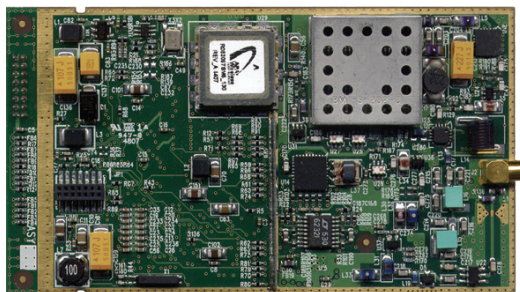




RADIO OEM BOARD

LMR400



DSP based OEM Radio Modem with Built-in wireless link Monitoring and Management Tools:

- Both Licensed and Unlicensed operation modes
- 8 miles Maximum Distance Range
- Data Speed over the air 38400 bps at 25 kHz and 19200 bps at 12.5 kHz
- Programmable Output Power (30 mW to 1 W)
- Advanced Forward Error Correction (FEC)
- UART serial interface with RTS/CTS flow control support
- Data Speed over the serial port 9600 to 115200 bps
- Testing, monitoring, and control of the unit over the air
- AlphaWave SuperScan® - automatic search and select for best frequency/channel

DATA SHEET

VERSION 3.0 MARCH 31, 2021

LMR400

The LMR400 radio transceiver provides a high-speed Point-to-Point and Point-to-Multipoint wireless data transfer at up to 38.4 kbps. LMR400 supports user-selectable modulation techniques (GMSK, 4FSK, DBPSK, DQPSK, D8PSK, or D16QAM), which allows the user to achieve the highest data speed for a given range (up to 8 miles). It also includes a selectable error correction, which improves the functioning of the radio modem under interference.

The unmatched features of LMR400 include data scrambling, frequency hopping, user-selectable transmit output power level, low power consumption sleep modes, autoscanning for the base, and plug-and-play installation for remote terminals.

LMR400 supports two separate Application Data and Maintenance modes of a single UART serial port.

The built-in software tools provide wireless link testing, units' status and error statistics monitoring, and units' settings change over the air. The software of the LMR400 radio transceiver resides in flash memory. The updating of the radio transceiver programs is entirely software-based. The flash memory is re-programmable through a UART interface or over the air.

Main Characteristics

GENERAL SPECIFICATION

- Input Voltage: 4.2 V \pm 5 %
- Power Consumption (average):
 - 3 W – transmit with 50% duty cycle (1 W TPO)
 - 1 W – receive mode
- Temperature range:
 - Operation -40 °F ... 140 °F (-40 °C ... +60 °C)
 - Storage -40 °F... 176 °F (-40 °C ... +80 °C)
- Dimensions:
 - 3.18 x 1.80 x 0.29/0.37 in (80.8 x 45.7 x 7.4/9.4 mm)
- Weight: 0.09 lbs (41 g)

FEATURES

- DSP-Modem
- Multi-Modulation Technologies
- Zero-IF Technologies
- Up to 115200 bps Data Rate
- Embedded Firmware Compensation for Operation and Extremely Low at High Temperatures
- Compact Design

RADIO TRANSMITTER SPECIFICATIONS

- Transmitter Output Power: +15... +30 dBm in 1 dB step / 50 Ω
- Carrier Power Stability: +1 dB / -2 dB

RADIO TRANSCEIVER SPECIFICATIONS

- Frequency Range:
 - LMR 400: 406 - 470 MHz
 - LMR400 EXT: 360 - 470 MHz
- Channel Spacing: 25/20/12.5/6.25 kHz
- Carrier Frequency Stability: \pm 1 ppm
- Modulation: GMSK/4FSK/DBPSK/DQPSK/D8PSK/D16QAM
- Communication Mode: Half duplex, simplex

