

Miniature FM Transmitter 200mW, 2.2-2.3 GHz

**MA05935-XXX
V1**

Features

- FM transmitter with PLL, VCO and PA devices
- J/F-12 certified
- +3.0VDC to +3.3VDC Supply Voltage
- Parallel hard-wired frequency selection
- Choice of all IRIG frequency channels in S_{LOWER} band
- High Saturated Output Power: 23 dBm min.
- 50 Ω Output Matched
- IRIG 106-01 compliant
- Up to 12Mbps operation
- High shock compatible
- 10 k ohm modulation input impedance

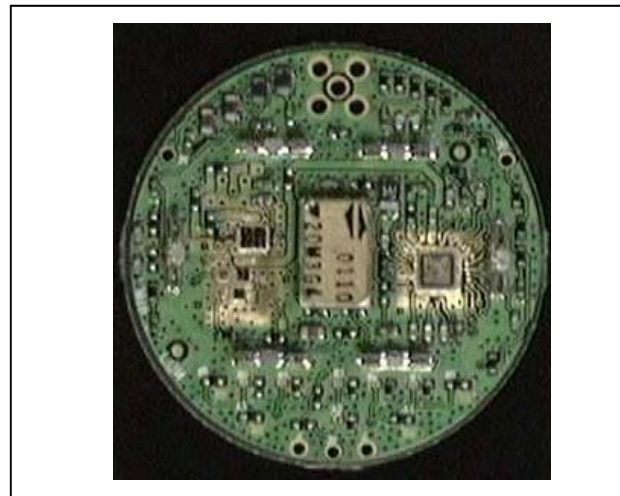
Description

M/A-COM's MA05935 is a 200mW miniature, phase-locked, FM transmitter module. The MA05935 is ideally suited for rugged telemetry systems.

The MA05935 contains a shock-hardened crystal oscillator, a silicon on sapphire phase-locked loop, an iHBT™ VCO, and power amplifier. The module requires only a single, regulated supply voltage of +3.0V_{DC} or +3.3V_{DC}. The MA05935 has a fully matched (50 Ω) output network.

M/A-COM's MA05935 is fabricated on standard FR-4 PC board material, employing automatic assembly of the hybrid technology components (silicon on sapphire, iHBT™ and SMT).

Transmitter Picture^{1, 2, 3}



1. Module diameter = 1.125"
2. Module height = 0.2"
3. Module weight = 3 grams typical

When fully encapsulated, this module will easily survive high shock pulses greater than 80,000G's. This product is 100% RF tested to ensure compliance to performance specifications.

Other output powers, features, and form factors are available upon request. Additional environmental screening is also available.

Electrical Specifications: $T_A = 25^\circ\text{C}$, $Z_0 = 50\Omega$ ¹

Parameter	Test Conditions	Frequency	Units	Min	Typ	Max
Supply Voltage	—	—	volts	3.0	—	3.3
Supply Current	—	2.2 - 2.3 GHz	mA	—	350	—
Output Power	—	2.2 - 2.3 GHz	dBm	23.0	23.5	24.0
Output VSWR	—	2.2 - 2.3 GHz	—	—	< 2:1	—
Stability	-40°C to +85°C	2.2 - 2.3 GHz	%	—	<± 0.002	—
Lock Time	—	2.2 - 2.3 GHz	ms	—	<30	—
Harmonics	—	2.2 - 2.3 GHz	dBm	-25	—	—
Output Power vs. Temp	-40°C to +85°C	2.2 - 2.3 GHz	dBm	—	± 0.6	—
Phase Noise	—	2.2 - 2.3 GHz	%	—	23	—

