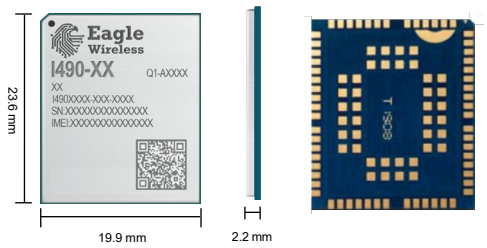
Eagle I490 Series

LTE Cat M1/ Cat NB2/ EGPRS Module



I490 is a series of a multi-mode LPWA module supporting LTE Cat M1/ Cat NB2/ EGPRS and integrated GNSS. It is 3GPP Rel-14 compliant and offers maximum data rates of 588 kbps downlink and 1119 kbps uplink under LTE Cat M1. It features ultra-low power consumption by leveraging the integrated RAM/ flash as well as the ARM Cortex A7 processor supporting ThreadX, achieving up to 70 % reduction in PSM leakage and 85 % reduction in eDRX current consumption compared to its predecessor.

I490 boasts a comprehensive set of hardware-based security features and enables trusted applications to run directly on the Cortex A7 TrustZone engine.

With a cost-effective SMT form factor of 23.6 mm × 19.9 mm × 2.2 mm and high integration level, I490 enables integrators and developers to easily design their applications and take advantage from the module's low power consumption and mechanical intensity. Its advanced LGA package allows fully automated manufacturing for high-volume applications. A rich set of Internet protocols, industry-standard interfaces and abundant functions extend the applicability of the module to a wide range of M2M applications such as wireless POS, smart metering, wearable devices, etc.

Key Features

- LTE Cat M1/ Cat NB2/ EGPRS module with ultra -low power consumption
- Integrated RAM/ flash in the baseband chipset
- Comprehensive set of hardware-based security features
- Support VoLTE (Cat M1 only), eSIM, etc.
- Fast time-to-market: reference designs, evaluation tools and timely technical support minimize design-in time and development efforts
- Compact SMT form factor ideal for size-constrained applications with tight space
- Robust mounting and interfaces
- Module and antenna are co-serviced to solve customer problems efficiently

LTE Cat M1 & Cat NB1/ NB2

EGPRS

LGA Package

Embedded Abundant Protocols

Integrate RAM/ Flash in Chipset

Enhanced AT Commands

USB 2.0 High Speed Interface

Ultra-low Power Consumption

DFOTA

Version: 1.1 Status: Released

Eagle I490-M1

LPWA	I490-M1
Region/Operator	Global
Dimensions (mm)	23.6 × 19.9 × 2.2
Temperature Range	
Operating Temperature	-35 °C to +75 °C
Extended Temperature	-40 °C to +85 °C
Frequency Bands	
LTE-FDD	**Cat M1 Only:** B1/ 2/ 3/ 4/ 5/ 8/ 12/ 13/ 18/ 19/ 20/ 25/ 26/ 27/ 28/ 66/ 85
GPRS (MHz)	-
Wi-Fi (for positioning)	-
Antenna Recommendation①	LTE: FPC_YF0006PA/ SMD_YPCP001AA/ External_YECN009AA GNSS: FPC_YFGA003AA/ Patch_YFGC025WWC/ External_YEGB000Q1C
Certifications	
Carrier	**America:** AT&T/Verizon/T-Mobile
Regulatory	**Global:** GCF **North America:** PTCRB **America:** FCC
Others	RoHS
Max. Data Rates	
LTE-FDD (kbps)	**Cat M1:** 588 (DL)/ 1119 (UL)
Interfaces	
(U)SIM	× 1 (1.8 V only)
UART	× 3
USB 2.0	× 1
PCM	× 1 (for VoLTE Only)
I2C	× 1 (for VoLTE Only)
GPIO	× 9
GRFC	× 2
Antenna	× 2
Voice	
Voice	VoLTE for Cat M1
SMS	
Short Message Service	Point-to-point MO and MT SMS Cell Broadcast Text and PDU Mode
Enhanced Features	
DFOTA	●
SoftSIM	*
nuSIM	*
IoT Platform Access	AWS/ Azure
Software Features	
Protocols	PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ NITZ/ PING/ MQTT/ LwM2M/ CoAP/ IPv6
USB Serial Driver	Windows 10/ 11, Linux 2.6–6.7, Android 4.x–14.x
GNSS/ RIL Driver	Android 4.x–14.x
Electrical Features	
Supply Voltage Range	2.6–4.8 V, typ. 3.3 V
Max Output Power (dBm)	Power class 5 21 @ LTE bands
Power Consumption @ PSM (μA)	4
Power Consumption @ LTE Cat M1 (mA)	**Sleep Mode:** 1.7 @ DRX = 1.28 s; 0.577 @ e-I-DRX = 81.92 s **Idle Mode:** 20 @ DRX = 1.28 s; 19.57 @ e-I-DRX = 81.92 s **Active Mode:** 210 @ 21 dBm, GNSS off

NOTE:
●: supported.
* : under development/ planning.
①: Eagle also provides customized antenna design services and can design a variety of structural types of antennas according to the customer's actual use scenarios.