RADIO RECEIVER SPECIFICATIONS

- Receiver Sensitivity for DBPSK (BER 1x 10⁻⁴):
 - 113 dBm for 25 kHz Channel Spacing
 - 113 dBm for 20 kHz Channel Spacing
 - 114 dBm for 12.5 kHz Channel Spacing
 - 114 dBm for 6.25 kHz Channel Spacing
- Receiver Sensitivity for DQPSK (BER 1x 10⁻⁴):
 - 110 dBm for 25 kHz Channel Spacing
 - 110 dBm for 20 kHz Channel Spacing
 - 111 dBm for 12.5 kHz Channel Spacing
 - 111 dBm for 6.25 kHz Channel Spacing
- Receiver Dynamic Range: -119 to -10 dBm

LMR400

MODEM SPECIFICATION

- Interface DSP: UART (serial port)
- Interface Connector: 16-lead Connector
- Data Speed of Serial Interface:
9600 - 115200 bps
- Data Rate of Radio Interface (25 kHz Channel Spacing)
9600 bps – DBPSK/GMSK
19200 bps – DQPSK
28800 bps – D8PSK
38400 bps – D16QAM
- Data Rate Radio Interface (20 kHz Channel Spacing)
7500 bps – DBPSK/GMSK
15000 bps – DQPSK
22500 bps – D8PSK
30000 bps – D16QAM
- Data Rate Radio Interface (12.5 kHz Channel Spacing)
4800 bps – DBPSK/GMSK
9600 bps – DQPSK
14400 bps – D8PSK
19200 bps – D16QAM

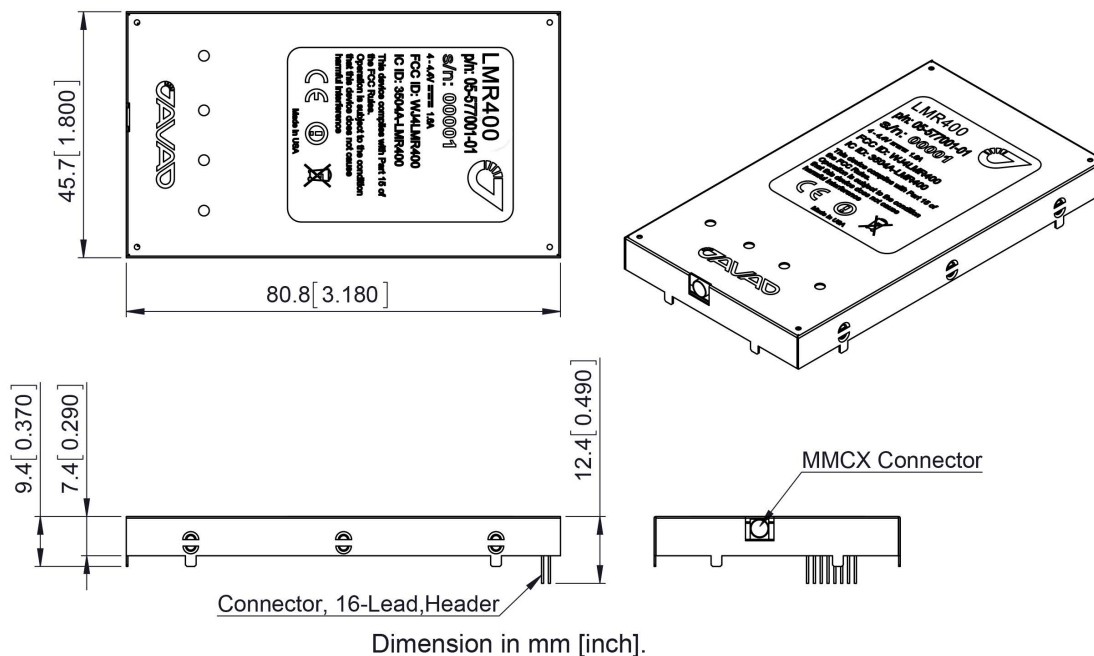
- Data Rate Radio Interface (6.25 kHz Channel Spacing)
2400 bps – DBPSK
4800 bps – DQPSK
7200 bps – D8PSK
9600 bps – D16QAM
- Forward Error Correction (FEC): Reed-Solomon Error Correction
- Data scrambling: Yes

