

μSmartDigi™

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μSmartDigi™

◆ μSmartDigi™ APRS® Digipeater

◆ μSmartDigi™ D-Gate™ D-STAR Gateway

◆ μSmartDigi™ ???

μSmartDigi™ Basics

- ◆ 1.5in x 2.5in PCB Expansion Board for Coastal ChipWorks TNC-X
- ◆ CPU is Microchip's dsPIC 30F/33FJ DSP Microcontroller Family
- ◆ 30+ MIPS
- ◆ Powered at 8-16 VDC, 100-200 mA
- ◆ Programmed in native C

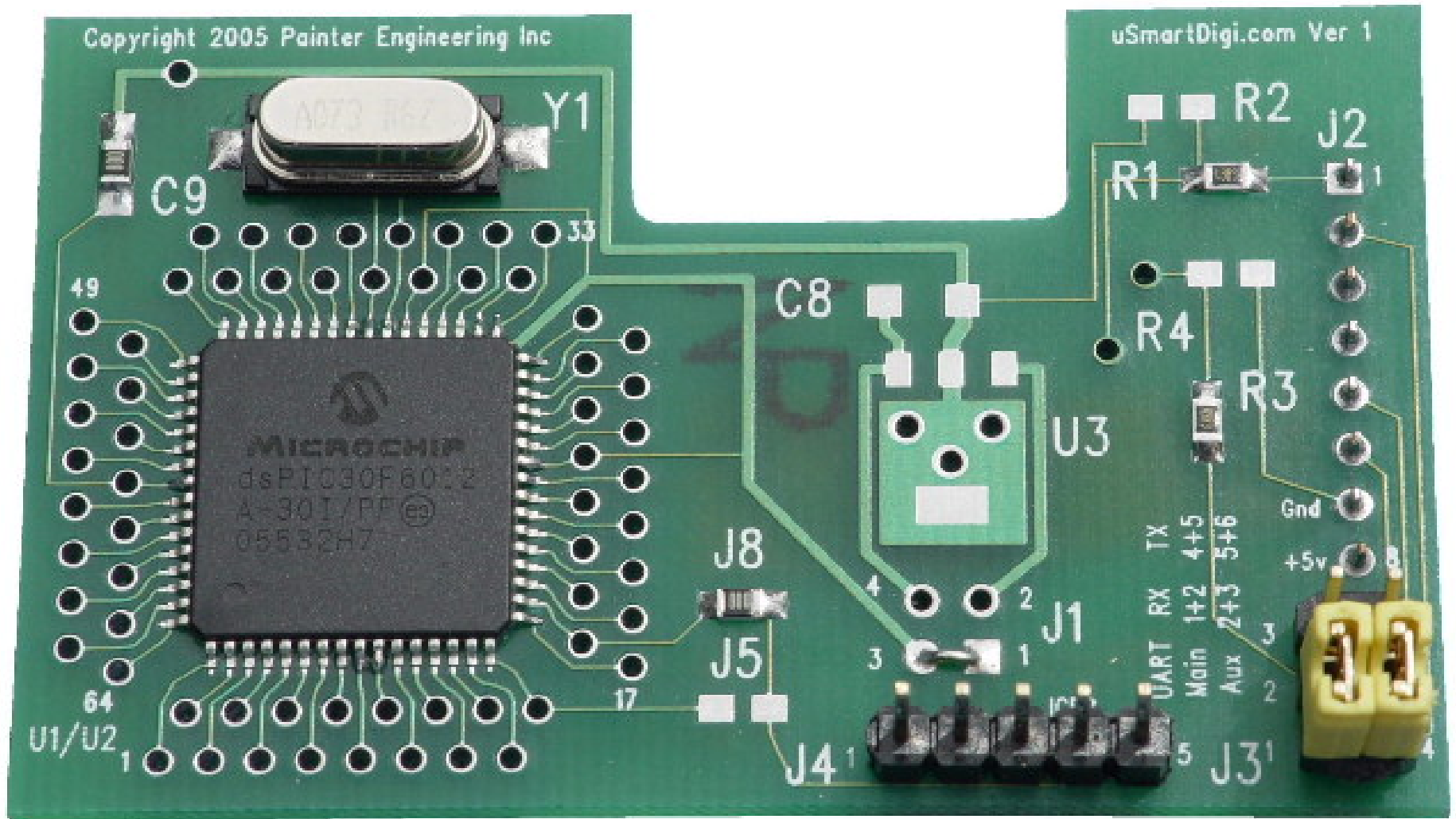
μSmartDigi™ Basics

◆ CPU Capacities

- 128-256 kB Program Memory
- 48 k Instructions
- 8-16 kB SRAM
- 4 kB EEPROM

◆ Current Use

- ~89 kB Program Memory
- ~8 kB SRAM, ~2.8 kB EEPROM



µSmartDigi™ Common Features

- ◆ Operates without dedicated PC/Laptop
- ◆ Firmware is Field Flashable without special hardware
- ◆ Configuration and Rules stored in EEPROM
- ◆ Interactive Monitor for Configuration changes and Message Logging

