

REP032: Lumped Element Output Match for the MAX2240 Non-Linear 2.45GHz PA

Rapid engineering prototypes are real circuits that Maxim application engineers have built and measured in our labs. They can provide a starting point for new RF designs. They are not available as evaluation kits.

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[Quick View Data Sheet for the MAX2240](#)
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Objective: To improve the low voltage 2.45GHz RF non-linear PA's output matching network using mainly lumped surface mount components.

The MAX2240 is a 2.45GHz non-linear RF power amplifier whose output match was originally developed with a series output transmission line and a sliding shunt capacitor. An open stub provided part of the match. A new output matching network for the MAX2240 was achieved by removing the open stub and replacing it with a capacitor series with inductor to ground. Then, the part was characterized for output power, supply current and 2nd order harmonic with $V_{cc}=3.3V$ and $P_{out}=19dBm$.

The MAX2240 is designed for applications in the 2.4GHz to 2.5GHz frequency range. It is compliant with Bluetooth, HomeRF, and 802.11 standards, as well as other FSK modulation systems. It features a high +20dBm output power, 2-bit digital power control with 4 output levels, and an integrated input match to 50Ω . Other features includes low 105mA operating current, 0.5mA low power shutdown mode current, and +2.7V to 5V single-supply operation. The MAX2240 is available in an ultra-chipscale package.

Specifications Conformance Matrix Rev 1.0

Test Conditions:

$V_{cc} = 3.3V$
 $P_{out} = +19dBm$
Temp = Room

All power levels have been called to input and output connectors

Frequency	Pin	I _{CC}	2nd Harmonic		3rd Harmonic	
GHz	dBm	mA	dBm	dBm	dBm	dBm
2.4	-0.8	105	-26	-15	-14.5	NA
2.45	0.0	103	-23	-15	-14.8	NA
2.5	0.6	102	-21	-15	-14.7	NA

Note:

- Capacitor value: 1.1pF, Murata, GRM36C0G1r1B50
- Inductor value: 1.0nH, Murata, LQP10A1N0C00

Bench Test Equipment List

Spectrum Analyzer: HP8562EC x1
Signal Source: E4433B ESG-D
RF Power Meter: HP 438A
RF Power Sensor : HP 8482

Circuit Modification Description Rev 1.0

- Remove the open stub section of output matching network of the MAX2240
- Shut a capacitor and inductor in series to ground
- Capacitor value: 1.1pF, Murata, GRM36C0G1r1B50
- Inductor value: 1.0nH, Murata, LQP10A1N0C00
- See the schematic for detail

Schematic

[Schematic](#) (PDF, 131K)

CA28Q401, December 2001

MORE INFORMATION

MAX2240: [QuickView](#)

-- [Full \(PDF\) Data Sheet \(192k\)](#)

-- [Free Sample](#)