

# Gopher: Find Me A Microcontroller



William Wong Bill is a staff editor for Electronic Design focusing on embedded, software, and systems. He is also the editor for the Embedded in Electronic Design department and the weekly hands-on column, EiED Online.

**Email address:** [bwong@penton.com](mailto:bwong@penton.com)

**Web site:** <http://www.elecdesign.com/Departments/DepartmentID/67/67.html>

[William Wong](#)

ED Online ID #19692

September 10, 2008

What do you do when you start a new microcontroller project? Crack the product catalog or log onto a vendor's Web site? Sticking with paper is tedious. A single vendor can have literally hundreds of chips that are potential candidates for your next project. Using a vendor's Web site is better but what about comparing products or searching with criteria that the vendor does not support? That is what GruntWare's Gopher is for.

Gopher is essentially a front-end to a database of microcontroller specifications. The application starts with a set of basic filters, including the vendor as well as basic criteria such as the number of serial ports or CAN ports ([Fig. 1](#)). This is on par with what most vendor sites provide but its cross vendor support makes comparisons significantly easier.

But where Gopher shines is in its detailed search criteria ([Fig. 2](#)). There are literally pages of details allowing you to fine tune the search for peripheral specifications down to the bit or temperature detail. The search options are Gopher-specific, but they're easy to learn and utilize. The challenge, really, is the number of options. Unfortunately, there is no grouping of the options even into major categories such as Analog Peripherals or Memory. There are literally hundreds of options, which is obviously good, but knowing what to use and finding them is not.

The final result is a list of chips with all their details ([Fig. 3](#)). This is where the big nit is. The list has hundreds of columns. It is possible to hide and size columns. It is also possible to do more than one search, but typically you need to print out the result to see everything.

Of course, while I'm nitpicking, another chink in the armor is Gopher's inability to save results in a spreadsheet or data format where they could be manipulated or used in reports—since justification of a selection is often part of the job.

For an initial release, Gopher is worth the investment. The time you save easily offsets its cost. Just think of how many hours you would spend browsing the Internet to get this kind of information especially if you have not chosen your supplier.

Gopher is priced at \$299 plus shipping.

GruntWare

[www.gruntwareinc.com](http://www.gruntwareinc.com)

**Gopher - Pre-Conditions**

**Pre-Conditions for Pin Sharing That Must Be Met Before Searching** What Does This Mean?

|                                |   |                                     |                                |                       |
|--------------------------------|---|-------------------------------------|--------------------------------|-----------------------|
| <input type="text" value="0"/> | Number of analog comparisons required (GPIO)  | <b>Serial Communications (GPIO)</b> | <input type="text" value="0"/> | Nbr of CAN Interfaces |
| <input type="text" value="0"/> | Total number of external Timer Compare signals that are required (Timers / GPIO)  | <input type="text" value="0"/>      | Nbr of LIN Interfaces          |                       |
| <input type="text" value="2"/> | Number of Timer Captures that are required (Timers/GPIO)  | <input type="text" value="1"/>      | Nbr of I2C Interfaces          |                       |
| <input type="text" value="4"/> | Number of A/D MCU pins required (if you use a mux, only indicate the number of A/D MCU pins required. If you required differential ended inputs, enter two times the required number) (ADCchans / GPIO) | <input type="text" value="0"/>      | Nbr of SCI Interfaces          |                       |
| <input type="text" value="0"/> | Number of D/A outputs required. (DAC / GPIO)  | <input type="text" value="1"/>      | Nbr of SPI Interfaces          |                       |
| <input type="text" value="2"/> | Number of UART's required. (GPIO)   | Number of Timers Required: 2        |                                |                       |
| <input type="text" value="0"/> | Number of external I/O Triggers required that are exclusive of the ones stated above (GPIO)   |                                     |                                |                       |
| <input type="text" value="0"/> | Number of GPIOs required that are exclusive of the ones stated above (GPIO)   |                                     |                                |                       |

