-7023P.

**With a world-class supporting product range...**

- RS provides everything else you need to keep your business going: tools, hardware, test & measurement equipment, process control, building maintenance, lighting, electrical & mechanical, health & safety and much more...

[www.osram-os.com/lightshop](http://www.osram-os.com/lightshop)



## Order your high power LEDs now!

Stop at OSRAM Opto Semiconductors' Light-Shop. Here you can buy our high power LED OSTAR® Lighting, Diamond DRAGON®, Platinum DRAGON® and many other state of the art opto components to let your applications shine. Enjoy one-stop shopping, 24/7, worldwide: [www.osram-os.com/lightshop](http://www.osram-os.com/lightshop)

Stop also at RS online: [rswww.com/electronics](http://rswww.com/electronics)



Opto Semiconductors

**OSRAM**

euroLED  
2008

## Europe's leading Solid State Lighting event

The fifth annual euroLED Conference, Workshop and Exhibition is set to be the largest yet due to increased support from research, industry and international media organisations.



euroLED 2008 is now the event for anyone wishing to discover how LED technologies are making an increasingly significant impact on the global lighting economy.

The event offers fantastic networking opportunities for all, as industry leaders, entrepreneurs and associating LED and SSL companies join together.

Last year saw the exhibition double in size; this is certain to happen again in 2008, so changing to a larger venue, Coventry's Ricoh Arena, has become necessary. Last year's Conference and Exhibition attracted over 660 visitors from more than 25 nationalities, including Australia, Brazil, China and Hong Kong, India, Israel, Japan, Singapore, South Korea, Taiwan and USA, as well as many from EU countries.

The Conference line up promises to be as exciting as ever with a plethora of

high profile industry experts speaking on a selection of appealing and 'need to know' topics. The four Conference Co-chairs are Dr. Geoff Archenhold of Aston Science Park, Dr Volker Harle of OSRAM Opto Semiconductors GmbH, Nadarajah Narendran, Director of the Lighting Research Centre, and Professor Wang, of the University of Bath.

In addition, this year sees the launch of a new and exciting sustainable lighting conference and exhibition, euroLight, to complement euroLED. Launched for the lighting industry, euroLight will address the issues of low carbon and sustainable lighting. The new event is intended for lighting designers, architects, light artists and end-users to discuss the future of quality sustainable lighting and experience the latest innovative lighting products targeted toward the architectural, retail and commercial lighting industries. ■

RS are exhibiting the latest additions to our Solid State Lighting range at euroLED 2008. To see all the latest news or to reserve your place, follow the euroLED 2008 link on the RS website [rswww.com/electronics](http://rswww.com/electronics).

### Conference Programme

#### Wednesday, 4th June

Session 1 (9:00 – 10:40):

#### Opening/Global Response to Low Carbon Lighting

SSL research activities, Government support for low carbon lighting, and the future of LED & lamp recycling.

Session 2 (11:00 – 12:50):

#### SSL Market Perspectives and Developments

High Brightness LED market overview & forecast, investor sentiment for SSL, and technology improvements to deliver market needs.

Session 3 (14:00 – 15:40):

#### Recent Developments in Materials, Components and Systems

Thermal management issues, recent advances in chip, phosphor and packaging technologies, and the use of Quantum Dots to deliver high quality white LEDs.

Session 4 (16:10 – 17:00):

#### Future Perspectives of Solid State Lighting

Novel airflow thermal management systems, power control techniques, and driving high power LEDs directly from AC mains.

#### Thursday, 5th June

Session 5 (9:00 – 10:40):

#### Market Application Trends and Standards

OLED market trends, OLED lighting: vision to reality, and world LED lighting standards overview.

Session 6 (11:10 – 12:25):

#### Architectural Lighting Applications

Why are Lighting Designers still sceptical of LEDs? What makes the perfect architectural lighting system? The future of architectural lighting.

Session 7 (13:45 – 15:00):

#### Retail and Commercial Applications

New applications, SSL in a retail environment, and developing high Lumens per Watt LED fixtures.

Session 8 (15:30 – 16:45):

#### Automotive, Rail and Transport Applications

Variable Message Signs, rail Applications, and LED street lighting.



TW Chemtronics

SODER-WICK LEAD-FREE SD DESOLDERING BRAID

- Fast, safe desoldering braid specifically formulated for use with Lead-Free applications
- ESD safe bobbins to prevent potential static charge
- Non-corrosive ultra high purity no-clean flux
- Will not leave ionic contamination on PCBs
- Can also be used on tin/lead solders
- Available in single bobbins or 10-bobbin VacuPak packaging for cost effective longer lasting use.



336-485	0.8mm wide x 1.5m length	£2.50
508-6425	1.5mm wide x 1.5m length	£2.45
508-6431	2.0mm wide x 1.5m length	£2.77
508-6324	2.8mm wide x 1.5m length	£2.80
508-6447	1.5mm wide x 3.0m length	£4.58
508-6453	2.0mm wide x 3.0m length	£4.96
508-6469	2.8mm wide x 3.0m length	£5.12

LEAD-FREE FLUX DISPENSING PEN

- Ideal for precision application of Lead-Free fluxes
- Non-corrosive halide-free
- Can also be used with tin/lead fluxes
- Contents 9g (0.32oz)



508-6374 Flux dispensing pen £6.84

LEAD-FREE FLUX-OFF FLUX REMOVER

- Evaporates quickly without leaving residues
- Non-Ozone depleting
- Can also be used to remove tin/lead fluxes
- Ergonomic design dispensing system



508-6396 Flux-off £8.02

Using Silicones to package LED's

Silicones play an important role in making for the reliable and efficient use of LED's for many lighting applications by offering the following benefits;

**Protection**  
Electronic circuitry needs protection from harsh environmental conditions.

**Improved Light Output**  
Optically clear compounds and gels can be used to improve light output. Encapsulating above the diode with an

optically clear silicone can reduce loss of light due to refraction, LED mega screens use a black or grey silicone to reduce glare from sunlight and improve the output and contrast of the LED image.

**Heat Dissipation**  
Heat must be dissipated away from the diode for long term efficiency. This can be achieved by applying a thermally conductive encapsulant or adhesive sealant between the diode and a suitable heat sink.

Attributes of some silicone encapsulants

- Temperature resistance (-60 to 300°C)
- Thermal Conductivity
- Optical Clarity
- Flame retardancy UL94 V-0
- Chemical resistance
- Protection from humidity and water
- UV resistant non-yellowing
- 1 or 2 Part systems
- Twin Pack Sachets for easy use
- Flexible cure regimes



LED lighting unit using thermally conductive encapsulant to seal the electronics and dissipate heat.

ACC Silicones have been manufacturing high performance silicone compounds for over 30 yrs supplying products into the aerospace, electronics and many other industries. Manufacturing is carried out in the UK, Italy and the USA with local based technical support.

RS P/No.	ACC P/No.	Description	Price
448-0179	Silcoset 101	High temperature 2-Part 1kg+cat	£36.10
448-0191	QSi1216	Optically clear twin pack 250g	£57.77
458-743	QSi1550	UL94 V-0 twin pack 250g	£21.25
283-460	QSi1553	Thermally conductive twin pack 250g	£22.00
448-0185	QSi112	Clear encapsulant 1kg+50g cat	£41.97
458-759	QGe1310	Optically clear gel twin pack 250g	£20.24
458-771	QGe1301	Gel fast cure twin pack 250g	£23.25
448-0258	AS1607	Thermally conductive RTV 75ml	£8.72
458-783	AS1803	Thermally conductive RTV 310ml	£18.95

BULGIN

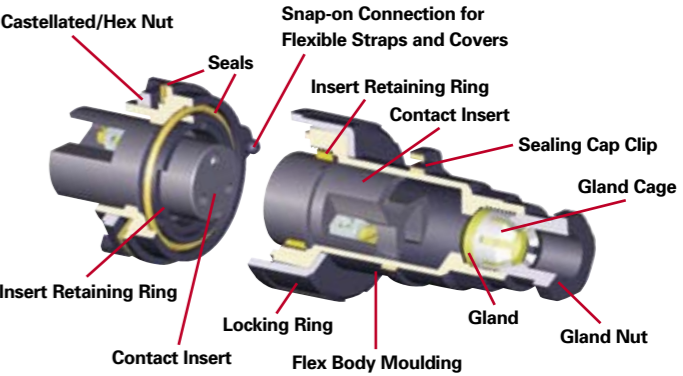
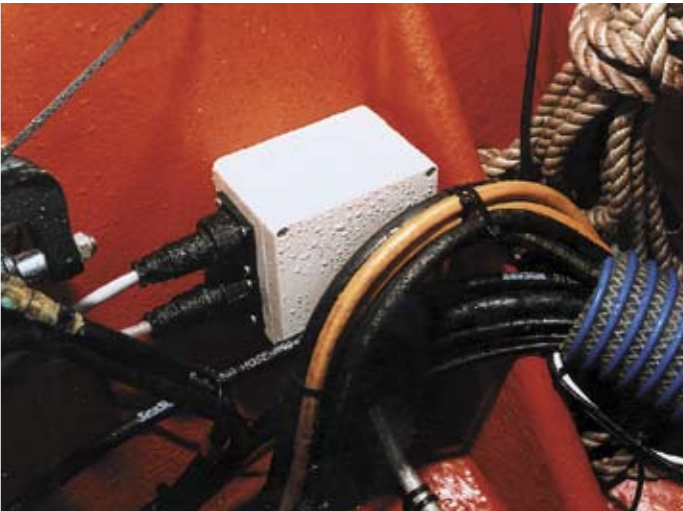
Standard Buccaneer Connectors

Originally specified for marine applications, the IP68 rated Standard Buccaneer now finds applications as far ranging as F1 tyre warmers to telematic systems in motorway gantries and from food processing printers to external lighting systems. Where there is dust or water, or harsh environments, Standard Buccaneer provides a proven solution.

Although using a connector that can be submerged in water may seem over specified for some applications, with a product as competitively priced as Buccaneer engineers can afford to be sure.

Standard Buccaneer enjoys many unique features, these include:

- A traditional gland system and cable collet provides the sealing and cable strain relief characteristics required
- Contact inserts are available with screw terminals, solder & crimp terminations and PCB pins. Screw terminals are ideal for 'field termination' requiring only a screwdriver to terminate the conductors, crimp and solder lend themselves to 'bench termination' and higher volumes
- Contact inserts are fully interchangeable within all body styles, easy to assemble and re-work, and are held in place with a simple castellated retaining nut
- 2, 3, 4, 6, 7, 9, 12 and 25 poles, with ratings up to 10A, 250Vac/dc and leading earth on the 3 pole version, Buccaneer's wide range of configurations suit a huge range of applications - go online at [rswww.com](http://rswww.com) to find the full range
- Cable glands to suit cable diameters from 6 to 8mm for 2 to 12 pole connectors and 7 to 9mm for the 25 pole versions
- Five body styles for: cable, in-line cable, panel mounting - with single hole fixing, PCB mounting and panel mounting - with flange fixing.
- Sealing caps maintain the IP68 integrity of the connector system when not in use and double as an assembly tool to tighten or release the castellated nut holding the contacts inserts in the main body
- Each connector is supplied with all of the necessary sealing accessories even down to sealing grommets for the screws on the square flange fixing versions



Screw Termination			
483-922	3-pin flex cable connector		£5.41
489-396	3-socket flex cable connector		£6.60
147-2989	3-pin flange connector		£5.97
147-3033	3-socket flange connector		£6.39
489-380	3-pin front of panel mounting connector		£4.38
483-916	3-socket front of panel mounting connector		£5.40
489-403	3-pin inline flex connector		£5.56
483-938	3-socket Inline flex connector		£7.12
494-4443	3-pin PCB connector		£5.47
494-4459	3-socket PCB connector		£6.91
526-0718	Cable support 5 to 7mm & 7 to 9mm cables (sold in 5s)		£0.556
489-419	Cap kit - pair for flex cable connector and panel connector		£1.41
494-4566	Cap kit - pair for flex cable connector and PCB connector		£1.50



RFI/EMI SCREENING ENCLOSURES, FRAMES AND LIDS

These individual RFI/EMI screening enclosures for PCBs consist of a 20swg steel frame and a 24swg fingered lid both bright acid tin finished.

