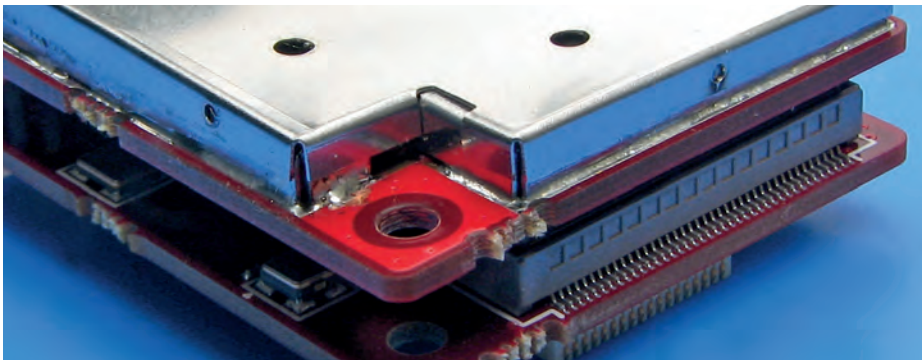


eWAVE

Embedded WAVE Module.



eWAVE Embedded WAVE module is a miniature 5.9 GHz Dedicated Short Range Communications (DSRC) device designed to provide integrated communication capabilities for IntelliDrive applications and support communications using 5.9GHz DSRC protocol. Due to its versatility and size, the eWAVE module can be integrated into vehicle, roadside and portable communication platforms.

eWAVE module contains an implementation of the WAVE stack. The WAVE stack supports vehicle-to-vehicle and vehicle-to-infrastructure communications, Channel Switching, WAVE Short Message protocol, WAVE Service Advertisement messages, IPv6 over WAVE and other features compliant with the IEEE 802.11p and P1609 standards. In addition, to 5.9GHz DSRC, the eWAVE module also supports other WiFi protocols including 802.11 a/b/g.

The high-speed MIPS 24K based network processor controls the radio module and manages the network communication including the support for WAVE DSRC and IPv4 and IPv6 protocols. The module includes on-board 8MB of non-volatile Flash memory and 32MB of RAM. A portion of the memory is utilized by the Linux OS and WAVE communication stack, and some memory is

available for application storage.

eWAVE module contains an embedded Linux and can host 3rd-party embedded applications. Applications running on the eWAVE module can perform low-latency processing of wireless messages and handle specialized communication protocols with the host platform. These features make the device particularly suitable for automotive and intelligent transportation applications.

The WAVE stack implements communication protocols according to IEEE 802.11p and IEEE P1609 standards. Additional libraries for encoding and decoding SAE J2735 messages are available. Also, as the communication standards evolve, eWAVE module firmware can be updated when future WAVE software becomes available.

eWAVE module offers a fully interoperable platform to support a wide range of current

IntelliDriveSM testbeds and future commercial, safety and mobility applications including: Commercial Vehicle screening, Signal Phase and Timing application (SPAT / GID messages), Traffic Signal Preemption and Priority, Traveler Information, vehicle on-board diagnostic and others.

EWAVE Module Features

- Host controller and radio in a compact module
- Flexible I/O ports : Ethernet, USB 1.1, Serial
- Miniature size, fits into a match box
- Fully integrated standards-compliant 5.9 GHz DSRC 1609 software stack
- Full supports for channel switching (provider and user modes)
- Messaging libraries for GPS and J2735 parsing
- Runs embedded Linux OS

WAVE starter kit

Jump start the development of the IntelliDrive applications using the WAVE starter kit.

The WAVE starter kit allows you to choose two communication platforms (two eWAVE development boards or a single eWAVE development board and a roadside platform MCNU R1500). WAVE starter kit also comes with a full WAVE software development kit which includes the software and utilities to develop communication applications for a host platform and the eWAVE module. Extensive documentation and application sample source code are included.

Mobile Communication Unit

Instead of creating custom hardware, use a compact Kapsch Mobile Communication Unit (MCU) built utilizing the eWAVE module. Develop application software faster. Applications developed using WAVE starter kit can be installed into the MCU and tested on the road.



WAVE starter kit



MCU

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Technical Features

Radio modes

- IEEE 802.11a/b/g/j/p PHY

Wireless modes

- WAVE, Ad-hoc, Infrastructure

Radio data rates

- 1, 2, 5.5, 11 Mbps
- 3, 4.5, 6, 9, 12, 18, 24, 27 Mbps
- 6, 9, 12, 18, 24, 36, 48, 54 Mbps

Radio frequencies

- 2.400 – 2.484 GHz (ISM)
- 4.940 – 4.990 GHz (PS)
- 5.250 – 5.350 GHz (UNII)
- 5.470 – 5.725 GHz (UNII)
- 5.725 – 5.825 GHz (UNII)
- 5.825 – 5.850 GHz (ISM)
- 5.850 – 5.925 GHz (ITS-DSRC)

Channels

- 172, 174, 176, 178, 180, 182, 184 (5.9Ghz DSRC)

RF Power output

- 14 dBm maximum Class C spectral mask (p mode)

Receiver sensitivity

- 91 dBm @ 6 Mbps (a/g mode typical)
- 88 dBm @ 6 Mbps (p mode typical)
- 97 dBm @ 6 Mps (b mode typical)

Power current consumption

- 3.3 V, +/- 5%, 750 mA (Max)

Network processor

- 32 bit MIPS 24K, 300 MHz.

Operating memory

- 8 MB Flash
- 32 MB SDRAM DDR

Dimensions

- 38 mm. x 27 mm.
- Height: 11 mm. (two board stacked)

Protocols

- WAVE DSRC (802.11p, 1609.3, 1609.4)

Operating parameters

- IPv6 (TCP and UDP)
- Temperature: -45° C to +85°C

Security

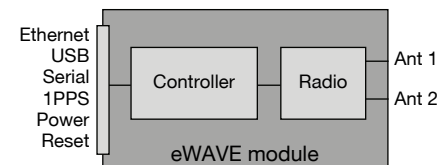
- WEP64 and WEP128bit, WPA, 802.1x 1609.2 – optional

Antenna connectors

- Two U.FL coaxial connectors (50 ohm) Support receiver diversity

On-board interface signals

- On board interface connector
- (Hirose 36 Pin DF12-36DS):
 - USB 1.1
 - Serial (UART)
 - 10/100 Fast Ethernet
 - GPS 1 PPS (3.0V TTL level)



pin	J3	pin#
GND	1	2
3.3V	3	4 3.3V
	5	6
Reset(active low)	7	8 1PPS GPS
	9	10
	11	12
Ethernet RX +	13	14 Ethernet RX-
GND	15	16 GND
USB-	17	18
USB+	19	20 GND
GND	21	22
	23	24 Serial in Rx
	25	26 GND
GND	27	28 Serial out Tx
Ethernet TX-	29	30 Ethernet TX +
Ethernet TX+	31	32 Ethernet TX +
3.3V	33	34 3.3V
	35	36 GND

DF12-36DS

Processor Board to Host Interface connector

Kapsch Group

The companies of the Kapsch Group – Kapsch TrafficCom, Kapsch CarrierCom and Kapsch BusinessCom – are leading the international markets for Intelligent Transportation Systems (ITS) and Information and Communication Technologies (ICT). Kapsch. Always one step ahead.