1

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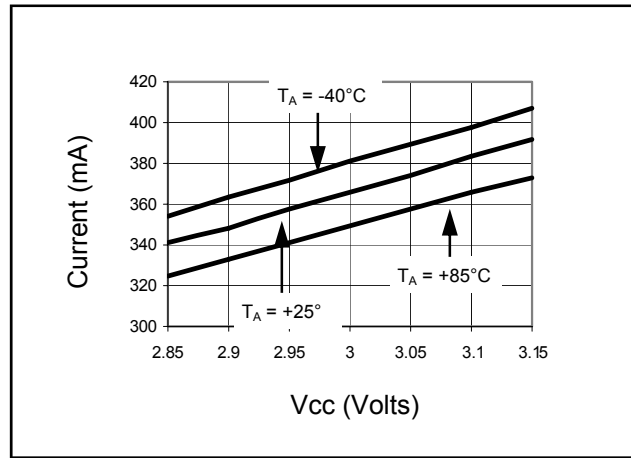
Visit www.macom.com for additional data sheets and product information.

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200mW, 2.2-2.3 GHz

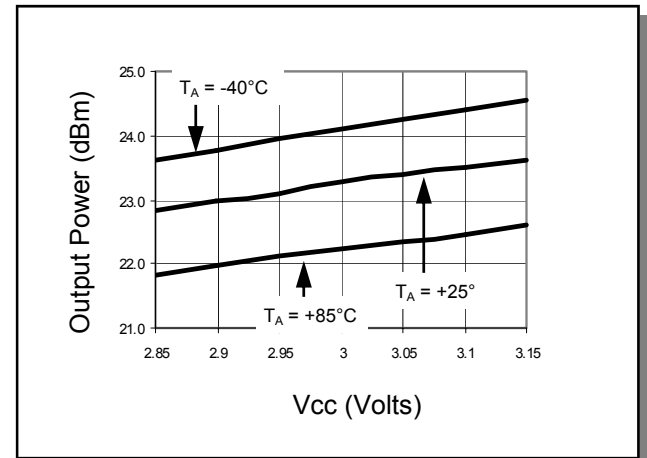
MA05935-XXX
V1

Typical Performance Curves

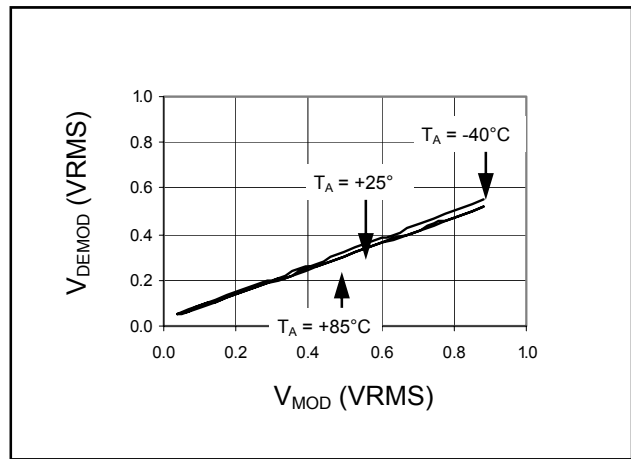
Current vs. Voltage Supply



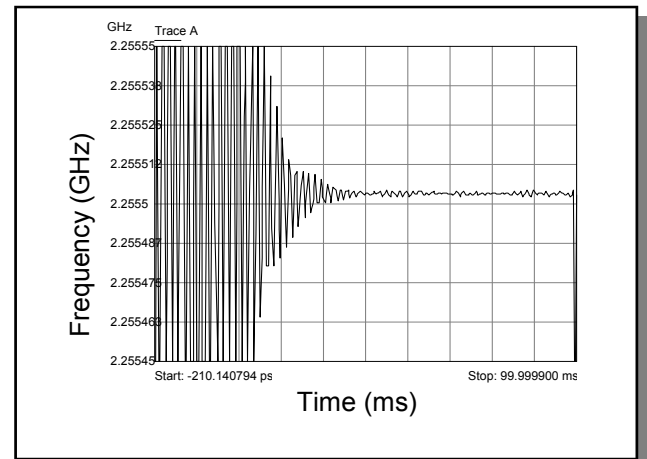
Output Power vs. Supply Voltage



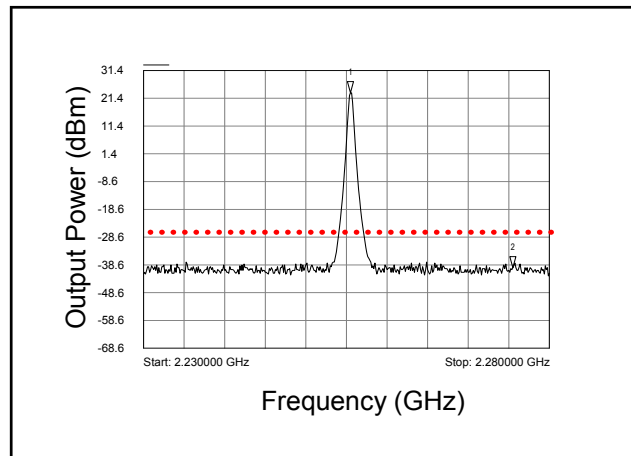
Modulation (ac) Linearity



