DSK.91C111

Technical Data Sheet

Document Revision 1.2   December 2011

10/100 MBit Ethernet LAN Daughter Card for glueless connection to Texas instruments and Spectrum Digital DSK and EVM DSP development boards

SUMMARY

- **Dual Speed 10/100 Ethernet Media Access Controller**
- **Integrated IEEE 802.3/802.3u 100Base-TX / 10Base-T physical layer, RJ-45 connector**
- **Auto-Negotiation: 10/100, Full/Half Duplex**
- **3.3V Single Supply (via DSK)**
- **16 / 32 Bit Data Bus Interface**

- **Memory mapped to DSK/EVM CSA or CSB daughter card address range**
- **supports interrupt driven, busy-polling or DMA operation**
- **Optimized TCP/IP Protocol Stack, does not require a RTOS, but can be run as a DSP/BIOS task. Requires no DSP resources (timer, interrupt, etc.)**
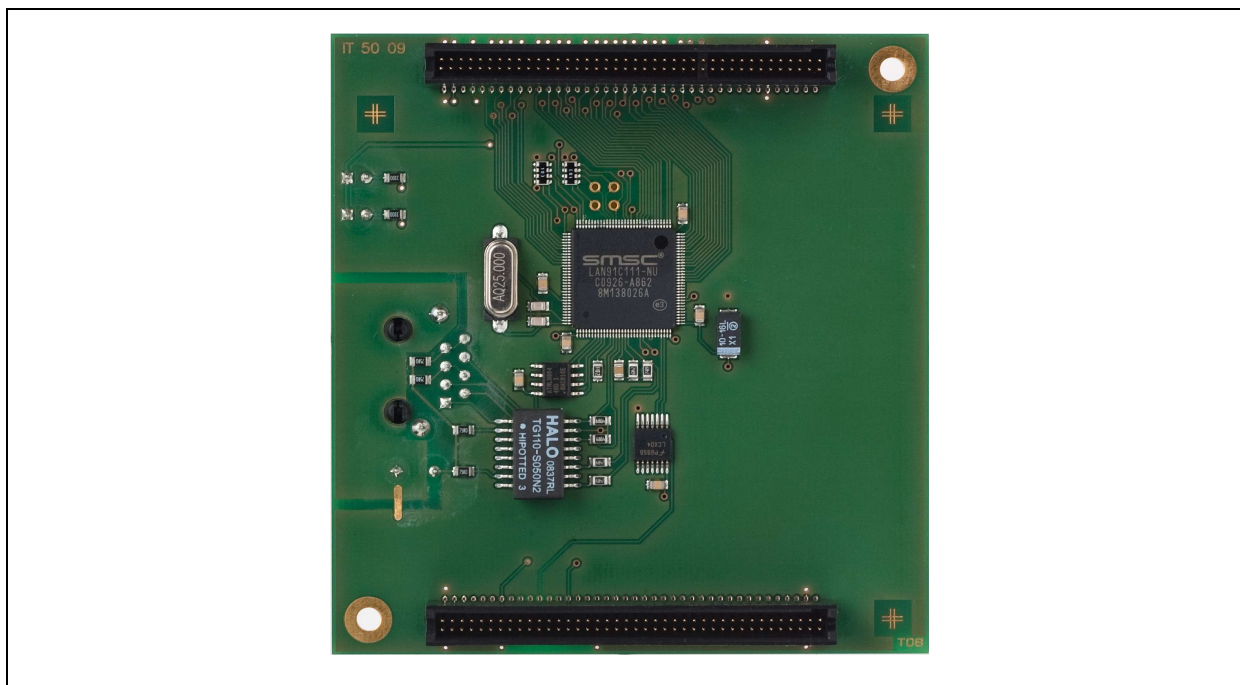
Software

The TCP/IP object code library has carefully been tailored to meet the constraints of a DSP system. Code and data memory size have been minimized, and no additional resources like DSP interrupts or timers are required.

The TCP/IP protocol stack can be used in a 'linear' C program, just as running as a task in DSP/BIOS. The protocol stack supports the following protocols:

- ARP - Address Resolution Protocol, resolves the IP address to a hardware MAC address. No user-action is required. If an address is unknown, an ARP request is generated automatically.

- IP - Internet Protocol. All data transferred by DNS, DHCP, ICMP, UDP and TCP is automatically packed into IP packets.

- ICMP - Internet Control Message Protocol. The protocol stack for the DSK91C111 responds to "ping" requests to test a connection.

- UDP - User Datagram Protocol. UDP provides a one-to-one or one-to-many connectionless data path. Data transmitted via UDP is not guaranteed to reach it's destination. This protocol has very low overhead and is especially useful for transmitting non-critical data like audio and video data.

- TCP - Transmission Control Protocol, provides reliable, connection-oriented, one-to-one connections. All data is acknowledged by the receiver and re-transmitted automatically if required. This protocol should be used for critical data like software uploads, commands, etc.

- DHCP - Dynamic Host Configuration Protocol. This protocol has been developed to ease maintenance of a TCP/IP network. A DHCP server manages the allocation of IP addresses and provides additional network configuration data like gateways, DNS servers etc. The TCP/IP stack integrates the client functions required to obtain an IP address, DNS server, and gateway.

- DNS - Domain Name System. This protocol allows to use symbolic host names instead of numerical IP addresses. The TCP/IP stack integrates the client functions to query a DNS server to resolve a host name.

The TCP/IP stack has been designed to keep code size to a minimum. Only those protocol functions required in your system will be linked to your application.