**Optional Parameters that are Commonly Specified** What Does This Mean?

|   |   |   |
|---|---|---|
| CPU Size (Number of data bits)<br><input type="radio"/> n/a <input type="radio"/> 4 <input checked="" type="radio"/> 8 <input type="radio"/> 16 <input type="radio"/> 32 <input type="radio"/> 64 | Program Memory Type<br><input type="radio"/> n/a <input checked="" type="radio"/> Flash <input type="radio"/> OTP <input type="radio"/> EROM <input type="radio"/> Mask | <input type="checkbox"/> Vcc (Min)            |
| <input type="text"/> Program Memory Size in Bytes (nn,nnn) (Min)  |   | <input type="checkbox"/> Vcc (Max)            |
| <input type="text"/> RAM Memory Size in Bytes (nn,nnn) (Min)  |   | <input type="checkbox"/> Operating Temp (Min) |
|   |   | <input type="checkbox"/> Operating Temp (Max) |

Project Name: **test**

## Step 1: Pre-conditions

Gopher - Parameter Search

## Parametric Search

0 Parts Found
[Allowable Expressions](#)
[Print Options](#)

[Multiple Vendor Search](#)
[Clear List](#)
[Expression Tips](#)

[Master Label List](#)
[Show Existing Data](#)

|                        |                                  |                       |                                  |                         |                      |                       |                      |
|------------------------|----------------------------------|-----------------------|----------------------------------|-------------------------|----------------------|-----------------------|----------------------|
| 1 PartNbr . . .        | <input type="text"/>             | 21 Ext_Triggers . . . | <input type="text"/>             | 41 Timers_12bit . . .   | <input type="text"/> | 61 XY_Drvtr . . .     | <input type="text"/> |
| 2 Status . . .         | <input type="text"/>             | 22 Timer_Nbrs . . .   | <input type="text"/>             | 42 Timers_14bit . . .   | <input type="text"/> | 62 Tot_Ad_Spcae . . . | <input type="text"/> |
| 3 CPU . . .            | <input type="text"/>             | 23 Timer_CAP . . .    | <input type="text" value="p=2"/> | 43 Timers_16bit . . .   | <input type="text"/> | 63 Int_Cache . . .    | <input type="text"/> |
| 4 CPU_Size . . .       | <input type="text" value="=8"/>  | 24 Timer_Cmp . . .    | <input type="text"/>             | 44 Timers_18bit . . .   | <input type="text"/> | 64 Ex_Cache . . .     | <input type="text"/> |
| 5 RAM . . .            | <input type="text"/>             | 25 UART . . .         | <input type="text"/>             | 45 Timers_24bit . . .   | <input type="text"/> | 65 MMU . . .          | <input type="text"/> |
| 6 FRDM . . .           | <input type="text" value="p=0"/> | 26 UART_Nbrs . . .    | <input type="text" value="p=2"/> | 46 Timers_32bit . . .   | <input type="text"/> | 66 MPU . . .          | <input type="text"/> |
| 7 PROM . . .           | <input type="text"/>             | 27 CAN . . .          | <input type="text"/>             | 47 Bus_Size . . .       | <input type="text"/> | 67 EMIF . . .         | <input type="text"/> |
| 8 EROM . . .           | <input type="text"/>             | 28 LIN . . .          | <input type="text"/>             | 48 MCU_Freq . . .       | <input type="text"/> | 68 Ex_Bus_Ctrl . . .  | <input type="text"/> |
| 9 MROM . . .           | <input type="text"/>             | 29 I2C . . .          | <input type="text" value="=Y"/>  | 49 Bus_Freq . . .       | <input type="text"/> | 69 DMA . . .          | <input type="text"/> |
| 10 Sply_V_Min . . .    | <input type="text"/>             | 30 SCI . . .          | <input type="text"/>             | 50 MIPS . . .           | <input type="text"/> | 70 DMA_Chans . . .    | <input type="text"/> |
| 11 Sply_V_Max . . .    | <input type="text"/>             | 31 SPI . . .          | <input type="text" value="=Y"/>  | 51 FLOPS . . .          | <input type="text"/> | 71 Clk_PLL . . .      | <input type="text"/> |
| 12 Oper_Temp_Min . . . | <input type="text"/>             | 32 WDT . . .          | <input type="text"/>             | 52 Min_Instr_Exec . . . | <input type="text"/> | 72 On_Chip_Dsc . . .  | <input type="text"/> |
| 13 Oper_Temp_Max . . . | <input type="text"/>             | 33 RTC . . .          | <input type="text"/>             | 53 Dheystones . . .     | <input type="text"/> | 73 Sub_Clk . . .      | <input type="text"/> |
| 14 ADC_Chans . . .     | <input type="text" value="p=4"/> | 34 POR . . .          | <input type="text"/>             | 54 Nbr_Instr . . .      | <input type="text"/> | 74 Freq_Div . . .     | <input type="text"/> |
| 15 ADC_Resol . . .     | <input type="text"/>             | 35 BOR . . .          | <input type="text"/>             | 55 Mply_Instr . . .     | <input type="text"/> | 75 OSD . . .          | <input type="text"/> |
| 16 Analog_Cmp . . .    | <input type="text"/>             | 36 PeriphPinSel . . . | <input type="text"/>             | 56 MAC_Instr . . .      | <input type="text"/> | 76 LVD . . .          | <input type="text"/> |
| 17 DAC_Chans . . .     | <input type="text"/>             | 37 Vol_Price . . .    | <input type="text"/>             | 57 M_MAC . . .          | <input type="text"/> | 77 Core_Sply_V . . .  | <input type="text"/> |
| 18 DAC_Resol . . .     | <input type="text"/>             | 38 Descr . . .        | <input type="text"/>             | 58 PEAK_MAC . . .       | <input type="text"/> | 78 IO_Sply_V . . .    | <input type="text"/> |
| 19 OpAmps . . .        | <input type="text"/>             | 39 Timers_8bit . . .  | <input type="text"/>             | 59 FPU . . .            | <input type="text"/> | 79 IO_V_Min . . .     | <input type="text"/> |
| 20 GPIO . . .          | <input type="text"/>             | 40 Timers_10bit . . . | <input type="text"/>             | 60 Barrel_Shflter . . . | <input type="text"/> | 80 IO_V_Max . . .     | <input type="text"/> |