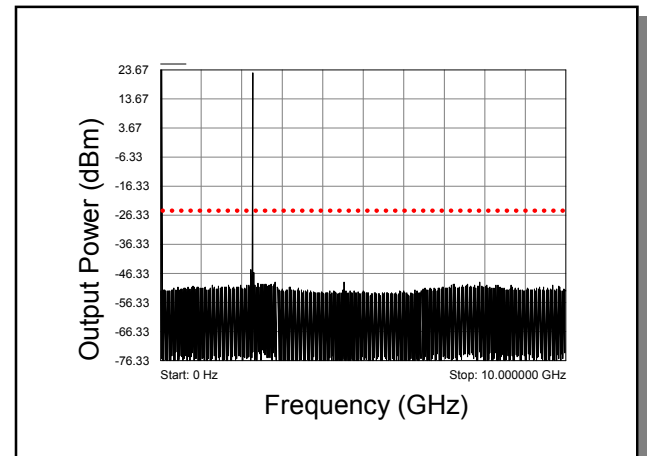
Lock Time



Spurious Emissions



Harmonic Spectrum



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**MA05935-XXX
V1**

Absolute Maximum Ratings^{4,5}

Parameter	Absolute Maximum
Modulation Voltage (V_{MOD})	3.0 V_{PP}
V_{CC} (+3.3V)	+3.5 V
I_{CC}	550 mA
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

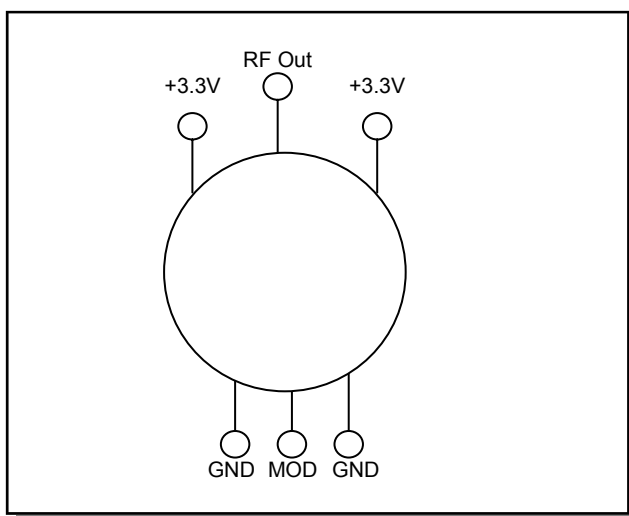
4. Operation of this device above any one of these parameters may cause permanent damage.
5. Adequate heat sinking and grounding required.

