

CEL's **FreeStar Pro** ZigBee radio modules are each loaded with a powerful 32-bit ARM7 processor. Based on Freescale's MC13224V and MC13226V Platform-in-Package (PiP) pin compatible transceivers, the FreeStar Pro provides a level of integration unprecedented in ZigBee modules. The 32-bit processor and expansive on-chip memory enables designers to eliminate the peripheral host processors often required by 8- and 16-bit transceiver solutions. This high level of integration helps reduce component count, lower power consumption, and reduce overall system costs.

With output of up to +20dBm and a range greater than 4000 feet, FreeStar Pro modules are ideal for mesh, point-to-point, and point-to-multipoint networks. Plus their low current consumption makes them ideal for battery-powered designs.

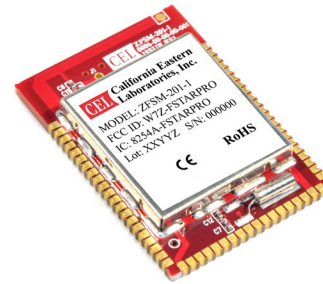
The small footprint requires very little real estate, while an integrated antenna helps to further reduce system size and cost. The FreeStar Pro supports Freescale's *BeeStack*™ software, which streamlines development and gets you quickly to market. They're also FCC, IC and CE certified, which eliminates the need for a costly, time-consuming certification of your design.

FreeStar Pro modules are an excellent choice for remote sensing, AMR/AMI, home and building automation, industrial control, and security applications.

The FreeStar Pro joins CEL's broad family of ZigBee modules, System-on-Chip transceivers, and discrete range extension devices.

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## FreeStar Pro 32 Bit ARM 7-Based ZigBee Modules

### FEATURES

- Freescale™ MC13224V and MC13226V Receiver Platforms:  
 ARM7TDMI 32-bit Processor
- For mesh, point-to-point and point-to-multipoint networks
- Small footprint: 25 x 36 mm
- 16 RF channels
- 46 GPIOs
- Integrated Inverted-F PCB antenna, plus optional support for external antenna

### SPECIFICATIONS

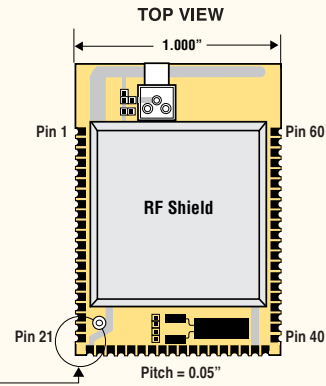
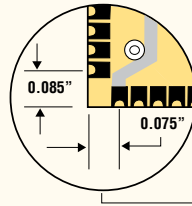
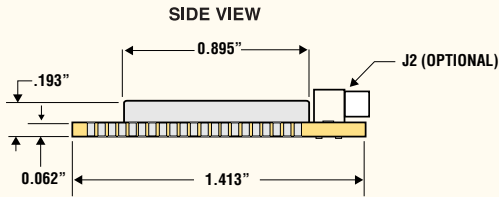
- Frequency: 2400 to 2483.5MHz
- 2.0 to 3.6 Volts Vcc
- +20 dBm Tx output power
- -94 dBm Rx sensitivity
- Over 4000 feet of range
- Power consumption:
  - Transmit Mode:* 193 mA
  - Receive Mode:* 30 mA
  - Hibernate Mode:* 1.1µA
- Operating temperature: -40°C to +85°C
- FCC / IC / CE certification

### APPLICATIONS

- Remote sensing
- AMR/AMI
- Home and building automation
- Industrial control
- Security applications

**MODULE DIMENSIONS (inches)**

See Data Sheet for Pin Outs, RF and Electrical Specifications



**CEL** FreeStar Pro™ Product Family

Part Number	Order Number	Description
ZFSM-201-1 MC13224V	ZFSM-201-1	100 mW Output power, PCB Trace Antenna
	ZFSM-201-1C	100 mW Output power, MMCX connector for external antenna
ZFSM-201-2 MC13226V	ZFSM-201-2	100 mW Output power, PCB Trace Antenna
	ZFSM-201-2C	100 mW Output power, MMCX connector for external antenna
FreeStar Pro Development Kit	ZFSM-201-KIT-1	Engineering Evaluation Kit