- RoHS compliant
- Suitable for low and high frequency use
- Surface resistivity 20x10-6Ω/cm2
- Conductivity 5x104Ω
- Enclosure internal dimension range = 20x20x10mm to 100x50x25mm
- PCB frame & lid internal dimension range = 25x25x10mm to 125x75x25mm

For the full range, visit [rswww.com](http://rswww.com)

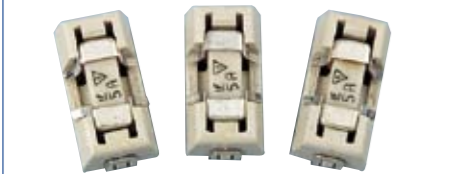


627-6433	RFI/EMI screening enclosure, 50x50x15mm	£6.65
627-6483	RFI/EMI PCB frame and lid, 125x75x25mm	£7.29

NANO<sup>2</sup> MINIATURE FUSES WITH HOLDER

Very small, very fast acting fuses in a thermoplastic body with a beryllium copper cap. This Slo-Blo fuse is one of the smallest available and its unique time delay helps solve the problem of nuisance "opening" by accommodating inrush currents.

- 9.73mm x 5.03mm package
- 125V nominal voltage



219-6068	0.25A (Qty 10)	£12.00
219-6074	0.5A (Qty 10)	£12.00
219-6096	1A (Qty 10)	£12.00
219-6103	2A (Qty 10)	£12.00
219-6119	3A (Qty 10)	£12.00
219-6125	4A (Qty 10)	£12.00
219-6153	7A (Qty 10)	£12.00
219-6226	1A (Qty 10)	£15.20
219-6232	2A (Qty 10)	£15.20
219-6248	3A (Qty 10)	£15.20
219-6254	4A (Qty 10)	£15.20

TORODIAL TRANSFORMERS

High quality open style toroidal transformers with a 0-115/230Vac 50/60Hz primary winding. Twin secondary windings may be connected in series or parallel or used independently. Designed for easy mounting with centre hole fixing.

- Dual standard tapped primary 115/230Vac
- Low profile-small size-lightweight
- Potted centre with M4 fixing hole
- Low level of radiated magnetic field
- High quality manufacturing and testing in accordance to EN61558,EN60950,EN60065, VDE0551,VDE0550,BS415
- Very low induced noise (hum)
- Double insulated primary leads
- 100% electrical and flash tested

Warning: Under no circumstances should both ends of the fixing bolt simultaneously contact the metal chassis or framework as this would create a potentially dangerous 'shorted-turn'.

For the full range visit [rswww.com](http://rswww.com)

278-6813	1.6VA 2x22V o/p	£7.65
278-6891	3.2VA 2x18V o/p	£7.80
278-6885	5VA 2x7V o/p	£8.25
278-7002	7VA 2x18V o/p	£8.85

HIGH FREQUENCY PCB PULSE TRANSFORMER

An open transformer designed for wide band and general pulse applications with thyristor and triac control systems to provide isolation between firing circuit and load.

- Bandwidth 3kHz to 1MHz
- Output pulse current 200mA

For full range see catalogue page 2-2011

196-375	3mH	£3.50
---------	-----	-------

**P** Production packaging ...and low prices

See page 4 or go online to [rswww.com](http://rswww.com)

HIGH BREAKING CAPACITY FUSES

Ideal for all SMD soldering processes, with a UL94VOP rated thermoplastic body and tin plated brass terminals.

- Nominal voltage 125V
- Breaking capacity at nominal voltage: 300Aac, 400Adc
- Size: L:7.4mm W:3.1mm H:2.55mm

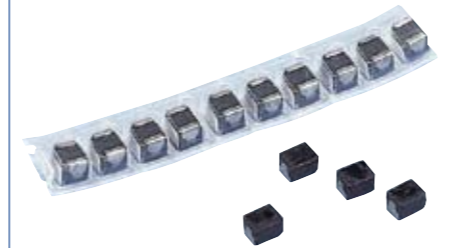


344-5119	0.063A (Qty 10)	£3.60
344-5147	0.5A (Qty 10)	£4.00
344-5197	3A (Qty 10)	£3.70

HIGH FREQUENCY NC SERIES INDUCTORS

Surface mounting core-less chip inductors designed for high frequency applications in miniature electronic equipment such as: mobile phones, pocket alarms and pagers etc.

- High Q ensures sharp frequency response
- Tolerance ±10%
- Package type 1008



Panasonic		Prices From
182-6730	0.047µH (Qty 10)	£2.00
182-6746	0.1µH (Qty 10)	£2.00
182-6752	0.15µH (Qty 10)	£2.00
182-6774	0.33µH (Qty 10)	£2.00
182-6780	0.47µH (Qty 10)	£2.00

RS have updated our extensive range of panel mount LED indicators

Designed and manufactured in the UK, the range comprises seven different cut-outs, recessed and flush and three different bezel finishes. Ranges are available with a wide choice of LED colour options including bicolour, tricolour and flashing LEDs.



LED sizes & voltage information

- 6mm indicators have 3mm LEDs
- 8mm indicators have 5mm LEDs
- 12mm indicators have 8mm LEDs
- 14mm, 16mm and 19mm indicators have 10mm LEDs
- 22mm indicators have 18mm LEDs

Switch Voltage	Operating Voltage Vop (Min to Max)	Operating Current Iop (Typical)
12Vdc	10.8 to 13.2Vdc	20mA
24Vdc	21.6 to 26.4Vdc	20mA
28Vdc	25.2 to 30.8Vdc	20mA
110Vac	99.0 to 121Vdc	6mA
230Vac	207 to 253Vdc	3mA

The indicators are available with integral resistors to permit direct connection to 12V, 24V, 110V and 220V. Some indicators also have the option of panel sealing to IP67.

- Life expectancy 100,000 hours
- Operating temperature -40° to 85°C
- Max reverse voltage 5V
- Viewing angle 100° (dependant on model)
- UL recognised
- Maximum panels thickness;  
6mm, 8mm & 12mm = 7mm  
14mm, 16mm & 19mm = 11mm  
22mm = Prominent 12mm, Flush 10mm

The selection chart for Red LED indicators will help in finding the exact match to your requirements. Other colour options, functions and finishes are available at [rswww.com/electronics](http://rswww.com/electronics).



Mounting Hole	Bezel Style	Bezel Finish	12Vdc	24Vdc	12 Vac/dc	24 Vac/dc	24-36Vdc	48-65Vdc	130Vac	230Vac	230Vac/115Vdc
6mm	Prominent	Black	206-003	210-327							
6mm	Prominent	Satin	205-173	210-248							
6mm	Recessed	Black	204-776	206-312							
6mm	Recessed	Satin	211-156	205-016							
8mm	Prominent	Satin	211-241	207-185							
8mm	Recessed	Satin	210-945	210-951							
12mm	Prominent	Black			208-762	209-169			205-246	206-407	
12mm	Prominent	Satin			208-756	208-611			205-375	204-338	
12mm	Prominent	Matt								206-435	
14mm	Prominent	Black	210-103	210-866			205-426	207-422			
14mm	Prominent	Satin	210-490	207-911			209-074	204-697			
16mm	Prominent	Black			203-969	207-573					
16mm	Prominent	Satin			203-919	205-707					
16mm	Flush	Black			211-847	208-302					
16mm	Flush	Satin			211-718	211-752					
19mm	Prominent	Black				208-532					208-784
19mm	Prominent	Satin				206-902					208-548
19mm	Prominent	Matt									211-831
22mm	Prominent	Black	206-766	204-990			212-216	207-416			
22mm	Prominent	Satin	206-299	203-672			207-466	212-064			

# Morgan uses only the finest components in its latest supercars

British car manufacturer Morgan unveiled its revolutionary concept car - the Life Car - at the Geneva Motor Show earlier this year. It's a luxury performance vehicle with zero emissions: powered exclusively by hydrogen fuel cells, it will accelerate from 0-60mph in seven seconds and reach a top speed of around 90mph - even travel 200 miles on a single fuel cell.

Morgan says the fuel cell hybrid power train is a 'new step in vehicle architecture' which goes far beyond the adaptation of traditional car designs. The car uses ultracapacitors, which charge during braking, to increase power during acceleration. A hand-built aluminium chassis and wooden seats help reduce weight, allowing for further gains in efficiency.

Life Car is another example of Morgan's innovative use of modern automotive technology combined with traditional values. The company is well-known for its expert craftsmanship and uncompromising attention to detail, qualities which are displayed in every component used in their vehicle.

These values are shared with EAO, the Swiss manufacturer of control panels and switches, so they were the obvious choice to supply Morgan with high-quality,

illuminated pushbuttons for dash panels in the Life Car and the new Aeromax.

**"Every EAO product has been developed by world-class industrial specialists and tested to international standards for reliability and durability."**

EAO's Series 61 was chosen because it complements the beautiful finish of the dash panel, which is the result of the craftsmen's passion at Morgan. The flush-mounting switch fits neatly into the dashboard and protrudes only 2mm above the surface, maintaining the clean lines. The anodised

aluminium bezel looks stylish against the polished panel. Each switch features an LED-illuminated symbol, which is cut out of a metal disk that is placed under the lens.

The Series 61's removable contact blocks can be pre-wired with the cable harness and snapped on later for easy assembly, suiting both the Morgan production process and the finished look and feel of the car interior. EAO has wide range of products which includes water and oil-sealed illuminated pushbuttons, indicators, Emergency-stops, rotary switches and keylocks, and a range of sealed and vandal-resistant keyboards and keypads. Every EAO product has been developed by world-class industrial specialists and tested to international standards for reliability and durability. These products are synonymous with creativity, innovation and excellence - the hallmarks of a market-leading company. ■



Morgan Aero 8

**SERIES 61 SWITCHES**

- Flush Mounting (2mm front of panel protrusion), professional grade switches with gold flashed snap on contact blocks
- Suitable for use with 1¼ midget groove lamps or LEDs
- Large legend area
- IP65 rated
- Supplied complete with bezel for flush mounting (22.5mm panel cut out)

219-4163	Red round aluminium momentary	£11.00
219-4179	Yellow round aluminium momentary	£11.00
219-4185	Green round aluminium momentary	£11.00
219-4258	Red round aluminium latching	£12.15
219-5346	Yellow round aluminium latching	£12.15
219-5368	Green round aluminium latching	£11.80



# Developing QVGA applications for the Microchip PIC24F Microcontroller

With widespread use of colour displays and touch interfaces in Smart Phones and Media players, the expectations of both consumers and industrial users are rising every year.