[<Prev>](#)
1-80
**81-160**
161-240
241-320
321-400
[<Next>](#)

Project Name: test

## Step 2: Refine the search conditions

GruntWare Note: The following screen indicates that Gopher found 1571 MCU parts based on the search criteria given in Step 2 above. By adding additional search parameters, one can easily trim the number of returned parts to just a handful.

|    | Vendor | PartNbr      | Status     | CPU  | CPU_Size | RAM  | FROM   | PROM | EROM | MROM | Sply_V_Min | Sply_V_Max | Oper_Temp |
|----|--------|--------------|------------|------|----------|------|--------|------|------|------|------------|------------|-----------|
| 1  | ATM    | AT89C2051    | Production | 8051 | 8        | 128  | 2048   |      |      |      | 2.7        | 6          | -40       |
| 2  | ATM    | AT89C4051    | Production | 8051 | 8        | 128  | 4096   |      |      |      | 2.7        | 6          | -40       |
| 3  | ATM    | AT89C5115    | Production | 8051 | 8        | 512  | 16384  |      | 2048 |      | 3          | 5.5        | -40       |
| 4  | ATM    | AT89C5130A-M | Production | 8051 | 8        | 1280 | 16384  |      | 1024 |      | 2.7        | 5.5        | -40       |
| 5  | ATM    | AT89C5131A-L | Production | 8051 | 8        | 1280 | 32768  |      | 1024 |      | 3          | 3.6        | -40       |
| 6  | ATM    | AT89C5131A-M | Production | 8051 | 8        | 1280 | 32768  |      | 1024 |      | 2.7        | 5.5        | -40       |
| 7  | ATM    | AT89C5132    | Production | 8051 | 8        | 2304 | 65536  |      |      |      | 2.7        | 3.6        | -40       |
| 8  | ATM    | AT89C51AC2   | Production | 8051 | 8        | 1280 | 32768  |      | 2048 |      | 3          | 5.5        | -40       |
| 9  | ATM    | AT89C51AC3   | Production | 8051 | 8        | 2304 | 65536  |      | 2048 |      | 3          | 5.5        | -40       |
| 10 | ATM    | AT89C51CC01  | Production | 8051 | 8        | 1280 | 32768  |      | 2048 |      | 3          | 5.5        | -40       |
| 11 | ATM    | AT89C51CC02  | Production | 8051 | 8        | 512  | 16384  |      | 2048 |      | 3          | 5.5        | -40       |
| 12 | ATM    | AT89C51CC03  | Production | 8051 | 8        | 2304 | 65536  |      | 2048 |      | 3          | 5.5        | -40       |
| 13 | ATM    | AT89C51ED2   | Production | 8051 | 8        | 2048 | 65536  |      | 2048 |      | 2.7        | 5.5        | -40       |
| 14 | ATM    | AT89C51IC2   | Production | 8051 | 8        | 1280 | 32768  |      |      |      | 2.7        | 5.5        | -40       |
| 15 | ATM    | AT89C51ID2   | Production | 8051 | 8        | 2048 | 65536  |      | 2048 |      | 2.7        | 5.5        | -40       |
| 16 | ATM    | AT89C51RB2   | Production | 8051 | 8        | 1280 | 16384  |      |      |      | 2.7        | 5.5        | -40       |