**CEL MESHCONNECT / ZIGBEE MODULES**

MODULE ▶	MeshConnect™	MeshConnect™ Extended Range	MeshConnect™ EM357	Apex	Apex LT	FreeStar Pro	FreeStar	Matrix 10mW / 100mW
<b>RADIO</b>	2405 to 2480 MHz / DSSS / IEEE 802.15.4							
<b>MCU</b>	Transceiver Chipset		Ember™ EM357 32 bit, ARM® Cortex™-M3	Ember™ EM250 16 bit, XAP2b	Ember™ EM260 Network processor	Freescale™ MC13224 / MC13226 32 bit, ARM7	Freescale MC13192 8 bit, HCS08	TI™ CC2430 8 bit, 8051
	Fmax		24 MHz	12 MHz	n/a	32 MHz	40 MHz	32 MHz
	Inputs/Outputs		23	17	n/a	46	8	17
<b>NETWORK</b>	Network		Mesh, Point-to-Point, Point-to-Multipoint	Mesh, Point-to-Point, Point-to-Multipoint	Mesh, Point-to-Point, Point-to-Multipoint	Mesh, Point-to-Point, Point-to-Multipoint	Point-to-Point, Point-to-Multi- point	Point-to-Point, Point- to-Multipoint
	Software/ ZigBee Stack		SNAP®, MAC, S-MAC, ZigBee®	EmberZNet PRO™ (ZigBee Pro)	EmberZNet PRO™ (ZigBee Pro)	BeeStack™ ZigBee Pro - MC13226 MAC, S-MAC - MC13224	LSR STAR Protocol BeeStack	LSR STAR Protocol Z-Stack™
<b>PERFORMANCE</b>	Tx Power Output		+20dBm	+20dBm	+20dBm	+20dBm	+20dBm	+10dBm / +20dBm
	Rx Sensitivity		-103dBm	-100dBm	-97dBm	-94dBm	-92dBm	-92dBm
	Range		13,000+ft	4,000+ft	4,000+ft	4,000+ft	4,000ft	2,000ft / 4,000ft
	Vcc		2.7 - 3.6V	2.1 - 3.6V	2.1 - 3.6V	2.0 - 3.6V	2.4 - 3.6V	2.1 - 3.6V
	Rx Current		28mA	37mA	37mA	30mA	42mA	27mA
	Tx Current		170mA	170mA	170mA	193mA	150mA	50mA / 130mA
	Sleep Current		6.0µA	5µA	5µA	5µA	<5µA	5µA
	Dimensions		25 x 36 mm	25 x 33mm	25 x 33mm	25 x 36 mm	23 x 31mm	23 x 29mm / 23 x 31mm
<b>PART NO. ▶</b>	ZICM2410P0-1 ZICM2410P0-1C	ZICM2410P2-2 ZICM2410P2-2C	ZICM357P2-1 ZICM357P2-1C	ZAXM-201-1 ZAXM-201-1C	ZALM-301-1 ZALM-301-1C	(MC13224) ZFSM-201-1 ZFSM-201-1C	ZFSM-101-1	Matrix 10mW ZMXM-400-1 ZMXM-400-1C
	ZICM2410P0-1-SN ZICM2410P0-1C-SN	ZICM2410P2-2-SN ZICM2410P2-2C-SN				(MC13226) ZFSM-201-2 ZFSM-201-2C		Matrix 100mW ZMXM-401-1 ZMXM-401-1C
<b>EVAL KIT ▶</b>	ZICM2410P0-KIT2-1	ZICM2410P2-KIT1-1	ZICM357P2-KIT1-1	ZAXM-201-KIT-1	ZAXM-201-KIT-1	ZFSM-201-KIT-1	ZFSM-101-KIT-1	ZMXM-400-KIT-2 ZMXM-401-KIT-1