Fortunately, with the advent of Microchip's 16-bit MCUs and Free Graphics Library, developing a low-cost QVGA touch screen solution for an embedded application has never been easier.

The hardware needed to start development of a touch QVGA application is:-

- DM240001 Explorer 16 Development Board  
RS Stock No. 623-1143 £73.02
- AC164127 QVGA Pictail TM Display Board  
RS Stock No. 406-742 £74.50
- DV164005 MPLAB ICD 2 in-circuit debugger  
RS Stock No. 467-0748 £91.51

The supporting Microchip C30 C Compiler, MPLAB Debug Environment and Graphics Library are all free downloads from [www.microchip.com](http://www.microchip.com)

## Ease of Development

The Graphics Library is ready to run on PIC24F processors and includes low level drivers for displays and touch screen. The following code segment shows the straightforward routines that are supplied by the Library:-

```
SetColor(WHITE);
ClearDevice();
PutImage(0,0,(void*)&mchpLogo,IMAGE_NORMAL);
PutImage(2,60,(void*)&intro,IMAGE_X2);
```

## Suitable Display Modules

Displays using the following Colour Graphics Controllers are currently supported by the Microchip Graphics Library : RS stock suitable 3.5" to 5.7" TFT QVGA displays with and without touch from Hitachi, Optrex and Sharp.

## Resource needed within the Microcontroller

An application of 5 Modules (for example driver, touch, radio buttons, slider, text) will use around 10KB of Flash Memory. Each font requires around 10KB of program memory, a 256-colour QVGA image will require 75KB. The fonts and images can be stored in internal or external memory.



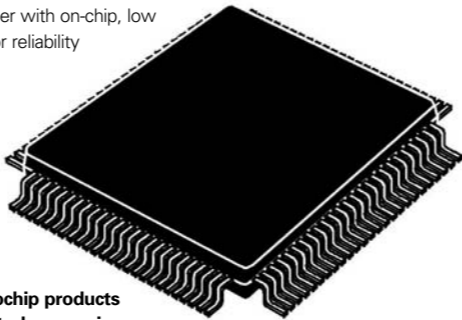
## Time and Cost Saving Using Microchip Free Graphics Library

Colour Display driving code would take several months to develop and debug in a structured and documented way. Code for driving a display from your chosen Microcontroller would cost £2,000-5,000 to buy and 2-4 times that much to develop in-house. Other considerations include Graphics Library and font. Picture conversion utilities also allow embedded software developers to concentrate on the peculiarities of their application or market segment instead of generic display and graphics issues. Supporting documentation including web seminars and online demonstrations are available at [www.microchip.com/graphics](http://www.microchip.com/graphics).

## PIC24 16-BIT MICROCONTROLLER

Microchip's microcontroller families deliver the performance, peripherals, software and hardware development tools and production support to the embedded system designer.

- Modified Harvard Architecture and upto 16MIPS operation@32MHz
- 128K Flash, 8k RAM
- 85 I/O ports
- Operating voltage range 2.0V to 3.6V
- Flash Program Memory of 1000 erase/write cycles and 20 year data retention memory
- Failsafe clock monitor operation
- JTAG Boundary scan and programming support
- Flexible watchdog timer with on-chip, low power RC oscillator for reliability



To see the latest Microchip products in our Embedded Controls campaign, go on-line to [rswww.com/electronics](http://rswww.com/electronics)

400-794	100TQFP	Prices From
		£3.20



# STM32 (ARM® Cortex™ M3) - 32-BIT Microcontrollers

The ARM® Cortex™-M3 processor is designed to deliver high performance in cost and power sensitive applications.

The design features reduced core size, excellent interrupt latency, integrated system components, flexible configuration, easy high-level programming and a strong software ecosystem. These combine to make the processor a compelling solution for a wide range of systems ranging from complex system-on-chips to low-end microcontrollers.

Flexible configuration of integrated hardware components, quick system debug and easy software programming reduce time to market for Cortex-M3 processor-based designs.

The Cortex-M3 is the first ARM processor-based on the ARMv7-M architecture. The Cortex-M3 core, based on a 3-stage pipeline Harvard architecture, incorporates features like branch speculation, single-cycle multiply and hardware divide to deliver an outstanding efficiency of 1.25 DMIPS/MHz. The combination of the Thumb® 2 instruction set with features like unaligned data & storage and atomic bit manipulation delivers 32-bit performance at the costs expected of 8 to 16-bit devices.

The integrated Nested Vectored Interrupt Controller (NVIC) offers deterministic, low latency interrupt handling through tail-chaining technology and can be configured for up to 240 interrupts. For safe operation in industrial control applications, the optional Memory Protection Unit (MPU) enables secure operation through privileged access modes and the separation of processes in an application. The Flash Patch and Breakpoint (FPB) unit,

Data Watchpoint and Trace (DWT) unit, Instrumentation Trace Macrocell (ITM) and the optional Embedded Trace Macrocell (ETM™) offer low-cost debug and trace capabilities. Extensive clock gating technology and integrated sleep modes enable low power designs.

The new STMicroelectronics MCUs are offered in two lines. The STM32F103 'Performance' line, with 72MHz clock frequency; and the STM32F101 'Access' line, which, with 36MHz clock frequency, offers 32-bit performance at 16-bit price levels.

At 72MHz, executing from Flash, an STM32 device consumes only 36mA, believed to be the lowest power consumption in the 32-bit market, an impressive 0.5mA/MHz. Well-suited for battery-operated applications, the devices operate from a 2.0V to 3.6V power supply and draw as little as 2µA in standby mode with reset circuitry active.

In performance terms, the STM32 family



offers up to 30% faster processing than an equivalent ARM7TDMI-based product. Or, for the same processing power, STM32 devices require 75% less power. The STM32 family also allows designers to reduce code size by up to 45%, via the use of the Thumb® 2 instruction set. In addition to traditional applications, such as industrial PLCs, domestic appliances and security, fire and HVAC systems, and consumer/PC applications such as card readers and biometrics, the new family is particularly well-suited for portable applications such as medical monitors where low power consumption is important.

Contributor: Semir Haddad, MCD 32-bit Microcontroller Line Manager, STMicroelectronics.

Contributor: Eric LALARDIE ARM Director Business Development E.M.E.A.I. Sales

	Package	Flash (Bytes)	RAM (Bytes)	I/O Pins	Prices From
<b>STM32F101</b>					
402-213	48LQFP	32K	6K	37	£2.09
402-190	48LQFP	64K	10K	37	£2.41
402-194	48LQFP	128K	16K	37	£2.95
402-223	64LQFP	32K	6K	51	£2.25
402-217	64LQFP	64K	10K	51	£2.60
402-207	64LQFP	128K	16K	51	£3.12
402-289	36VFQFPN	32K	6K	26	£2.32
402-201	36VFQFPN	64K	10K	26	£2.85
402-285	100LQFP	64K	10K	80	£2.97
402-267	100LQFP	128K	16K	80	£2.97
<b>STM32F103</b>					
402-263	48LQFP	32K	6K	37	£2.53
402-279	48LQFP	64K	10K	37	£2.97
402-273	48LQFP	128K	16K	37	£3.92
402-295	64LQFP	32K	6K	51	£2.67
402-324	64LQFP	64K	10K	51	£3.19
402-251	64LQFP	128K	16K	51	£3.71
402-241	100LQFP	64K	10K	80	£3.58
402-245	100LQFP	128K	16K	80	£4.14



# New RS Embedded Development Platform saves design time and cost

**RS have launched a unique embedded development solution consisting of a Baseboard able to hold up to 4 modules. This may set you wondering: ‘why has nobody done this before?’**

Electronics design has always been an expensive and complex process, keeping up with the latest developments in microcontrollers and their supporting devices. Every time you need to upgrade to a new processor, your old development boards go in the bin. You’re left facing the expense of buying a new one and the hassle of interfacing both software and hardware to the existing application circuits. RS is pleased to announce a solution to this perennial problem: the Embedded Development Platform or EDP.

### The concept explained

The Baseboard consists of 4 ‘stations’ with the minimum configuration of the motherboard with a single plug-in processor module. All 4 stations are identical, and there are many permutations of CPU modules and Application modules possible. Even with just the minimum configuration of Baseboard and CPU module, you can, for example, easily run a web-server through the standard on-board Ethernet connection.

There are various application modules; we have introduced an initial starter range consisting of basic digital and analogue I/O, a motor control module and a communications module - many more are planned over the coming months. The more advanced user will discover that it is possible to run more than one processor module on the Baseboard in a Master and Slave configuration.

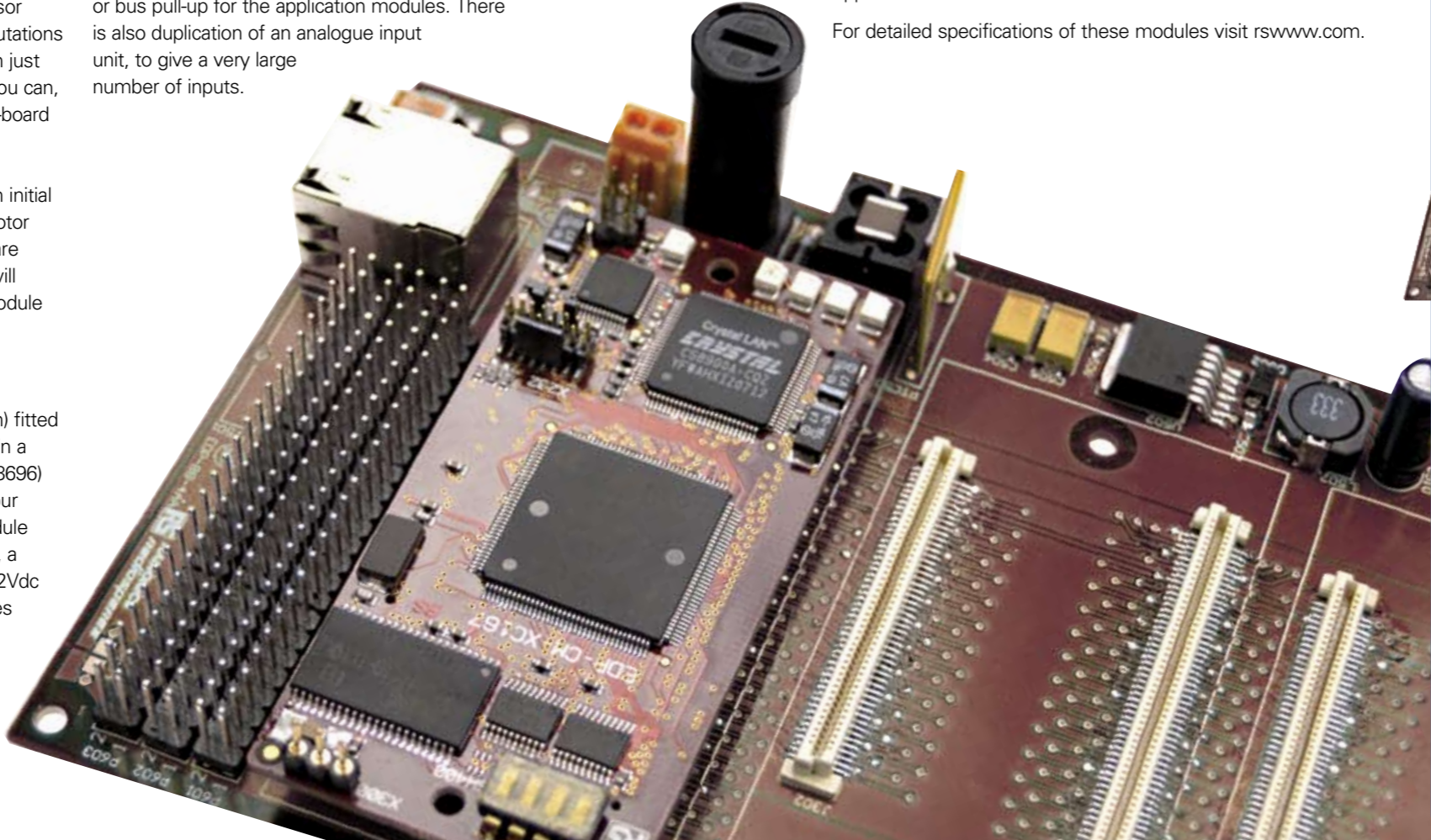
### What’s on the Baseboard?