Handling

Permanent damage to the MA05935 may occur if the following precautions are not adhered to:

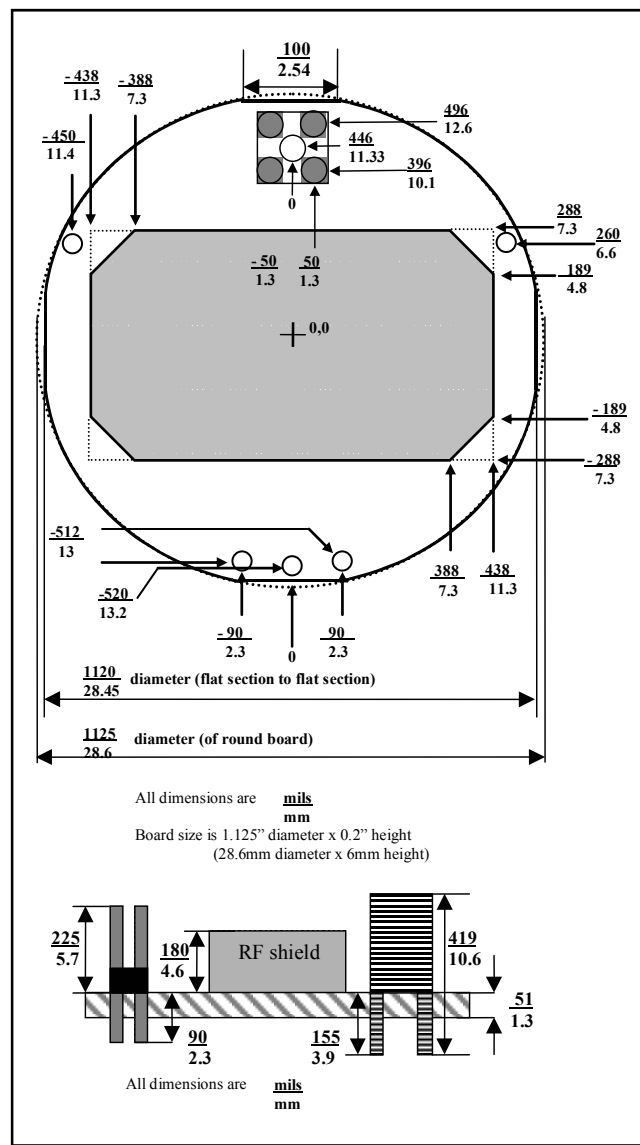
- A. Static Sensitivity – All die handling equipment and personnel should comply with DOD-STD-1686 Class I.
- B. Transients – Avoid instruments and power supply transients while bias is connected to the MA05935. Use shielded signal and bias cables to minimize inductive pick-up.

Typical Bias Configuration⁶



6. Apply V_{CC} before applying V_{MOD} .

Module Outline



Mounting

DO NOT expose the MA05935 to temperatures greater than 180°C for more than 20 seconds. Higher temperatures may result in reflow of the Sn63/Pb37 solder used for SMT component attach.

Miniature FM Transmitter 200mW, 2.2-2.3 GHz

**MA05935-XXX
V1**

RF Connector

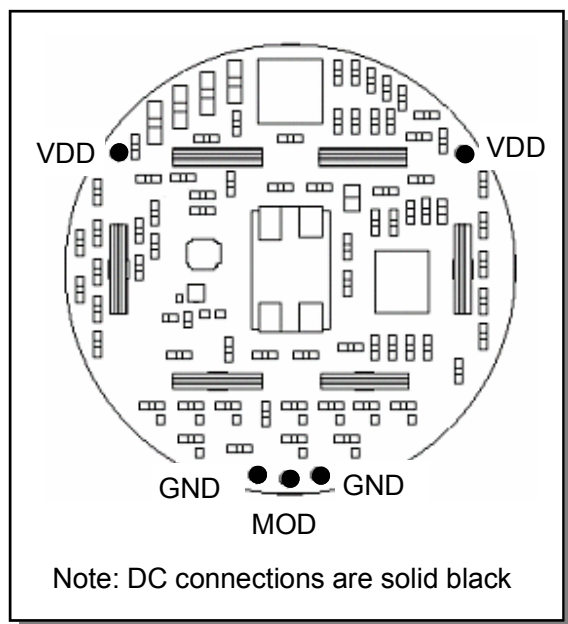
The RF connector is a standard-sized, through-hole mounted SSMC connector. To allow user flexibility, the RF connector can be provided with the MA05935 unattached to the board. The user may mount the connector on either the component side or bottom side of board, as required.