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Eagle I490-M3

LPWA	I490-M3
Region/Operator	Global
Dimensions (mm)	23.6 × 19.9 × 2.2
Temperature Range	
Operating Temperature	-35 °C to +75 °C
Extended Temperature	-40 °C to +85 °C
Frequency Bands	
LTE-FDD	**Cat M1:** B1/ 2/ 3/ 4/ 5/ 8/ 12/ 13/ 18/ 19/ 20/ 25/ 26/ 27/ 28/ 66/ 85 **Cat NB2:** B1/ 2/ 3/ 4/ 5/ 8/ 12/ 13/ 18/ 19/ 20/ 25/ 28/ 66/ 71/ 85
GPRS (MHz)	GSM 850/ EGSM 900/ DCS 1800/ PCS 1900
Wi-Fi (for positioning)	-
Antenna Recommendation①	LTE: FPC_YF0006PA/ SMD_YPCP001AA/ External_YECN009AA GNSS: FPC_YFGA003AA/ Patch_YFGC025WWC/ External_YEGB000Q1C
Certifications	
Carrier	**America:** AT&T/Verizon/T-Mobile
Regulatory	**Global:** GCF, **North America:** PTCRB, **America:** FCC, **Europe:** CE RED&DA*, **Oceania:** RCM*
Others	RoHS
Max. Data Rates	
LTE-FDD (kbps)	**Cat M1:** 588 (DL)/ 1119 (UL)
NB-IoT Data Rate (kbps)	**Cat NB2:** Max. 127 (DL)/ Max. 158.5 (UL) **Cat NB1:** Max. 32 (DL)/ Max. 70 (UL)
EDGE Data Rate (kbps)	Max. 296 (DL)/ Max. 236.8 (UL)
GPRS (kbps)	Max. 107 (DL)/ Max. 85.6 (UL)
Interfaces	
(U)SIM	× 1 (1.8 V only)
UART	× 3
USB 2.0	× 1
PCM	× 1 (for VoLTE Only)
I2C	× 1 (for VoLTE Only)
GPIO	× 9
GRFC	× 2
Antenna	× 2
Voice	
Voice	VoLTE for Cat M1
SMS	
Short Message Service	Point-to-point MO and MT; SMS Cell Broadcast; Text and PDU Mode
Enhanced Features	
DFOTA	●
SoftSIM/nuSIM	●
IoT Platform Access	AWS/ Azure
Software Features	
Protocols	PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ NITZ/ PING/ MQTT/ LwM2M/ CoAP/ IPv6
USB Serial Driver	Windows 10/ 11, Linux 2.6–6.7, Android 4.x–14.x
GNSS/ RIL Driver	Android 4.x–14.x
Electrical Features	
Supply Voltage②	3.3–4.3, typ. 3.8
Max Output Power (dBm)	Power class 5 21 @ LTE bands
Power Consumption @ PSM (μA)	3.9
Power Consumption @ LTE Cat M1 (mA)	**Sleep Mode:** 1.89 @ DRX = 1.28 s; 0.63 @ e-I-DRX = 81.92 s **Idle Mode:** 18.9 @ DRX = 1.28 s; 18.2 @ e-I-DRX = 81.92 s **Active Mode:** 193 @ 21 dBm, GNSS off
Power Consumption @ LTE Cat NB1 (mA)	**Sleep Mode:** 1.49 @ DRX = 1.28 s; 0.67 @ e-I-DRX = 81.92 s **Idle Mode:** 14.8 @ DRX = 1.28 s; 14.3 @ e-I-DRX = 81.92 s **Active Mode:** 154 @ 21 dBm, GNSS off

NOTE:
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②: Please refer to the hardware design manual to see more specific requirements for the power supply voltage.

