



## **M12x Series Product Comparison M12+ Oncore™ and M12M Oncore™**

The new i-Lotus M12M, RoHS compliant GPS receiver began shipping in production quantities in March of 2007. It replaces the popular iLotus M12M, rated RoHS 5 of 6, available since August of 2006, and the predecessor Model M12+ shipped by Motorola. Many M12+ users have made the simple transition to the backward compatible M12M since it is a virtual drop-in, true 3 VDC replacement for the original M12+. *The following discussion refers to the original M12+ and both RoHS and non-RoHS versions of the M12M:*

### **1. M12M Board Dimensions:**

The M12M board is the same length and width but the PWB itself is made from slightly thicker material (0.020") so that the resultant thickness is approximately 0.063". This may affect some users in their mounting hardware stack-ups if the currently utilized screws are a little on the short side. The M12M will still fit in both styles of Synergy Systems' M12x EMI shield cans without modification. The RF and data connectors are the same, the connectors are physically in the same places and the pin-outs are unchanged.

### **2. Power Supply Requirements:**

Power requirements are almost the same for the new receiver. One benefit is that the upper power supply voltage limit has been raised to +3.3V. Power consumption has also dropped by 35mW (a little more than 10mA). Values are tabulated below:

	<b><u>M12M</u></b>	<b><u>M12+</u></b>
V <sub>cc</sub> Range	+2.8 - +3.3V	+2.85 - +3.15V
Power Consumption	155mW max	185mW max

### **3. RF Requirements:**

The older Motorola RFIC series (e.g. RFIC1505) used in the M12+ has been replaced with the SiRF GSCI-2000-TR. This update extends the M12M's acceptable external gain range from the antenna/cable system from 18 – 36dB on the M12+ to a more useful 10 - 50dB for the M12M receivers. This wider gain range allows the M12M to perform with a wider range of antenna/cabling systems. Jamming immunity of the M12M is equal to that of the M12+.

#### 4. Cold Start TTFF Time:

Typical Cold-Start time for the timing receiver has been reduced from 200 seconds for the M12+ to 150 seconds for the M12M products. Cold-Start time for the positioning receiver remains at 60 seconds.

#### 5. M12+ to M12M Part Number Conversions:

For ordering purposes, instead of the part numbers beginning with P1x3 or P2x3 as with the M12 and M12+ receivers, the M12M part numbers begin with IL-GPS. Part number cross-references are shown below.

Detail	Motorola	iLotus	iLotus
	M12+	M12M (RoHS 5 of 6)	M12M RoHS 6
Timer, no battery	P273T12T1x	IL-GPS-0010-A	IL-GPS-0010-B
Nav, no battery	P273T12N1x	IL-GPS-0020-A	IL-GPS-0020-B
Timer, with battery	P283T12T1x	IL-GPS-0030-A	IL-GPS-0030-B
Nav, with battery	P283T12N1x	IL-GPS-0040-A	IL-GPS-0040-B

#### 6. M12M Receiver ID Message:

When issuing the binary @@Cj Receiver ID Command, the M12M returns the receiver Model Number ID as shown in the M12M column above. An exception exists with the M12M Timing receiver Model IL-GPS-0010-x. Many timing customers need a “P” to be returned as the first letter so the M12M is compatible with their previous M12+ software. Therefore, the letter “P” (not the entire old model number) is coded into the ID message where the “I” would normally exist.

#### 7. Reference Oscillator vs. TCXO:

The M12M now includes a more stable TCXO so an on-board oscillator temperature sensor, as used on the M12+ is no longer required. *As a result, the Oscillator Temperature bits in the @@Ha Position/Status/Data message, shown on page 170 of the iLotus M12M Users Guide, are nulled out and, therefore, not functional.*

**The M12+ Temperature message bits (below) are not available in the M12M @@Ha message**  
 TT = oscillator temperature -110...250 half degrees C (-55.0...+125.0°C).

	M12M (RoHS and non-RoHS)	M12+
RF IC	MG2000 (GSCI-2000-TR) 1. No temperature sensor 2. No voltage regulator, no reference oscillator inside (uses TCXO) 3. 12 channel correlator 4. Input Gain 10~50dB	MRFIC1505 1. Temperature sensor 2. Reference Oscillator, Voltage Regulator 3. No correlator 4. Input Gain 18~36dB

	5. Operating Temperature -40~105°C	5. Operating Temperature -40~85°C
Oscillator	TCXO: Higher degree of reference oscillator stability	Standard crystal oscillator
CLK_OUT	CLK_OUT generated by TCXO → after 1 BJT → CLK_OUT_BUF into microprocessor	Crystal (external) →Reference oscillator (internal) →buffer (internal) →microprocessor
TTFF	150s (cold start)	200s
Power	150mW	195mW

Please contact Synergy Tech Support for assistance with integrating the M12M into your timing or navigation applications.

Synergy Systems, LLC  
Email: [Oemtech@synergy-gps.com](mailto:Oemtech@synergy-gps.com)