EXTERNAL CONNECTORS

- RF Connector: J2 is Antenna Input / Output Connector: MMCX RIGHT ANGLE PCB JACK, AMPHENOL P/N 908-24100.
- Main Connector - 285209LF CONN, 16LEAD, HEADER, 5.84CONT COMM CON INC 3913-16G2

COMPLIANCE

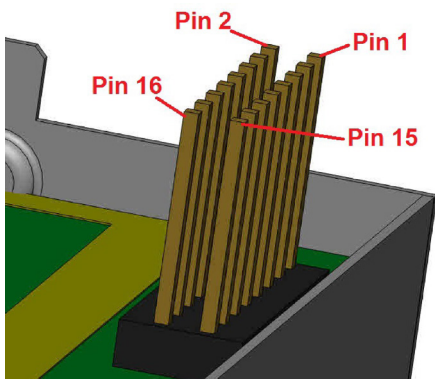
- FCC Part 90
- Industry Canada RSS-210
- ETSI EN 300 113-2 , ETSI EN 301 489-1, ETSI EN 301 489-5



LMR400

16-Lead Header Connector Pinout

PIN #	Signal Designator	Signal name	Description	I/O	Comments
1	GND	GND	Ground	-	Signal and Chassis Ground
2	DSP UART 1	TXD	Transmitted Data	TTL Input	Serial Data Input
3	DSP UART 2	RXD	Received Data	TTL Output	Output for received serial data
4	DPORT5	DTR or DP/MP	Data Terminal Ready	TTL Input	Control line can be used as a backup method for entering Command mode:(0V) – Maintenance Mode; (3.3V) – Data Mode An internal 100K pull-up enables Data Mode if this signal is left unconnected. Maintenance Mode is also accessible by transmitting an escape sequence.
5	DPORT1	CTS	Clear to Send	TTL Output	Used to control transmit flow from the user to the radio: (0V) – Transmit buffer not full, continue transmitting (3.3V) – Transmit buffer full, stop transmitting
6	TTLI1	SLEEP	Sleeps/wakes radio Receive only	TTL Input	In sleep mode, all radio functions are disabled consuming less than 50µA. An internal 10K pull-down wakes up the radio if this signal is left unconnected. At wake up, any user programmed configuration settings are refreshed from flash memory, clearing any temporary settings that may have been set:(3.3V) – Sleep Radio; (0V) – Wake Radio. As an option could be used as TTL Input Line 1.
7	DPORT3	MDM_GRN	Data Carrier Detect	TTL Output	Used by remotes to indicate that the remote has successfully acquired the signal from base station: (0V) 1 – Carrier detected (synchronized)(3.3V) 0 – No carrier detected (not synchronized)
8	DPORT4	RTS	Request to Send	TTL Input	Gates the flow of receive data from the radio to the user on or off. An internal 10K pull-down enables data receive if this signal is left unconnected. In normal operation, this signal should be asserted:(0V) – Receive data (RxD) enabled (3.3V) – Receive data (RxD) disabled
9	DPORT2	DSR	Data Set Ready	TTL Output	Used to control transmit flow from the user to the radio:(0V) 1 – Receive buffer has data to transfer; (3.3V) 0 – Receive buffer is empty
10	RES CONT	RESCONT	Reset the radio	TTL Input	Reset the radio by shortening this pin to the ground.
11	TTLO1	TTLOUT1	TTL Output Line 1	TTL Output	Reserve line
12	TTLO2	TTLOUT2	TTL Output Line 2	TTL Output	Reserve line
13	GND	GND	Ground	-	Signal and Chassis Ground
14	TTLI2	TTLIN	TTL Input line	TTL Input	An internal 100K pull-up resistor is applied.
15	VCC36	PWR	Power Supply	External	Regulated positive 4.2V DC from ext. Power Supply.
16	VCC36	PWR	Power Supply	External	Regulated positive 4.2V DC from ext. Power Supply.



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