The Baseboard is an Extended Euro card size (220 x 100 mm) fitted with rubber feet to lay flat on the bench, but able to be used in a standard rack system. Add a 64-way DIN connector (RS 381-8696) and you can plug the EDP into a backplane. Connectors for four module stations are supplied, arranged to ensure correct module fitting. There are also fitted +3.3V and +5V voltage regulators, a back-up battery, RJ45 Ethernet and mini-USB connectors, +12Vdc power-supply jack, I/O breakout header and eight DIP switches ported onto the system I<sup>2</sup>C bus.

Available late May - pre-order online now at [rswww.com/electronics](http://rswww.com/electronics)

### So how does it work?

The DIP switches allow the user software running on a processor module to read a configuration setting, enabling I/O ports to be set up correctly, for example. Depending on the capability of the particular processor module in use, up to three I<sup>2</sup>C buses and two CAN networks are available. Many of the application modules use an I<sup>2</sup>C bus for primary communication with the processor providing maximum flexibility. Some processor chips will require +5Vdc, others +3.3Vdc. A factory link on the module selects the correct supply from the connector. This supply is linked to a further connector pin on all the other module stations providing a correct voltage reference or bus pull-up for the application modules. There is also duplication of an analogue input unit, to give a very large number of inputs.



### A reusable development solution

The EDP is designed to be used and reused with new CPU and application modules being introduced on a regular basis. Its robust design has been rigorously tested, and every effort has been made at the design stage to protect the EDP from the most common human errors: the motherboard will have a significantly longer life than the average development board.

For this reason the EDP will prove attractive to all design engineers looking for a cost effective solution which allows them to significantly improve their development process and thus deliver products in reduced time. As design engineers, consultants, educators and trainers you will quickly realise the benefits and recognise the potential of the development platform modules system as an effective solution.

**The EDP represents the start of a continuous launch process which will see the introduction of new processor and application modules on a monthly basis.**

### Modules Available Now

- Processor Module: **ST Microelectronics STR912**
  - Processor Module: **Infineon XC167**
  - Application Module: **Analogue Input**
  - Application Module: **Digital Input/Output**
  - Application Module: **Brush DC Motor Control**
  - Application Module: **Basic Communications**
- For detailed specifications of these modules visit [rswww.com](http://rswww.com).

The CD supplied with the motherboard and each module contains full schematics, Gerber files and a Bill of Materials. RS are supplying these on an ‘Open-Source’ basis so that the users can develop their own boards for their own use – not for resale. However if you come up with a design you think RS should add to the range, talk to us about it. Also on the CD are all the necessary software drivers, and in the case of processor modules, appropriate Windows® based development tools. ■

### EMBEDDED DEVELOPMENT PLATFORM

This new solution means you no longer need to purchase individual development boards or incur costs to evaluate new MCU’s. A unique RS Components own brand embedded development platform system has arrived offering a suite of MCU and application modules for evaluation, ranging from Motor control to Communications. Each module fits the Baseboard as a stand alone or in series. ST STR9 and Infineon XC167 microprocessors are available as modules with more to be added regularly.

- Base board holds up to 4 modules
- Both 3.3 and 5V are available to support both 5V and 3.3 processors and devices
- The EDP use I<sup>2</sup>C as the data and control backbone, up to 3 independent I<sup>2</sup>C buses are available
- The on-board CAN network allows interconnection of modules and other EDP systems

**Note:** The Base board does not include 64 way din connector (RS 381-8696)  
**Available late May - pre-order online now at [rswww.com/electronics](http://rswww.com/electronics)**



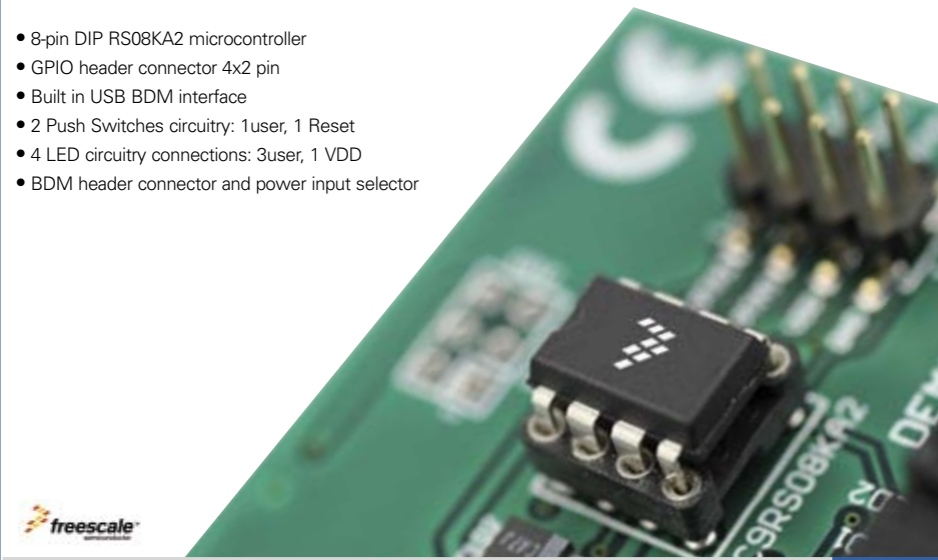
460-285	Base board	£129.00
460-297	STR912 CPU module	£129.00
460-308	XC167 CPU module	£129.00
460-281	Analogue 16 input application	£119.00
460-314	Digital I/O application module	£105.00
460-304	Motor control application module	£105.00
460-310	Basic comms application module	£99.00
460-257	STR9 complete foundation kit	£269.00
460-253	XC167 complete foundation kit	£369.00
460-275	Comms kit (No CPU)	£229.00
460-269	Comms/analogue I/O/digital I/O kit (No CPU)	£499.00
460-279	Comms/motor control kit (no CPU)	£349.00
381-8696	64 way din connector for backplane solution	£4.82



## RS08KA DEMONSTRATION BOARD

The KA2's demoboard is a development tool supporting the RS08 architecture. The RS08KA2 board has built-in circuitry and USB programmer interface included, to reduce hardware interface development time and allow faster code evaluation.

- 8-pin DIP RS08KA2 microcontroller
- GPIO header connector 4x2 pin
- Built in USB BDM interface
- 2 Push Switches circuitry: 1user, 1 Reset
- 4 LED circuitry connections: 3user, 1 VDD
- BDM header connector and power input selector



642-9356

£32.50

## RS08KA 8-BIT MICROCONTROLLERS

An extremely small, low-cost, 6- and 8-pin microcontroller unit (MCU) series for home appliances, toys and small geometry applications.

- Very small and highly efficient RS08 CPU core
- 63 bytes RAM
- 2K bytes Flash
- 8-bit modulo timer
- Keyboard interrupt
- Analogue comparator

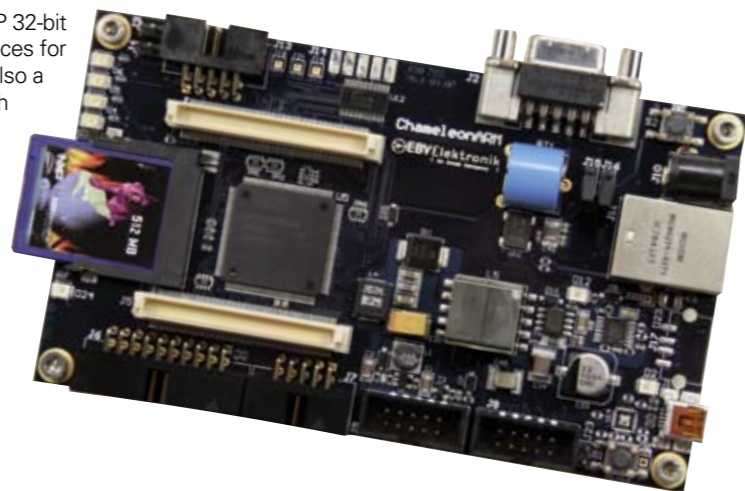


Stock No.	Package	Flash (Bytes)	RAM (Bytes)	Operating Temperature	Quantity	Price From
<b>397-161</b>	8SOIC	2K	63	-40 to +85°C	5	<b>£1.95</b>
<b>397-171</b>	8PDIP	2K	63	-40 to +85°C	5	<b>£2.17</b>
<b>397-177</b>	6DFN	2K	63	-40 to +85°C	5	<b>£1.87</b>
<b>396-746</b>	8SOIC	1K	63	-40 to +85°C	5	<b>£1.65</b>
<b>396-742</b>	8PDIP	1K	63	-40 to +85°C	5	<b>£1.80</b>
<b>396-752</b>	6DFN	1K	63	-40 to +85°C	5	<b>£1.50</b>

## CHAMELEON ARM REFERENCE PLATFORM

The ChameleonARM platform was created to complement the NXP 32-bit ARM7 single-chip LPC23xx family with its rich set of on-chip interfaces for applications requiring various types of serial communications. It is also a tool for system developers who want to familiarise themselves with the LPC23xx family as a complete reference platform.

Installed demo software shows both the processor power within the ARM7 environment as well as the communication interfaces such as Ethernet (10/100 MB/s), USB and CAN. Featured with power-over-Ethernet, the board is independent from an external power supply and could be used in applications where cables cause complications. Provided with installed demo software.



384-957

£259.99

## MINIPROG1 DEVELOPMENT KIT

The MiniProg1 uses a 5-pin ISSP (In-System Serial Programming) header for prototype programming of PSoC® devices on the MiniEval PCB or directly on a target board. The MiniEval PCB is a programming and evaluation board that allows DIP device socket programming which includes LEDs and a potentiometer for simple evaluation and demonstration.