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Eagle Wireless

Eagle I490-M5

LPWA	I490-M5
Region/Operator	Global
Dimensions (mm)	23.6 × 19.9 × 2.2
Temperature Range	
Operating Temperature	-35 °C to +75 °C
Extended Temperature	-40 °C to +85 °C
Frequency Bands	
LTE-FDD	**Cat M1:** B1/ 2/ 3/ 4/ 5/ 8/ 12/ 13/ 18/ 19/ 20/ 25/ 26/ 27/ 28/ 66/ 85 **Cat NB2:** B1/ 2/ 3/ 4/ 5/ 8/ 12/ 13/ 18/ 19/ 20/ 25/ 28/ 66/ 71/ 85
GPRS (MHz)	GSM 850/ EGSM 900/ DCS 1800/ PCS 1900
Wi-Fi (for positioning)	-
Antenna Recommendation①	LTE: FPC_YF0006PA/ SMD_YPCP001AA/ External_YECN009AA GNSS: FPC_YFGA003AA/ Patch_YFGC025WWC/ External_YEGB000Q1C
Certifications	
Carrier	-
Regulatory	-
Others	RoHS
Max. Data Rates	
LTE-FDD (kbps)	**Cat M1:** 588 (DL)/ 1119 (UL)
NB-IoT Data Rate (kbps)	**Cat NB2:** Max. 127 (DL)/ Max. 158.5 (UL) **Cat NB1:** Max. 32 (DL)/ Max. 70 (UL)
EDGE Data Rate (kbps)	Max. 296 (DL)/ Max. 236.8 (UL)
GPRS (kbps)	Max. 107 (DL)/ Max. 85.6 (UL)
Interfaces	
(U)SIM	× 1 (1.8 V only)
UART	× 3
USB 2.0	× 1
PCM	× 1 (for VoLTE Only)
I2C	× 1 (for VoLTE Only)
GPIO	× 9
GRFC	× 2
Antenna	× 2
Voice	
Voice	VoLTE for Cat M1
SMS	
Short Message Service	Point-to-point MO and MT; SMS Cell Broadcast; Text and PDU Mode
Enhanced Features	
DFOTA	●
SoftSIM/nuSIM	*
IoT Platform Access	AWS/ Azure
Software Features	
Protocols	PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ NITZ/ PING/ MQTT/ LwM2M/ CoAP/ IPv6
USB Serial Driver	Windows 10/ 11, Linux 2.6–6.7, Android 4.x–14.x
GNSS/ RIL Driver	Android 4.x–14.x
Electrical Features	
Supply Voltage②	3.3–4.3, typ. 3.8
Max Output Power (dBm)	Power class 3 23 @ LTE bands
Power Consumption @ PSM (μA)	6
Power Consumption @ LTE Cat M1 (mA)	**Sleep Mode:** 1.56 @ DRX = 1.28 s; 0.72 @ e-I-DRX = 81.92 s **Idle Mode:** 17.3 @ DRX = 1.28 s; 16.6 @ e-I-DRX = 81.92 s **Active Mode:** 226 @ 23 dBm, GNSS off
Power Consumption @ LTE Cat NB1 (mA)	**Sleep Mode:** 1.43 @ DRX = 1.28 s; 0.68 @ e-I-DRX = 81.92 s **Idle Mode:** 13.5 @ DRX = 1.28 s; 13.1 @ e-I-DRX = 81.92 s **Active Mode:** 190 @ 23 dBm, GNSS off

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Eagle I490-M6

LPWA	I490-M6
Region/Operator	Global
Dimensions (mm)	23.6 × 19.9 × 2.2
Temperature Range	
Operating Temperature	-35 °C to +75 °C
Extended Temperature	-40 °C to +85 °C
Frequency Bands	
LTE-FDD	**Cat M1:** B1/ 2/ 3/ 4/ 5/ 8/ 12/ 13/ 18/ 19/ 20/ 25/ 26/ 27/ 28/ 66/ 85 **Cat NB2:** B1/ 2/ 3/ 4/ 5/ 8/ 12/ 13/ 18/ 19/ 20/ 25/ 28/ 66/ 71/ 85
GPRS (MHz)	-
Wi-Fi (for positioning)	-
Antenna Recommendation①	LTE: FPC_YF0006PA/ SMD_YPCP001AA/ External_YECN009AA GNSS: FPC_YFGA003AA/ Patch_YFGC025WWC/ External_YEGB000Q1C
Certifications	
Carrier	-
Regulatory	-
Others	RoHS
Max. Data Rates	
LTE-FDD (kbps)	**Cat M1:** 588 (DL)/ 1119 (UL)
NB-IoT Data Rate (kbps)	**Cat NB2:** Max. 127 (DL)/ Max. 158.5 (UL) **Cat NB1:** Max. 32 (DL)/ Max. 70 (UL)
EDGE Data Rate (kbps)	-
GPRS (kbps)	-
Interfaces	
(U)SIM	× 1 (1.8 V only)
UART	× 3
USB 2.0	× 1
PCM	× 1 (for VoLTE Only)
I2C	× 1 (for VoLTE Only)
GPIO	× 9
GRFC	× 2
Antenna	× 2
Voice	
Voice	VoLTE for Cat M1
SMS	
Short Message Service	Point-to-point MO and MT; SMS Cell Broadcast; Text and PDU Mode
Enhanced Features	
DFOTA	●
SoftSIM/nuSIM	*
IoT Platform Access	AWS/ Azure
Software Features	
Protocols	PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ NITZ/ PING/ MQTT/ LwM2M/ CoAP/ IPv6
USB Serial Driver	Windows 10/ 11, Linux 2.6–6.7, Android 4.x–14.x
GNSS/ RIL Driver	Android 4.x–14.x
Electrical Features	
Supply Voltage②	3.3–4.3, typ. 3.8
Max Output Power (dBm)	Power class 3 23 @ LTE bands
Power Consumption @ PSM (μA)	5
Power Consumption @ LTE Cat M1 (mA)	**Sleep Mode:** 1.42 @ DRX = 1.28 s; 0.58 @ e-I-DRX = 81.92 s **Idle Mode:** 18.5 @ DRX = 1.28 s; 18.2 @ e-I-DRX = 81.92 s **Active Mode:** 204 @ 23 dBm, GNSS off
Power Consumption @ LTE Cat NB1 (mA)	**Sleep Mode:** 1.31 @ DRX = 1.28 s; 0.55 @ e-I-DRX = 81.92 s **Idle Mode:** 14.2 @ DRX = 1.28 s; 14 @ e-I-DRX = 81.92 s **Active Mode:** 173 @ 23 dBm, GNSS off