µSmartDigi™ Common Features

◆ PC/Laptop Utility

- Processes Configuration and Rules from ASCII text files
- Performs extensive error checking
- Downloads Configuration and Rules into EEPROM
- Flashes Firmware distributed in Intel Hex format (standard for Microchip)

μSmartDigi™ Common Features

◆ PC/Laptop Utility cont.

- Communicates with **μSmartDigi™** over RS-232 or TNC-X Optional USB Module

◆ Use PC/Laptop Terminal Emulator, etc. to Monitor Logged Messages, directly enter Configuration Parameters (but not Rules)

μSmartDigi™ Common Features

- ◆ User-configurable Rule Processing
- ◆ Log output is UI-View style
- ◆ Performs Duplicate Checking

μSmartDigi™ Common Features

- ◆ Duplicate Checking Function
 - Fields src, src ssid, dst, info
 - Uses Fast CCITT CRC16 1021 Normal Table-based algorithm
 - User-defined time window (default 28 seconds)

µSmartDigi™ Digi Features

- ◆ Configured with fixed Lat-Lon or uses real-time updates from attached GPS
- ◆ Supports a combo of GPS and Log Monitoring on single serial port

µSmartDigi™ Digi Features

◆ Sample Transaction

```
DROP: Path Rules: Bad Digi: -0 and H=0  
KD6FVP-2>APSL224,N6EX-1,WIDE1 <UI Len=45>:  
>152343z[224]*We know most of your faults!!!
```

```
DROP: Path Rules: Digi1 RELAY  
N6XQY-12>GPSLJ,RELAY,WIDE2-2 <UI Len=71>:  
$GPRMC,013641.06,A,3348.1607,N,11807.4631,W,34.0,090.5,231105,13.,E*73
```

µSmartDigi™ Digi Features

- ◆ Packet-Checking Algorithm
 - Uses short-circuit logic
 - 1. Verify Digipeater Path
 - 2. Perform Duplicate Check
 - 3. Decode Position Information
 - 4. Process against User-defined Rules

µSmartDigi™ Digi Features

- ◆ Verify Digipeater Path
 - Checks for Generic Path (dst field)
 - Checks for exhaustion
 - Optionally scans for RELAY
 - Ignores TRACE
 - Applies hop-count limits (Max, Total)
eg. WIDE1-1,WIDE4-4

μSmartDigiTM Digi Features

- ◆ Perform Duplicate Check
 - Fields src, src ssid, dst, info
 - Uses Fast CCITT CRC16 1021 Normal Table-based algorithm
 - User-defined time window (default 28 seconds)

µSmartDigi™ Digi Features

- ◆ Decode Position Information
 - Raw NMEA Messages
 - ◆ GGA
 - ◆ RMC
 - MIC-E
 - Base-91 Compression

µSmartDigi™ Digi Features

◆ Position Information Currently Supported

- \$ (GGA and RMC only)
- !=
- /@
- ` \

µSmartDigi™ Digi Features

- ◆ Process against User-defined Rules
 - Implicit and Explicit Rules
 - Short-circuit logic
 - Specify *PASS* or *DROP*
 - Match src or dst fields with optional wild character (*)
 - Geoposition based on *compass* direction, *circle*, *sector* (pie segment) or *rectangle*

µSmartDigi™ Digi Features

- ◆ Process against User-defined Rules
 - Lat, Lon and Angles are specified in several flexible formats
 - ◆ Colon: [s]DDD:MM:SS[.F*]
-38:33:29.222 45:18:
 - ◆ Dotted: [s]DDD.MM.[F*]
-103.00. -38.33.379
 - ◆ DMC (Degrees Minutes seconds):
N 39d 23.7m, 33.9c, W104d40m8.4c, -42.5d