### Kit contents:

- MiniProg Programming Unit
- MiniEval Socket Programming and Evaluation board, plus a 28 Pin CY8C29466-24PXI PDIP PSoC® Device Sample
- PSoC® Designer Software CD
- Getting Started Guide and USB 2.0 cable



390-671

£16.80

**P** **Production packaging**  
...and low prices  
See page 4 or  
go online to [rswww.com](http://rswww.com)

## EMBEDDED ETHERNET CONTROLLERS

WIZnet's range of Embedded Ethernet controller chips, which includes the following:

- **LQFP48:** a single chip/single port PHYceiver with an MII/SNI and implements all 10/100M Ethernet Physical-layer functions. A PECL interface is supported to connect with an external 100Base-FX fiber optic transceiver
- **LQFP64:** a fully hardwired TCP/IP stack supporting TCP, UDP, IP, ARP, ICMP, MAC internet protocols. Features include amazing protocol processing speed depending upon MCU; 8051 (max. 1Mbps), AVR (max.8 Mbps), ARM7 (max. 21Mbps)
- **LQFP64:** a fully hardwired TCP/IP stack with support for ADSL connection (with PPPoE) and TCP, UDP, IP, ARP, ICMP, IGMP, PPPoE, MAC protocols. Features include high throughput speeds; 8051(max. 1MB/s), AVR (max. 8MB/s), ARM7 (max. 21MB/s) and 10/100 Base-T Ethernet (Auto detection) support
- **LQFP80:** a fully hardwired TCP/IP stack with support for TCP, UDP, ICMP, IPv4 ARP, IGMP, PPPoE protocols. Features include 10BaseT/100BaseTX Ethernet MAC/PHY embedded support and ADSL connection (with PPPoE Protocol with PAP/CHAP Authentication mode)

<b>419-952</b>	LQFP48	<b>£3.40</b>
<b>419-974</b>	LQFP64	<b>£6.90</b>
<b>419-978</b>	LQFP64 with PPPoE	<b>£5.40</b>
<b>419-930</b>	LQFP80 with PPPoE+PHY	<b>£5.20</b>

## QUICKWRITER™ FAST PIC PROGRAMMER

A flexible, full featured PICmicro® MCU programmer designed for both In-circuit and gang programming.

- Supports In-Circuit Programming with the included cable
- Programs 4 devices as quickly as a single device when using a gang adaptor
- Supports the PIC12, PIC14, PIC16 and PIC18 series of Microchip PICmicro® MCUs
- Power supply not included



405-610

£134.90

## PROPELLER™ STARTER KIT 32300

The kit includes everything you need to get started with the Propeller™ microcontroller, and includes:

- The Propeller™ Demo Board with built-in Propeller (P8X32A-Q44), EEPROM and 5MHz crystal
- Propeller™ Manual, software CD and USB cable



405-571

£109.90

## MPLAB REAL ICE IN-CIRCUIT EMULATOR

The next generation high speed emulator for Microchip Flash DSC® and MCU devices. It debugs and programs PIC® and dsPIC® Flash microcontrollers with the easy-to-use but powerful graphical user interface of the MPLAB Integrated Development Environment (IDE), included. The MPLAB REAL ICE probe is connected to the design engineer's PC using a high-speed USB 2.0 interface and is connected to the target with either a connector compatible with the popular MPLAB ICD 2 system (RJ11) or with the new high speed, noise tolerant, low voltage differential signal (LVDS) interconnection (CAT5).



381-592

£269.00

## MC33941 EVALUATION KIT IN TOUCH SENSING APPLICATIONS

The evaluation kit features the MC33941 proximity sensor that is intended for applications where non-contact sensing of objects is desired. It contains circuitry necessary to generate a low-level electric field and measure the field loading caused by objects moving into the field. The kit allows for designers to easily evaluate the MC33941 in any application, specifically capacitive touch sensing. The connector offers access to all electrodes, enabling you to connect the included touch pad board or any other electrode design.

- Sample electrode board demonstrates keys, linear and rotational sliders and proximity pad
- Machined plastic cover for front panel non-contact touch evaluation
- Access to all 7 electrodes and shield drive through easy-to-use connector
- Adjustable sensitivity through jumpers (tuneable frequency)
- Adjustable response time through jumpers



211-590

£64.50

**You can find more Embedded control products online**

[rswww.com/electronics](http://rswww.com/electronics)



## NONVOLATILE F-RAM MEMORY WITH PARALLEL INTERFACE

High-performance parallel reads and writes with true non-volatility, without a battery requirement.

Stock No.	Package	FRAM (Bytes)	Access Time	Operating Voltage	Price From
<b>394-879</b>	28SOIC	32K x 8	70ns	5V	<b>£6.14</b>
<b>394-835</b>	32TSOP-1	128K x 8	60ns	3.3V	<b>£12.95</b>
<b>394-831</b>	44TSOP-II	256k x 16	55ns	2.7-3.6V	<b>£29.71</b>



ARM966E-S™ 16/32-BIT FLASH MICROCONTROLLERS

A series of ARM-powered microcontrollers which combines a 16/32-bit ARM966E-S RISC processor core, dual-bank Flash memory, large SRAM for data or code, and a rich peripheral set. Ideal for a wide variety of applications such as point-of-sale terminals, industrial automation, security and surveillance, vending machines, communication gateways and medical equipment.



Stock No.	Pack	Flash (Bytes)	RAM (Bytes)	Peripherals	Price From
228-532	80LQFP	256K+32K	64K	CAN, 40 I/O	£7.47
228-576	80LQFP	256K+32K	96K	USB, CAN, 40 I/O	£9.12
629-1202	128LQFP	256K+32K	96K	Ethernet, USB, CAN, EMI, 80 I/O	£11.50
228-605	128LQFP	512K+32K	96K	Ethernet, USB, CAN, EMI, 80 I/O	£12.40

XC164CM - AUTOMOTIVE CONTROLLER WITH CAN

The XC164CM Series offers impressive DSP performance and advanced interrupt handling combined with a powerful integrated peripheral set and high performance and reliable on-chip Flash memory. It is suited for automotive and general purpose markets and features a dedicated PWM unit for AC and DC motors, TwinCAN and a 10-bit AD Converter.

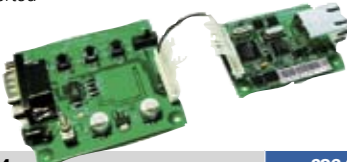


Stock No.	Package	Flash (Bytes)	SRAM (Bytes)	Clock Frequency	Price From
407-634	64TQFP	32K	4K	20MHz	£5.92
407-650	64TQFP	32K	4K	40MHz	£6.19
407-707	64TQFP	64K	6K	20MHz	£6.09
407-656	64TQFP	64K	6K	40MHz	£6.37

SERIAL ETHERNET 8051 3.3V + RJ45

WIZnet's NM7010A chip network module features:

- Plug-in module can be used without re-designing the schematic of W3100A-LF, PHY chip, Transformer, and RJ45 into target board
- Module rapidly evaluates W3100A-LF with MCU of target board
- All MCU interface modes of W3100A-LF such as non-clocked, clocked, external-clocked are supported



419-924 £26.90

EVALUATION BOARD 8051 + NM7010A (W3100A I2C)

WIZnet's 8051 evaluation kit features full-duplex Data Transfer up to 1MB/s with Atmel's AT89C51RD2 (16MHz, X2 Mode). Internet Application Protocols include: ANSI C Source Codes such as DHCP, HTTP, DNS, etc. All source codes are developed by Keil Compiler, with Firmware programming using the Flip Tool supplied by Atmel.

- Kit contents:**
- EVB8051 evaluation board
  - NM7010A module providing internet connectivity
  - Power Adaptor (5V)
  - User manual and software CD
  - UTP and Serial cables



419-940 £149.00

W5100 (PPPOE) AUTO-CROSSOVER SOCKET

WIZnet's WIZ810MJ chip network module features:

- Plug-in module
- Fast evaluation of W5100 and MCU in the target board
- Supports MCU BUS and SPI Interface
- Supports Auto MDI/MDIX (auto detection of crossover)



419-895 £17.20

WIZNET'S EVB-PIC24 EVALUATION BOARD

- Features:**
- Full-Duplex Data Transfer up to 6MB/s with PIC24
  - Internet Application Protocols : ANSI C Source Codes such as TCP, UDP, DHCP
  - By using external 96-pin connectors, all PIC24's pins can be used to support the developer's needs
  - Provides various application source codes : Loopback, Webserver, Ping
  - Supports ICSP Interface



419-912 £79.00



Surface mount antennas for wireless PCB applications

Chipset suppliers will try to minimise their bill of materials by using a PCB trace antenna in their reference designs. While this hides the true cost of the antenna it can result in poor performance and long development times.

Antenova's gigaNOVA® antennas can work better, take up less space and are easier to design in than PCB trace antennas. This article explains the advantages of using a separate antenna, instead of a PCB trace antenna.

Cost

The extra space needed by a trace antenna is not free. The PCB itself is expensive, but add to that the increased costs of the enclosure, packaging and distribution. Longer design times and a larger, less effective product can also have a negative impact on sales.

Size

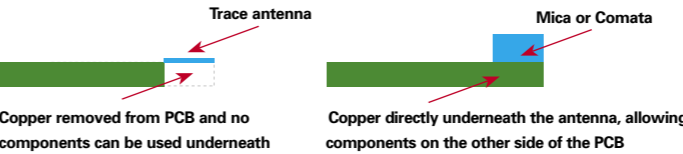
A typical printed inverted F or meandered monopole antenna will be much larger than the gigaNOVA equivalent, but it is not just the size itself that is important. gigaNOVA antennas are designed to allow components to be placed nearby, meaning the total board area required is much less. The table below shows a typical 2.4GHz printed inverted F antenna and compares it to a 'Fusca', the smallest antenna in the gigaNOVA range. The antenna itself is eight times smaller than the inverted F. When the space required on the PCB is taken into account, the difference is even greater; Fusca is thirty-eight times smaller than the trace antenna.

	Printed antenna <sup>1</sup>	gigaNOVA 'Fusca'	
Antenna Size	105mm <sup>2</sup>	12mm <sup>2</sup>	8x smaller
PCB space used	934mm <sup>2</sup>	24mm <sup>2</sup>	38x smaller

<sup>1</sup>From IEEE Antennas and Propagation Magazine article – "Analysis and Design of an Inverted F Antenna Printed on a PCMCIA Card for the 2.4 GHz ISM band."

Flexibility of design

Trace antennas require that the opposite side of the PCB from the antenna be free from components. Placing components underneath a trace antenna can result in very poor performance, but Antenova has a solution. Mica and Comata antennas from the gigaNOVA range use a planar inverted F design that makes them ideal for devices where the ground cannot be removed.



This added flexibility makes it possible to design the antenna on to a device with a large screen or connectors beneath the antenna.

Ease of integration

Antennas have to work when they are integrated into real products. Nearby objects affect the way they work and even small design changes can have a big impact. This can be overcome by adjusting the antenna, changing the design to re-tune it to the correct frequency. With a trace antenna, this could mean re-designing your PCB to optimise performance. Each change to the antenna design would mean making a completely new PCB and failing to adjust the design in this way could leave you with a very poor antenna, limited transmission range and reduced battery life. gigaNOVA antennas take a different approach, using a small matching circuit to fine tune the performance of the antenna. By choosing the right component values there is no need to redesign your PCB to get the antenna working.

Time to market

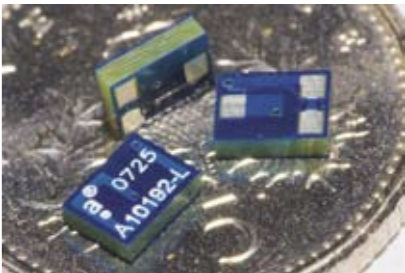
Designing an antenna takes time. However, Antenova's designs can shorten your time to market as they have already gone through design iterations and have been optimised for performance using electromagnetic simulation and production prototype revisions. This results in a great antenna design that has been tuned to the materials and processes used in mass production. When you choose a gigaNOVA antenna we have already done the hard work for you and there is no need to iterate through multiple PCB designs to get the antenna working properly. Antenova provides PCB artwork so that you can lay out your PCB right away – with confidence. Parts are available from stock and if you need samples to start testing they are available right away.