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Eagle I490-M9

LPWA	I490-M9
Region/Operator	Global
Dimensions (mm)	23.6 × 19.9 × 2.2
Temperature Range	
Operating Temperature	-35 °C to +75 °C
Extended Temperature	-40 °C to +85 °C
Frequency Bands	
LTE-FDD	**Cat M1:** B1/ 2/ 3/ 4/ 5/ 8/ 12/ 13/ 18/ 19/ 20/ 25/ 26/ 27/ 28/ 31③/ 66/ 72③/ 73③/ 85/ 87/ 88 **Cat NB2:** B1/ 2/ 3/ 4/ 5/ 8/ 12/ 13/ 18/ 19/ 20/ 25/ 28/ 31③/ 66/ 72③/ 73③/ 85/ 86/ 87/ 88
GPRS (MHz)	-
Wi-Fi (for positioning)	-
Antenna Recommendation①	LTE: FPC_YF0006PA/ SMD_YPCP001AA/ External_YECN009AA GNSS: FPC_YFGA003AA/ Patch_YFGC025WWC/ External_YEGB000Q1C
Certifications	
Carrier	TBD
Regulatory	Global: GCF; Europe: CE; Australia/ New Zealand: RCM
Others	RoHS
Max. Data Rates	
LTE-FDD (kbps)	**Cat M1:** Max. 588 (DL)/ Max. 1119 (UL)
NB-IoT Data Rate (kbps)	**Cat NB2:** Max. 127 (DL)/ Max. 158.5 (UL) **Cat NB1:** Max. 32 (DL)/ Max. 70 (UL)
EDGE Data Rate (kbps)	-
GPRS (kbps)	-
Interfaces	
(U)SIM	× 1 (1.8 V only)
UART	× 3
USB 2.0	× 1
PCM	× 1 (for VoLTE* Only)
I2C	× 1 (for VoLTE* Only)
GPIO	× 9
GRFC	-
Antenna	× 2
Voice	
Voice	VoLTE* for Cat M1
SMS	
Short Message Service	Point-to-point MO and MT; SMS Cell Broadcast; Text and PDU Mode
Enhanced Features	
DFOTA	●
SoftSIM/nuSIM	*
IoT Platform Access	AWS/ Azure
Software Features	
Protocols	PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ NITZ/ PING/ MQTT/ LwM2M/ CoAP/ IPv6
USB Serial Driver	Windows 10/ 11, Linux 2.6–6.7, Android 4.x–14.x
GNSS/ RIL Driver	Android 4.x–14.x
Electrical Features	
Supply Voltage②	3.2–4.2, typ. 3.8
Max Output Power (dBm)	Power class 2: 26 @ B31/ 72/ 73 Power class 3: 23 @ other LTE bands
Power Consumption @ PSM (μA)	4.4
Power Consumption @ LTE Cat M1 (mA)	**Sleep Mode:** 1.37 @ DRX = 1.28 s; 0.62 @ e-I-DRX = 81.92 s **Idle Mode:** 14.49 @ DRX = 1.28 s; 13.92 @ e-I-DRX = 81.92 s **Active Mode:** 207 @ 23 dBm; 282 @ 26 dBm, GNSS off
Power Consumption @ LTE Cat NB1 (mA)	**Sleep Mode:** 1.36 @ DRX = 1.28 s; 0.72 @ e-I-DRX = 81.92 s **Idle Mode:** 14.78 @ DRX = 1.28 s; 13.93 @ e-I-DRX = 81.92 s **Active Mode:** 180 @ 23 dBm; 263 @ 26 dBm, GNSS off

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