Higher level protocols like SMTP, HTTP or FTP are based on the described protocols, most of them using TCP. The TCP/IP library includes a ready-to-use FTP server, which allows to upload programs and parameters to the DSK Flash Memory, or download log files and data from the DSK. The FTP server is widely configurable: users, passwords, directories files, and access restrictions are maintained in a simple data structure. A HTTP server framework is also provided. This framework handles multiple connections and passes GET and POST parameters to a user-defined callback function, hence providing the required flexibility for dynamic data. The DSP can send static HTML pages and images as well as inserting the current value of variables, generate images from data acquisition buffers, etc. on demand. Finally, basic SMTP functionality is provided to send an e-mail, e.g. to periodically send log-files to the system administrator.

The TCP/IP software uses a socket architecture, similar to the familiar Berkeley sockets. Following is a description of the function calls implemented:

General Initialization

net_init()	initialize sockets
net_set_gateway()	configure gateway for connections outside the local IP net.

Socket Configuration

socket_open()	open a new socket
socket close()	close a socket
set_socket_option()	specify non-standard socket options, e.g. disable UDP checksum
socekt_define_callback()	install a user-defined callback function
install_icmp_socket()	install a socket and buffer for 'pings'

Send Functions

net_send()	non-blocking send function
net_send_string()	blocking send function for strings

net_send_ready()	blocking send function for binary

Receive Functions

net_recv()	non-blocking receive function
net_revc_ready()	blocking receive function

Miscellaneous Functions

net_isq()	main network polling function, must be called periodically in your program's main loop or from a periodic task.

TCP Connection Functions

connect ()	establish a connections
shutdown ()	shutdown a connection
gethostbyname()	host name resolution
accept()	test if TCP socket is connected

This example demonstrates how to program a UDP echo server to retransmit all data received on port 7:

```c
#define ECHO_PORT       7
#define HOST_IP         ANY_IP
#define HOST_PORT       ANY_PORT
#define MAX_ECHO_SIZE   1024

char udp_echo_buffer[MAX_ECHO_SIZE];

net_init();
udp_echo_socket = socket_open (HOST_IP, HOST_PORT, ECHO_PORT, IPT_UDP, DATATYPE_CHAR);

/*******************************************************************************
  main program loop
*******************************************************************************/
for (;;)
{
    /*******************************************************************************
      signal processing
    *******************************************************************************/
    ...

    /*******************************************************************************
      network polling function
    *******************************************************************************/
    net_isq();

    /*******************************************************************************
      UDP echo
    *******************************************************************************/
    if (len = net_recv (udp_echo_socket, udp_echo_buffer, MAX_ECHO_SIZE))
    {
        net_send (udp_echo_socket, udp_echo_buffer, len);
    }
}
```

Hardware

The DSK-91C111 is compatible with the Texas Instruments Cross-Platform Daughter Card Specification Revision 1.0. Currently the following DSK boards are supported:

Product Description	TI Part No	Spectrum Part No
DSP Starter Kit (DSK) for TMS320VC5510	TMDSDSK5510 TMDSDSK5510-OE	701880
TMS320VC5509A DSK-C5509 Power Management DSK	TMDSDSK5509 TMDSDSK5509-OE	701882
TMS320C6416T (1GHz) DSP Starter Kit (DSK)	TMDSDSK6416-T	701891
DSP Starter Kit (DSK) for TMS320C6713	TMDSDSK6713	701895
EVM3206418 Evaluation Module		701885

Electrical and Mechanical Characteristics

- Data Bus Interface: 16 or 32 bit wide
- Address Range: uses A2, A3
- Chip Select: CSA or CSB, configurable via solder link
- Interrupts: INTA, INTB, INTC o INTD,configurable via solder link
- Ethernet Interface: IEEE 802.3/802.3u 100Base-TX / 10Base-T, RJ-45 connector
- LEDs: Link and Activity
- Power Supply: 3.3V / 100 mA typ, 150 mA max.,
  supplied from DSK/EVM via daughter card connector
- Operating Temperature: 0 to +70°C
- Size: 86.2 x 80 x 27 mm

ORDER INFORMATION

DS.DSK91C111	Ethernet daughter card base package, including: - daughter card - single-user test and development license for TCP/IP library - object code library for TCP/IP - documentation - sample software in C-source code (UDP and TCP echo, FTP, HTTP, SMTP)
OL.DSK91C111	OEM license for TCP/IP library, no limitations or royalties, includes schematics and hardware documentation to integrate the Ethernet LAN hardware into your production system.
DSK91C111	OEM daughter card only
QL.DSK91C111-10	TCP/IP Software quantitiy license for 10 prototype units

ADDITIONAL OPTIONS ON VOLUME PURCHASE

For volume purchase D.SignT offers customer specific modifications of the hardware either to reduce costs through reduced functionality or to increase functionality to meet the customers application requirements. Extensive experience in custom designs and the powerful engineering tools of our development department bring your application and our DSP know how together for your solution. Please contact D.SignT directly.

TECHNICAL SUPPORT

Our products include free of charge technical support. You can reach the technical support by e-mail (support@dsignt.de) phone or fax.

PRICING

Please ask for our current price list and volume discounts.

AVAILABLITY

Our standard products are typically available ex-stock. For special modifications or non-standard products please consult our sales department.

WARRANTY

All D.SignT products come with a 12 month warranty.

For additional information contact your local distributor who will also support you after your purchase or contact D.SignT directly.

Distributed and supported locally by

d.signt
signalprocessing technology

D.SignT GmbH & Co. KG
phone: +49 (0) 2833 / 570977 • fax: +49 (0) 2833 / 3328
mail: info@dsignt.de • web: www.dsignt.de
Marktstraße 10 • 47647 Kerken • Germany