Article by Tim Palmer, gigaNOVA® Business Manager

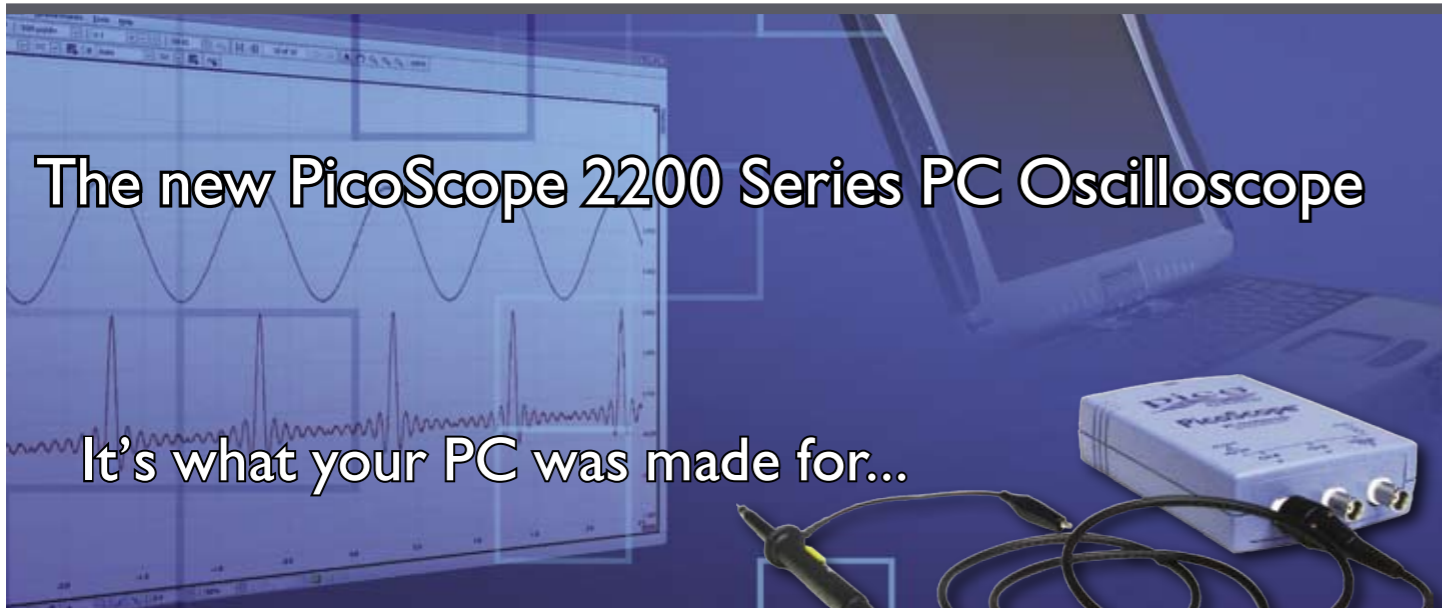
NEW ULTRA SMALL CHIP ANTENNA

The smallest, lightest, yet highly efficient low profile SMD antenna, offering proven performance and quality for miniature products such as headsets etc.

- Designed for 2.4GHz applications [Bluetooth®, Wi-Fi® (802.11b/g), ZigBee®, and WiMAX applications at 2.3 GHz and 2.5 GHz.]
- -40°C to +85°C operation
- Gain 0.4dBi
- Termination SMD
- Size: 4 x 3 x 1.1mm



384-484 £2.49



The new PicoScope 2200 Series PC Oscilloscope

It's what your PC was made for...

PicoScope 2200 Series  
Uncompromising Price

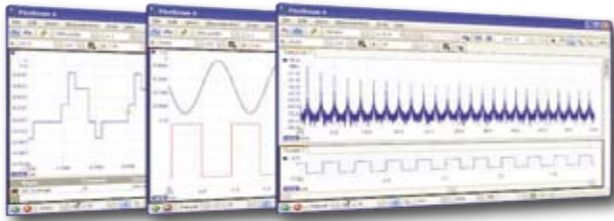
Pico Technology has launched the new PicoScope 2200 series, a breakthrough in price-performance from the leading-edge PC Oscilloscope company.

- Available in 5MHz, 10MHz and 25MHz bandwidth options
- Extremely versatile and great value for money, each PicoScope is a 5-in-1 instrument: Oscilloscope, spectrum analyser, signal generator, arbitrary waveform generator and data logger
- Feature-rich PicoScope 6 software stands for power and simplicity. Basic controls at your finger-tips, advanced features and controls never more than 2 menus deep
- Assured measurement accuracy and performance stems from our UK based design teams employing state-of-the-art manufacturing in the UK

PicoScope 5200 Series  
Uncompromising Performance

Other oscilloscopes in this price range force you to compromise on one of the three specifications. With the PicoScope 5200 series you no longer have to compromise.

- 250MHz bandwidth
- 1GS/s real-time sample rate
- 128 Msample buffer size



rswww.com

Model	Bandwidth (MHz)	Sample rate	Buffer size	Stock number	Price
PicoScope 2203	5	40MS/s	8k	445-129	£159
PicoScope 2204	10	100MS/s	8k	445-125	£225
PicoScope 2205	25	200MS/s	16k	445-135	£295
PicoScope 5203	250	1GS/s	32M	136-746	£1195
PicoScope 5204	250	1GS/s	128M	136-730	£1795

LL SERIES MONOLITHIC CERAMIC CAPACITORS

Three types of low ESL type ceramic capacitors offering high capacitance in ultra small case sizes, plated with Ni and Matte Sn. Ideal for use in high speed microprocessor and high frequency digital equipment.

- Good noise reduction at high frequencies
- Capacitance tolerance  $\pm 20\%$
- LLL Type: standard 2-terminal (reversed geometry)
- LLA Type: 8-terminal
- LLM Type: 10-terminal
- RoHS compliant
- Sold in multiples listed below

For the full range visit [rswww.com](http://rswww.com)



	Priced From
619-8276 LLL 4V 10 $\mu$ F (Qty 25)	£3.00
619-8327 LLM 6.3V 2200nF (Qty 10)	£2.40
619-8046 LLA 10V 470nF (Qty 25)	£2.25
619-8210 LLL 10V 470nF (Qty 25)	£0.98
619-8074 LLA 10V 1000nF (Qty 25)	£2.25
619-8068 LLA 10V 2200nF (Qty 25)	£2.25
619-8232 LLL 16V 100nF (Qty 25)	£2.10
619-8052 LLA 16V 220nF (Qty 25)	£2.25
619-8254 LLL 16V 220nF (Qty 25)	£2.25
619-8080 LLA 16V 470nF (Qty 25)	£2.10
619-8298 LL 16V 1000nF (Qty 25)	£2.10
619-8248 LLL 25V 15nF (Qty 25)	£0.88
619-8260 LLL 25V 47nF (Qty 25)	£2.10
619-8282 LL 25V 220nF (Qty 25)	£2.10
619-8305 LLL 25V 470nF (Qty 25)	£2.10

P Production packaging  
...and low prices

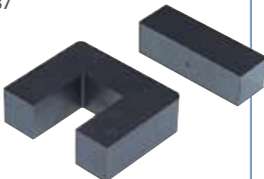
See page 4 or  
go online to [rswww.com](http://rswww.com)

NEW FERRITE CORES

Manufactured from SIFERRIT materials, these U and I cores are suitable for power, pulse and high voltage transformers such as: line deflection transformers, diode splitting transformers, energy storage chokes, ignition transformers, etc.

- U and I cores are supplied separately
- Materials N27 and N87

For full technical specifications see  
BOOK 2 page 2-2017



213-4470	U Core N27 5400nH	£22.80
647-9648	U Core N87 5700nH	£39.90
213-4486	I Core N27 7400nH	£16.15
647-9660	I Core N87 7900nH	£24.85

NEW CARBON COMPOSITION HIGH ENERGY RESISTORS

Designed for high energy pulse applications, ARCOL's RCC type, solid axial lead, carbon slug resistor offer unsurpassed quality and reliability with full RoHS compliance.

- Small size, high performance
- 0.25W dissipation
- Sold in packs of 25

For the full range visit [rswww.com](http://rswww.com)



	Priced From
385-932 10 $\Omega$	£2.00
386-935 15 $\Omega$	£2.00
385-910 100 $\Omega$	£2.00
386-931 150 $\Omega$	£2.00
385-922 1k $\Omega$	£2.00
385-893 1.1k $\Omega$	£2.00
386-834 1.2k $\Omega$	£2.00
386-941 1.5k $\Omega$	£2.00
386-593 1.8k $\Omega$	£2.00
385-926 10k $\Omega$	£2.00
386-880 15k $\Omega$	£2.00
385-900 100k $\Omega$	£2.00
386-874 110k $\Omega$	£2.00
386-824 120k $\Omega$	£2.00
386-890 150k $\Omega$	£2.00

NEW 1812LS SERIES FERRITE CHIP INDUCTORS

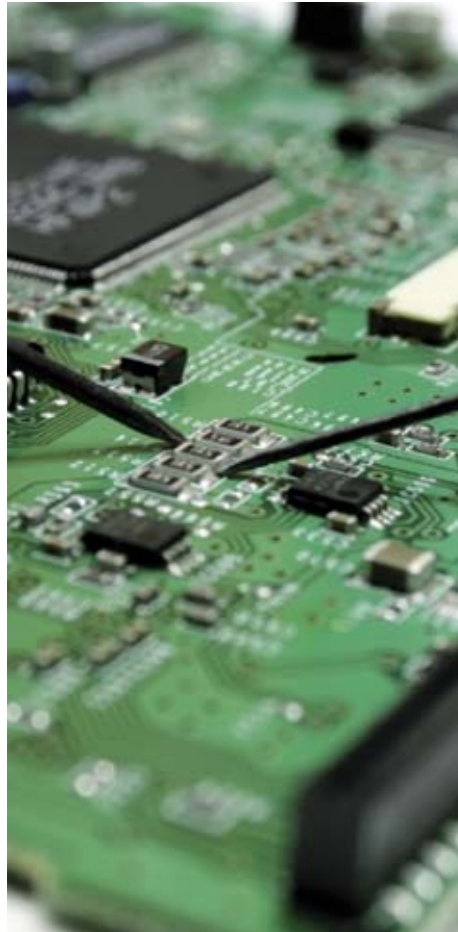
These ceramic chip inductors are ideal for electronic products needing a midrange inductance and close tolerance.

- Excellent current carrying capacity
- RoHS compliant
- 260°C compatible
- 5% tolerance
- Sold in packs of 10



COILCRAFT

	Priced per pack		Priced per pack
134-706 5.6 $\mu$ H	£5.20	654-0699 39nH	£5.20
134-699 6.8 $\mu$ H	£10.40	654-0683 47nH	£5.20
134-677 8.2 $\mu$ H	£5.20	654-0201 56nH	£5.20
134-712 10 $\mu$ H	£5.20	654-0295 68nH	£5.20
134-661 22 $\mu$ H	£10.40	654-0043 82nH	£5.20
134-683 33 $\mu$ H	£10.40	654-0289 100nH	£5.20
654-0065 12nH	£5.20	654-0015 120nH	£5.20
653-9942 15nH	£5.20	654-0093 180nH	£5.20
653-9936 18nH	£5.20	654-0037 220nH	£5.20
654-0605 27nH	£5.20	654-0009 270nH	£5.20



NEW PS-900 SOLDERING STATION

This versatile station uses variable power technology to produce high quality lead-free solder joints whilst protecting sensitive components from damage.