| 17 | ATM    | AT89C51RC    | Production | 8051 | 8        | 512  | 32768  |      |      |      | 4          | 6          | -40       |
| 18 | ATM    | AT89C51RC2   | Production | 8051 | 8        | 1280 | 32768  |      |      |      | 2.7        | 5.5        | -40       |
| 19 | ATM    | AT89C51RD2   | Production | 8051 | 8        | 2048 | 65536  |      |      |      | 2.7        | 5.5        | -40       |
| 20 | ATM    | AT89C51RE2   | Production | 8051 | 8        | 8448 | 131072 |      |      |      | 2.7        | 5.5        | -40       |
| 21 | ATM    | AT89C51SND1C | Production | 8051 | 8        | 2304 | 65536  |      | 4096 |      | 2.7        | 3.6        | -40       |
| 22 | ATM    | AT89C51SND2C | Production | 8051 | 8        | 2304 | 65536  |      | 4096 |      | 2.7        | 3.6        | -40       |
| 23 | ATM    | AT89C594D    | Production | 8051 | 8        | 256  | 20480  |      |      |      | 4          | 6          | -40       |
| 24 | ATM    | AT89LP2052   | Production | 8051 | 8        | 256  | 2048   |      |      |      | 2.4        | 5.5        | -40       |
| 25 | ATM    | AT89LP213    | Production | 8051 | 8        | 128  | 2048   |      |      |      | 2.4        | 5.5        | -40       |
| 26 | ATM    | AT89LP214    | Production | 8051 | 8        | 128  | 2048   |      |      |      | 2.4        | 5          | -40       |
| 27 | ATM    | AT89LP216    | Production | 8051 | 8        | 128  | 2048   |      |      |      | 2.4        | 5.5        | -40       |
| 28 | ATM    | AT89LP4052   | Production | 8051 | 8        | 256  | 4096   |      |      |      | 2.4        | 5.5        | -40       |
| 29 | ATM    | AT89LS51     | Production | 8051 | 8        | 128  | 4096   |      |      |      | 2.7        | 4          | -40       |
| 30 | ATM    | AT89LS52     | Production | 8051 | 8        | 256  | 8192   |      |      |      | 2.7        | 4          | -40       |
| 31 | ATM    | AT89LV55     | Production | 8051 | 8        | 256  | 20480  |      |      |      | 2.7        | 5.5        | -40       |
| 32 | ATM    | AT89S2051    | Production | 8051 | 8        | 256  | 2048   |      |      |      | 2.7        | 5.5        | -40       |
| 33 | ATM    | AT89S4051    | Production | 8051 | 8        | 256  | 4096   |      |      |      | 2.7        | 5.5        | -40       |
| 34 | ATM    | AT89S51      | Production | 8051 | 8        | 128  | 4096   |      |      |      | 4          | 5.5        | -40       |
| 35 | ATM    | AT89S52      | Production | 8051 | 8        | 256  | 8192   |      |      |      | 4          | 5.5        | -40       |
| 36 | ATM    | AT89S8352    | Production | 8051 | 8        | 256  | 12288  |      | 2048 |      | 2.7        | 5.5        | -40       |

### Step 3: List of results