DC Connector

The DC connection of the MA05935 is made through five single pin connectors. Each pin is a through hole of 0.030" diameter. The pin assignments are shown in the figure below.

The through-hole connector was chosen to allow freedom in mounting; this connector may be either placed or omitted to allow use of other connector types.

DC Connector Pinout



Channel Selection

The PLL determines the frequency of operation for the transmitter. The channel selection on the board is performed through the use of 0402 SMT zero ohm resistors, connected to the parallel input lines of the PLL. All IRIG channels in the lower S-band are available.

See the corresponding application notes for frequency choices, and the required resistor positions..

Ordering Information

PART NO.	DESCRIPTION
MA05935-000	23dBm module (operates at 2200.5MHz)
MA05935-001	23dBm module (operates at 2201.5MHz)
MA05935-002	23dBm module (operates at 2202.5MHz)
MA05935-003	23dBm module (operates at 2203.5MHz)
MA05935-004	23dBm module (operates at 2204.5MHz)
MA05935-005	23dBm module (operates at 2205.5MHz)
MA05935-006	23dBm module (operates at 2206.5MHz)
MA05935-007	23dBm module (operates at 2207.5MHz)
MA05935-008	23dBm module (operates at 2208.5MHz)
MA05935-009	23dBm module (operates at 2209.5MHz)
MA05935-010	23dBm module (operates at 2210.5MHz)
MA05935-011	23dBm module (operates at 2211.5MHz)
MA05935-012	23dBm module (operates at 2212.5MHz)
MA05935-013	23dBm module (operates at 2213.5MHz)
MA05935-014	23dBm module (operates at 2214.5MHz)
MA05935-015	23dBm module (operates at 2215.5MHz)
MA05935-016	23dBm module (operates at 2216.5MHz)
MA05935-017	23dBm module (operates at 2217.5MHz)
MA05935-018	23dBm module (operates at 2218.5MHz)
MA05935-019	23dBm module (operates at 2219.5MHz)
MA05935-020	23dBm module (operates at 2220.5MHz)
MA05935-021	23dBm module (operates at 2221.5MHz)
MA05935-022	23dBm module (operates at 2222.5MHz)
MA05935-023	23dBm module (operates at 2223.5MHz)
MA05935-024	23dBm module (operates at 2224.5MHz)
MA05935-025	23dBm module (operates at 2225.5MHz)