- Fixed temperature, variable power with no thermal overload
- Ergonomic, comfortable handle
- Auto-sleep workstand increases tip life
- Contents: 90W 110-240Vac power supply, iron, workstand and tip removal pad



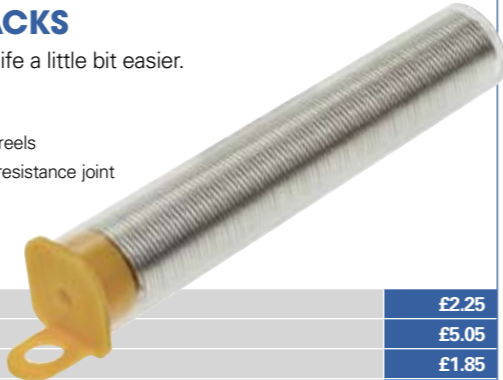
456-018

£139.00

NEW LEAD-FREE SOLDER PACKS

Supplied in handy sized dispensers to make life a little bit easier.

- Choice of copper or silver solder wire (0.8mm)
- Dispensers of approximately 4 metre tubes or 100g reels
- Silver solder has a lower melt point and gives a low resistance joint



272-634	Copper 13g tube	£2.25
272-640	Copper 100g reel	£5.05
273-255	Silver 13g tube	£1.85
273-249	Silver 100g reel	£4.20

BRASS SCREW KIT

Nickel plated brass slotted pan-head machine screws with nuts and plain washers supplied in a handy moulded plastic storage case.

- Screws to DIN85, nuts to DIN934 and washers to DIN125-1A
- 197 screws in total, 6 sizes M2.5 to M6 in 7 different lengths
- 1290 nuts and 1290 washers



482-7742

£78.44

ESD PLIERS

Cost effective tools manufactured to exacting DIN standards.

- Durable box-joint design
- Made from high grade steel
- Made in Germany to DIN ISO9655 standards



161-085	Snipe nose 145mm	£19.79
161-079	Snipe nose 120mm	£16.30
161-063	Flat nose 120mm	£16.30

THREADED SPACERS

Metric threaded insulated and non-insulated spaces with the same thread size at both ends.

- Nylon and nickel plated brass options

To view our full range visit [rswww.com](http://rswww.com)



653-9403	Nylon pillar male-female M3 x 13mm (Qty 50)	£33.00
325-738	Nylon spacer-female M3 x 8mm (Qty 50)	£6.00
653-9548	Nylon mini-pillar male-female M3 x 7mm (Qty 50)	£20.50
606-670	Brass male-female threaded hex spacer M3 x 5mm (Qty 50)	£7.00

80 SERIES CUTTERS

Manufactured to the highest standards and designed to cope with wiring found in the electronics industries.

- Drop-forged and lap-jointed
- Black oxidised for corrosion protection
- Comfortable plastic handles and return springs
- Cutting edges hardened to 63-65HRC



603-463	Spring wire cutter	£28.70
603-457	Oval head flush cutter	£26.50
614-766	Piano wire cutter	£33.50
400-8474	Small head cutter	£32.00

Flexible Pricing from RS

For orders over £1,000 take advantage of our flexible pricing service by calling:

0845 602 5226



16 DRAWER STORAGE UNIT

Convenient, cost effective storage.

- Manufactured from high impact plastic
- Label and slot on drawer front
- Size: H.208 W.208 D.222mm

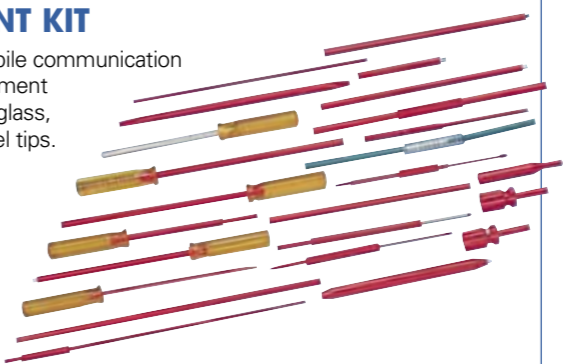


236-3583

£10.05

TRIMMER AND ALIGNMENT KIT

A must for engineers in electronics, mobile communication servicing etc, contains 25 assorted alignment tools made from butyrate, celon or fibreglass, some with screwdriver handles and steel tips.



736-074

£53.87

ELECTRO-WASH® MX

A high flash point cleaner that quickly removes soils, adhesives and residues from insulation jackets and conductors on telecom, fibre optic and coaxial cables.

- Leaves no residues
- Low odour
- Contains no CFCs, HCFCs or chlorinated solvents
- Available in a box of handy wipes or for precision application, a press-to-release pen with a fibre tip.



613-1475	Box of 25 wipes (254mm x 203mm)	£25.95
336-491	13ml pen	£5.20

FREEZER SPRAY

A useful and versatile, non-corrosive refrigerant that offers a rapid and safe method of cooling small components.

- Can also be used to shrink fit mechanical components
- Safe on most materials (test prior to use)
- Ozone depletion potential 0



846-682	400ml aerosol	£8.380
283-230	200ml aerosol	£8.55

NEW HIGH POWER INVERTIBLE AIRDUSTER

Quickly remove dust and airborne contamination from delicate or inaccessible electronic equipment with this powerful aerosol.

- Pure compressed inert gas
- Non-flammable
- Non-CFC and HCFC products



NEW PRECISION SLOTTED SCREWDRIVERS

Economical, precision screwdrivers with a rotating cap for precise adjustment and optimum drive.

- High grade chrome vanadium blades
- Tri-lobe handle for a comfortable grip



243-620	1.5mm slotted	£1.94
243-614	2.5mm slotted	£1.94
243-490	No. 0 Pozidriv®	£1.94
243-484	No. 1 Pozidriv®	£2.34



# How to select a fan for electronic equipment cooling

**Power losses, in the form of heat, occur in all electronic components. This heat not only warms the surrounding air; it is absorbed by the PCB, enclosure and adjacent components, raising their temperatures and reducing efficiency.**



The following questions guide fan selection at the design stage to give the required level of cooling.

## Where is heat generated?

Densely populated PCBs are a major source of heat. Miniaturization causes increased component densities, which can lead to components being placed too close together for convection cooling. Microprocessors, power supplies, high-powered LEDs and other semiconductors can be major sources of heat, so it's important to follow manufacturers' instructions for heatsinks.

## What are the restrictions on convection cooling?

Convection cooling happens when warm air rises up through equipment, drawing in cooler air at a lower level. For effective convection cooling, holes or slots are required to allow cooling air in and out, and the air currents need clear, well planned

paths to pass through the equipment.

## How much space is available?

Putting it simply, the larger the free space inside the fan venturi, the more air passes through it. Also, the greater the fan depth, the higher the pressure generated. So, if a large amount of cooling is needed, a small fan won't be able to supply all the air required. But remember that it's always worth choosing the largest fan that space will allow.

## Choosing between AC or DC fans

DC fans are more flexible than AC devices because blade speed is directly related to input voltage. The wide range of sizes and DC voltages allows flexibility to match the airflow to the cooling requirements, while keeping noise to a minimum. The life expectancy of a DC fan is longer than a comparable AC fan because they are up to

five times as efficient. Lastly, don't forget the safety requirements associated with mains-powered AC fans.

## Does the fan need monitoring?

Fan performance problems can be caused by blocked filters, blade obstruction, power supply failure or the fan approaching its end of life. There are applications where any problem might be critically important, so monitoring the fan provides early warning of a potential system failure.

DC fans use a Hall device to generate a signal to feed into a monitor circuit that can generate an alarm signal when the fan is slowing down.



## Does the fan need to be controlled?

Fans such as the ebm-Papst Variofan control the speed for a particular temperature range, automatically producing more or less air flow, depending on the temperature.

## Life expectancy

Fan life is specified by an 'L' figure, the expected life which will be achieved by 90% of the products. Fan manufacturers normally provide life figures such as 30,000 hours (3.42 years) at 65 °C, the maximum rated temperature. If the fan operates at a lower temperature or is not running continually, the period will be extended.

## Is noise a problem?

Fan noise is a fact of life. It depends on bearing noise, air noise (fan blades slicing through the air), the venturi (designed to increase the air pressure as it passes through the fan) and operating speed (the slower the fan runs, the quieter it will be for its size). Furthermore, fans mounted directly to a metal panel can cause it to vibrate and resonate. Use anti-vibration mounts to prevent this.

## Conclusion

All too often, fans are only specified during the prototype build. The equipment heats up, so a cooling fan is added. This is the worse case scenario - the electronics work, the box size is fixed, so the fan is selected to fit the available space.

Since temperature rise in electronic equipment is inevitable, the components' thermal properties and the airflow through the box should always form part of the design process.

## Remember:

- Plan ahead
- Design with cooling in mind Ensure all boxes have ventilation holes (necessary even without forced cooling)

Article by Geoff Lockwood, Technical Director, ebm-papst UK Ltd.

For more information on fan selection, please see additional documents and resources in the Thermal Management section of our [rswww.com/electronics](http://rswww.com/electronics) website. ■

**THERMAL MANAGEMENT SOLUTIONS GUIDE**

Available to download or request a copy at [rswww.com/electronics](http://rswww.com/electronics)

**NEW IP55 MAINS FILTER FANS**

Unique pleated fabric filter and louvre design gives high airflow at IP55. The patented water and dust pre-separation system ensures the majority of water and dust never reach the filter mat, extending its lifetime and reducing maintenance requirements.

- Extremely high air flow (Highest in the market)
- Reversibility
- Click and fit design
- UV stable and suitable for use in outdoor applications without any extra protection
- Fully certified
- 25 design patents

A wide selection of new Filter Fans are available – see the Thermal Management page at [rswww.com/electronics](http://rswww.com/electronics)

Stock No.	Dimensions mm (HxWxD)	Price
251-015	145 x 145 x 70	£52.96
250-797	252 x 252 x 113	£68.14
250-775	320 x 320 x 150	£109.18

**1.5V ANALOGUE TEMPERATURE SENSORS**

As the industry's first 1.5V analogue temperature sensors with user-selectable gains, the LM94021 and LM94022 precision analogue-output CMOS temperature sensors increase thermal management performance in low-voltage systems. These temperature sensors' wide range of operation (-50°C to 150°C), flexibility (four user-selectable gains) and low-power performance make them well-suited for low-voltage, battery-powered systems such as cellular phones, PDAs, MP3 players and digital cameras.

- Vcc = 1.5V to 5.5V
- Four user-selectable programmable gain options: -5.5 mV per degrees C, -8.2 mV per °C, -10.9 mV per °C or -13.6 mV per °C
- Low quiescent currents
- SC70 package
- Industry-standard LM20 footprint
- Sold as pack of 5

651-2672	LM94021BIMG	£0.62
639-4014	LM94022BIMG	£0.62

**NEW PC FANS**

These case-mount fans for personal computers help prevent component instability and prolong the life of the PC.

- Fitted with 3 way Molex connector
- Airflow up to 82.4m³/h
- Include sensor signal for speed monitoring
- Aerodynamic features achieve low noise emissions
- Long life expectancy

More new PC Fans are available – see the Thermal Management page at [rswww.com/electronics](http://rswww.com/electronics)

Stock No.	Dimensions mm (HxWxD)	Price
426-386	40 x 40 x 10	£12.35
426-326	50 x 50 x 15	£13.25
426-348	60 x 60 x 15	£15.55
426-392	70 x 70 x 15	£13.35
426-360	80 x 80 x 25	£15.59
426-342	119 x 119 x 25	£25.29

**GAP PAD® 2000S40**

Adapted for electrical insulation and as thermal joints on assemblies of components where the height varies.