µSmartDigi™ Digi Features

- ◆ Process against User-defined Rules
 - Rules are edited in an ASCII file
 - No special editor
 - Files are portable
 - PC/Laptop Utility reads, error checks, compiles into compressed internal format and downloads into EEPROM

µSmartDigi™ Digi Features



Example Rules

```
implicit      pass
drop src ab0vo
pass dst APU25N
pass circle 2.5      n 39d 31m,      W 104.669d      // hole
drop cir      50.5    n 39d 31m,      w 104.669d      // donut
drop compass W      39:31:00, w 104.669d # drops West
drop rect 40d 0m .5c, -104d 30m, 39d, -103d /* box
drop sect 32d, 60d, 5 // drops all packets 5 miles or
                        // greater from the repeater
                        // from 32deg from N to 60deg
                        // from North
```

μSmartDigi™ Digi Features



Configuration Parameters

- Parameters are edited in an ASCII file or interactively into the **μSmartDigi™**
- No special editor
- Files are portable
- PC/Laptop Utility reads, error checks and complies into compressed internal format and downloads into EEPROM

µSmartDigi™ Digi Features



Configuration Parameters (subset)

<code>call</code>	<code>CALL</code>
<code>ssid</code>	<code>SSID</code>
<code>beacon</code>	<code>seconds</code>
<code>position</code>	<code>Lat Lon</code>
<code>havegps</code>	<code>y n</code>
<code>log</code>	<code>y n</code>
<code>host</code>	<code>[baud]</code>
<code>tnc</code>	<code>[baud]</code>
<code>gps</code>	<code>[baud]</code>
<code>relay</code>	<code>y n</code>
<code>widemax</code>	<code>N</code>
<code>widetotal</code>	<code>N</code>
<code>dupewin</code>	<code>seconds</code>

µSmartDigi™ D-Gate™ Features

- ◆ Gates D-STAR Digital Messages to APRS® RF Network
- ◆ Requires specific D-STAR Message Format
- ◆ Message Format Calculator at <http://www.aprs-is.net/dprscalculator.htm> courtesy of Pete Loveall, AE5PL

µSmartDigi™ D-Gate™ Features


D-PRS Message Calculator

[[Home](#)] [[Up](#)] [[D-PRS Message Calculator](#)] [[D-PRS Symbols](#)] [[DStarTNC2.zip](#)]

This page calculates the necessary GPS message for use with D-PRS. Your browser must have JavaScript enabled to use this page.

Note that the symbol code occupies the first four characters of the GPS message (space padded) and that there is a checksum appended to the text preceded by an asterisk.

The D-PRS CallSSID can be used to look up your station on www.jfindu.net or www.findu.com

MyCall 8 Char Max Right Space Padded	D-PRS Symbol	GPS Message
<input type="text" value="AB0VO 9"/>	DIGI (white center) Symbol:  Overlay: <input type="text"/>	<input type="text" value="D-GATE TEST"/>
D-PRS CallSSID: <input type="text" value="AB0VO-9"/>		Input into TX Message C1: <input type="text" value="BD D-GATE TEST*71"/>

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µSmartDigi™ D-Gate™ Features

- ◆ Eliminates duplicates based on Call Sign within 10-second window
- ◆ Eliminates duplicate messages within a configurable 28-second window (classic dupe checking)
- ◆ Filters messages according to set of User-defined Rules

μSmartDigi™ D-Gate™ Features

◆ Gateway Function

- Converts D-STAR NMEA GPS data to Third-party Position Reports
- Supports GPS-A Mode on IC-2820H
- Converts Symbol and Text Data
- Use User-defined Path

µSmartDigi™ D-Gate™ Features

◆ Sample Transaction

D-STAR:

```
$GPGGA,163212,3901.6726,N,10440.1415,W,1,05,2.8,2319.4,M,-21.7,M,,*40  
$GPRMC,163214,A,3901.6717,N,10440.1413,W,1.7,200.6,140806,9.7,E,A*07  
AB0VO 9,BD D-GATE TEST*71
```

PASS:

```
AB0VO-3>AP220D,WIDE1-1,WIDE2-2 <UI Len=69>:  
}AB0VO-9>APRS,DSTAR*:!3901.67N/10440.14W#200/001 D-GATE TEST/A=007607
```

μSmartDigi™ Summary

◆ Q&A

◆ Web Sites

<http://usmartdigi.com>

<http://www.tnc-x.com>

<http://www.aprs-is.net/dprscalculator.htm>

<http://www.icomamerica.com/amateur/d-star/dstar2.asp>

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