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MA05935-XXX
V1

PART NO.	DESCRIPTION
MA05935-026	23dBm module (operates at 2226.5MHz)
MA05935-027	23dBm module (operates at 2227.5MHz)
MA05935-028	23dBm module (operates at 2228.5MHz)
MA05935-029	23dBm module (operates at 2229.5MHz)
MA05935-030	23dBm module (operates at 2230.5MHz)
MA05935-031	23dBm module (operates at 2231.5MHz)
MA05935-032	23dBm module (operates at 2232.5MHz)
MA05935-033	23dBm module (operates at 2233.5MHz)
MA05935-034	23dBm module (operates at 2234.5MHz)
MA05935-035	23dBm module (operates at 2235.5MHz)
MA05935-036	23dBm module (operates at 2236.5MHz)
MA05935-037	23dBm module (operates at 2237.5MHz)
MA05935-038	23dBm module (operates at 2238.5MHz)
MA05935-039	23dBm module (operates at 2239.5MHz)
MA05935-040	23dBm module (operates at 2240.5MHz)
MA05935-041	23dBm module (operates at 2241.5MHz)
MA05935-042	23dBm module (operates at 2242.5MHz)
MA05935-043	23dBm module (operates at 2243.5MHz)
MA05935-044	23dBm module (operates at 2244.5MHz)
MA05935-045	23dBm module (operates at 2245.5MHz)
MA05935-046	23dBm module (operates at 2246.5MHz)
MA05935-047	23dBm module (operates at 2247.5MHz)
MA05935-048	23dBm module (operates at 2248.5MHz)
MA05935-049	23dBm module (operates at 2249.5MHz)
MA05935-050	23dBm module (operates at 2250.5MHz)
MA05935-051	23dBm module (operates at 2251.5MHz)
MA05935-052	23dBm module (operates at 2252.5MHz)
MA05935-053	23dBm module (operates at 2253.5MHz)
MA05935-054	23dBm module (operates at 2254.5MHz)
MA05935-055	23dBm module (operates at 2255.5MHz)
MA05935-056	23dBm module (operates at 2256.5MHz)
MA05935-057	23dBm module (operates at 2257.5MHz)
MA05935-058	23dBm module (operates at 2258.5MHz)
MA05935-059	23dBm module (operates at 2259.5MHz)
MA05935-060	23dBm module (operates at 2260.5MHz)
MA05935-061	23dBm module (operates at 2261.5MHz)
MA05935-062	23dBm module (operates at 2262.5MHz)

PART NO.	DESCRIPTION
MA05935-063	23dBm module (operates at 2263.5MHz)
MA05935-064	23dBm module (operates at 2264.5MHz)
MA05935-065	23dBm module (operates at 2265.5MHz)
MA05935-066	23dBm module (operates at 2266.5MHz)
MA05935-067	23dBm module (operates at 2267.5MHz)
MA05935-068	23dBm module (operates at 2268.5MHz)
MA05935-069	23dBm module (operates at 2269.5MHz)
MA05935-070	23dBm module (operates at 2270.5MHz)
MA05935-071	23dBm module (operates at 2271.5MHz)
MA05935-072	23dBm module (operates at 2272.5MHz)
MA05935-073	23dBm module (operates at 2273.5MHz)
MA05935-074	23dBm module (operates at 2274.5MHz)
MA05935-075	23dBm module (operates at 2275.5MHz)
MA05935-076	23dBm module (operates at 2276.5MHz)
MA05935-077	23dBm module (operates at 2277.5MHz)
MA05935-078	23dBm module (operates at 2278.5MHz)
MA05935-079	23dBm module (operates at 2279.5MHz)
MA05935-080	23dBm module (operates at 2280.5MHz)
MA05935-081	23dBm module (operates at 2281.5MHz)
MA05935-082	23dBm module (operates at 2282.5MHz)
MA05935-083	23dBm module (operates at 2283.5MHz)
MA05935-084	23dBm module (operates at 2284.5MHz)
MA05935-085	23dBm module (operates at 2285.5MHz)
MA05935-086	23dBm module (operates at 2286.5MHz)
MA05935-087	23dBm module (operates at 2287.5MHz)
MA05935-088	23dBm module (operates at 2288.5MHz)
MA05935-089	23dBm module (operates at 2289.5MHz)
MA05935-090	23dBm module (operates at 2290.5MHz)
MA05935-091	23dBm module (operates at 2291.5MHz)
MA05935-092	23dBm module (operates at 2292.5MHz)
MA05935-093	23dBm module (operates at 2293.5MHz)
MA05935-094	23dBm module (operates at 2294.5MHz)
MA05935-095	23dBm module (operates at 2295.5MHz)
MA05935-096	23dBm module (operates at 2296.5MHz)
MA05935-097	23dBm module (operates at 2297.5MHz)
MA05935-098	23dBm module (operates at 2298.5MHz)
MA05935-099	23dBm module (operates at 2299.5MHz)