- The thicknesses available (0.5, 1, 2, 3 and 4 mm) mean that GAP Pads can be used when the texture of the surface varies
- Excellent elasticity
- Thermal Conductivity 2.0 W/mK
- Breakdown Voltage 13,400Vac/mm
- Operating Temperature -60°C to +200°C

For full range of sizes and thicknesses, visit [rswww.com/electronics](http://rswww.com/electronics)

Stock No	Dimensions/Thickness (mm)	Price Each
491-4054	101.6x101.6/1.02	£16.52
491-4105	203.2x101.6/2.03	£34.33
491-4155	203.2x406.4/3.18	£168.67

**BGA HEATSINK, TAPE MOUNTING**

A range of anodised pin heatsinks with thermally conductive adhesive tape mounting.

- Saves board space by eliminating mounting holes
- Convenient quick and clean peel and stick assembly
- Pin Fin array allows omni-directional airflow to maximize heat dissipation
- Height = 18mm

104-036	23x23mm, 23.4 °C/W	£1.22	103-948	35x35mm, 15.3 °C/W	£1.65
103-926	27x27mm, 20.3 °C/W	£1.20	103-932	40x40mm, 12.2 °C/W	£1.20



# Heavy duty connectors to use where vibration, water ingress or corrosion are a problem

If you're looking for a heavy duty connector, Tyco Electronics specialises in the development and manufacturing of HTS heavy duty connectors that serve a wide range of industries including industrial, construction, rail, shipbuilding and electrical power utilities.

Apart from the well-known standard connectors (6 - 24 pins), the product range also offers product series featuring a high number of pins (up to 216) and high current connectors of up to 500 A. The housings are made from aluminium die-cast and are classed IP code 65 - 68. The HTS range is cost effective, EMI-protected, corrosion-protected and ideal for a large variety of customer applications including machinery, manufacturing equipment, factory automation, field instrumentation, power and signalling.



**Tyco Electronics**  
Our commitment. Your advantage.

www.tycoelectronics.com  
HTS, Tyco Electronics Device and Tyco Electronics are trademarks



## VANDAL-PROOF SWITCHES

MSM metal switches, stylish, elegant design and extremely robust with an IP67 rating which makes them ideal for use in industrial automation, food processing, vending machines and applications where vandalism is likely to occur.

- MSM LA Latching Switch:**
- Two electrically isolated contacts, can be used for single/two-pole applications
  - 19mm and 22mm mounting diameter options
  - Temperature range -25°C to +85°C
  - Rating: 30Vdc to 250Vac at 12A maximum switching
  - Illuminated option available

- MSM DP (Double-pole) Switch**
- Two separate switch contacts can be used as N/O, N/C or as change-over functions
  - Can also be used in applications where an additional second contact is required for a safety circuit
  - Switching capacities: 3A 250Vac, 5A 125Vac

- MSM Momentary Switch with IP67 Contact System**
- Increases the safety and performance in critical applications
  - Fits tight to the panel with a height of only 1.7mm
  - 19mm and 22mm mounting diameter options
  - Ring illuminated options for dark conditions or disability access systems
  - Rated to 6A 250Vac



436-872	MSM 19LA Latching Switch Ring illuminated red	£26.60
436-890	MSM19 LA Latching Switch Ring illuminated green	£26.60
436-935	MSM22 LA Latching Switch Ring illuminated green	£27.60
436-884	MSM22 LA Latching Switch Ring illuminated blue	£33.00
436-917	MSM19 DP Momentary Switch double pole Ring illuminated red	£23.80
436-901	MSM19 DP Momentary Switch double pole non illuminated	£10.20
436-939	MSM19 DP Momentary Switch double pole Ring illuminated blue	£25.00
436-913	MSM22 DP Momentary Switch double pole Ring illuminated blue	£28.80
426-477	MSM19 Momentary Switch non illuminated IP67 contact system	£9.00
426-471	MSM19 Momentary Switch non illuminated IP67 contact system	£22.60
429-461	MSM22 Momentary Switch non illuminated IP67 contact system	£9.80
436-929	MSM22 Momentary Switch Ring illuminated red IP67 contact system	£23.40



## NEW TECHNOLOGY SWITCHES

ActiveTouch patented touch sensitive technology brings a whole new level of durability to switches, sensors and control systems.

Applications include medical, military, marine, ATMs, pharmaceutical, security, clean rooms, gaming, food processing, vandal resistant point of sale etc.

Material capable of supporting shear and torsional mechanical waves at ultrasonic frequencies can have those waves trapped or localised by contouring its surface (Fig.1).

When the integral ultrasonic transducer is set in motion it generates a resonant vibration. A finger or gloved hand touching the surface of the resonant cavity dampens the vibration and reduces the regions ring-down time. Which like a bell that has been struck, creates a decay rate that is then detected by a microprocessor (Fig. 2).

When the time to the threshold value is lower than a pre-set value the microprocessor is programmed to indicate switch actuation (Fig.3).

Visit [rswww.com/electronics](http://rswww.com/electronics) for lots more information on this exciting new technology.



Fig. 1 Trapped torsional mode is the key to the technology's unprecedented performance



Fig. 2 Resonant ring-down reduction waveform & Dampened ring-down reduction waveform



Fig. 3 The decay rate has changed. Actuation is triggered

445-191	19mm s/steel 5V switch digital output	£29.85
445-147	22mm s/steel 10-12V switch O/C output	£29.85
445-185	30mm s/steel 5V switch O/C output	£36.20
445-181	19mm aluminium clear 5V switch digital output	£24.60
445-220	22mm aluminium clear 5V switch digital output	£25.80
445-157	30mm aluminium clear 5V switch O/C output	£28.99
445-153	16mm non-illuminated latching switch	£6.95
445-179	3 x 4 keypad	£93.98
445-175	4 x 4 keypad	£99.98



ISO-TECH

IPS 1603D PSU

A rugged, high specification digital instrument with all the features of the popular 1810H, but with individual LED displays of voltage and current.

- Constant current/voltage operation
- Coarse and fine controls of voltage and current
- Overload and short circuit protection
- Voltage range 0-60V, Current range 0-3A



204-729	IPS1603D	£309.00
204-791	+RS Cal	£354.00
669-996	+UKAS Cal	£372.50

IPS1810H PSU

Rugged, high specification units for both industrial and educational use.

- Constant voltage and constant current operation
- Two 60mm x 80mm analogue meters
- Coarse and fine control of voltage and current
- Overload and short circuit protection
- Voltage range 0-18V, Current range 0-10A



204-713	IPS1810H	£349.00
204-785	+RS Cal	£394.00
669-980	+UKAS Cal	£412.50

IPS303A PSU

A very cost effective analogue instrument that's easy to use and control, which makes it ideal for laboratory, schools and production lines.

- Constant voltage and constant current operation
- Excellent output regulation
- Can be connected in series or parallel
- Voltage range 0-30V , current range 0-3A
- Remote voltage and current setting capability



201-3424	IPS303A	£174.00
208-5104	+RS Cal	£219.00
208-5110	+UKAS Cal	£237.50

IPS2050 & IPS3630 1000W PROGRAMMABLE SWITCHING POWER SUPPLIES

High power, highly efficient units for constant voltage and constant current operation.

- Low ripple and noise
- Backlit LCD display
- RS-232 interface
- Over-voltage, current and temperature protection
- Wide input voltage range and high power factor
- IPS2050: 2 to 20V, 0 to 50A
- IPS3630: 3 to 36V, 0 to 30A



513-4984	IPS2050	£845.00
514-2058	+RS Cal	£890.00
513-5016	IPS3630	£845.00
514-2109	+RS Cal	£890.00

IPS303DD DC PSU

Flexible single display digital metering dual-voltage bench unit capable of 0-30V 0-3A output with low ripple and noise.

Common Features

- Supply voltage ac 100-120/220-240V 50/60Hz, switchable
- Number of outputs 1
- Separate 3 digit LED voltage and current meters
- Two units can be connected for series or parallel operation
- Weight 5kg
- Dimensions (mm) W 128, H 145, D 285



325-6004	IPS303DD	£174.00
329-3249	+RS Cal	£219.00
329-3255	+UKAS Cal	£235.50



New!

FLUKE®

Fluke 8808A 5.5 Digit Multimeter

Versatile multimeter for manufacturing, development and service applications

The Fluke 8808A 5.5 digit multimeter is a cost-effective solution providing the performance and flexibility required from a bench meter in R&D, development and service applications.

The Fluke 8808A is remarkably easy-to-use particularly in production applications, making the measurements you perform most often extremely easy and fast to do. Setup buttons on the front panel allow the meter to be easily set up for common measurements.

8808A Features

- 5.5 digit resolution
- Basic VDC accuracy of 0.01%
- Dual display
- Dedicated DC leakage current measurement
- 2 x 4 ohms 4-wire measurement technique
- 6 dedicated buttons for fast access to instrument setups
- Hi/Lo limit compare for Pass/Fail testing

Perform 4-wire measurements with only two leads on the Fluke 88xx Series

Patented split terminal jacks for the 2 x 4-wire ohms function allow you to perform 4-wire measurements using only two leads with the Fluke TL2X4W test lead accessory.

Fluke. Keeping your world up and running.™

Fluke Part Number	Stock No.	Price Each
Fluke 8808 Bench DMM	414-193	£427.00
Fluke TL2X4W	648-1556	£48.00

IDM91E

Enhanced version of the popular 91 multimeter has a 2000 count and a large 20mm digit high contrast display.

- Water resistant, O ring sealed case
- Diode test and continuity bleeper
- Fuse protection for both 200mA and 10A current ranges
- Beep guard system warns when probes are incorrectly connected
- Meets IEC1010-1 600V CAT II
- Supplied with: protective holster, fitted 9V PP3 alkaline battery, test lead set and instructions



ISO-TECH

159-2140	IDM 91E	£61.75
159-2162	+RS Cal	£98.75
159-2156	+UKAS Cal	£116.75

625 THERMOHYGROMETER

A long-term, drift-free thermohygrometer with a built-in humidity probe head for measuring air moisture and temperature. Ideal for periodic checks of environmental test chambers.

- Large 2-line display shows temperature, relative humidity, wet bulb temperature and dewpoint
- Humidity probe can be removed for use in hard to access areas
- Max/Min, Auto-off and Hold functions
- Measurement range: -10°C to +60°C, 0 to 100%RH
- 2 year guaranteed long-term stability
- Wide range of accessories

For the full range of accessories see BOOK 4 page 4-5575



518-4743	£166.40
----------	---------

VIEW 2 DATALOGGERS

Now equipped with a large LCD display and perfect for longer term monitoring of environmental test chambers.

- User programmable logging interval 1sec to 10 days
- Two user programmable alarms
- Fast data off-load via serial or USB cable
- User replaceable battery with up to 2 years life
- IP54 splashproof case

For the full specifications and range of accessories see BOOK 4 page 4-5612



Tinytag

283-937	Internal temperature sensor logger	£110.00
283-909	Ext. temperature probe logger	£145.00
283-921	Internal temperature & RH sensors logger	£165.00