

X2 MMIC Surface Mount Frequency Multiplier

CY2-143+

50Ω Output 4 to 14 GHz

The Big Deal

- Ultra-wideband, output from 4 to 14 GHz
- Wide input power range, +12 to +18 dBm
- Low conversion loss, 12 dB
- Good fundamental and harmonic suppression:
F1, 30 dBc; F3, 32 dBc
- Tiny size, 4 x 4 x 1mm
- Low cost



CASE STYLE: DG1847

Product Overview

Mini-Circuits' CY2-143+ is an ultra-wideband MMIC frequency doubler, converting input frequencies from 2 to 7 GHz into output frequencies from 4 to 14 GHz. Its wide output range makes this model suitable for broadband systems as well as a wide variety of narrowband applications. Utilizing GaAs HBT technology, the multiplier comes housed in a tiny 4 x 4 x 1mm MCLP package and offers excellent repeatability, low inductance, good thermal efficiency, and low cost.

Key Features

| Feature | Advantages |
|--|---|
| Broadband, 4 to 14 GHz output | With an output frequency range spanning 4 to 14 GHz, this multiplier supports broadband applications such as defense and instrumentation as well as a wide range of narrowband system requirements. |
| Low conversion loss, 12 dB typ. | With a low conversion loss, CY2-143+ produces higher output power, reducing the need for amplification. |
| Excellent fundamental and harmonic suppression: <ul style="list-style-type: none">• F1, 30 dBc• F3, 32 dBc• F4, 17 dBc | Reduces spurious signals and the need for additional filtering. |
| Wide input power range, +12 to +18 dBm | Wide input power signal range accommodates different input signal levels while still maintaining a low conversion loss. |
| 4 x 4mm, 24 lead MCLP package | Low inductance, repeatable transitions, and excellent thermal contact to the PCB |
| Low cost | Provides an easy, cost-effective solution for generating high-frequency signals from a lower frequency signal source. |

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Maximum Ratings

| | |
|---|-----------------|
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +150°C |
| RF Input Power | 21 dBm |
| Permanent damage may occur if any of these limits are exceeded. | |

Pad Connections

| | |
|----------------|-------------------|
| INPUT | 3 |
| OUTPUT | 16 |
| GROUND | 2,4,15,17, Paddle |
| NO CONNECTIONS | all others |

Features

- wideband, output 4 to 14 GHz
- low conversion loss, 12 dB typ.
- high fundamental & harmonic suppression, F1, 30 dBc typ.; F3, 32 dBc typ.; F4, 17 dBc typ.
- miniature size 4x4x1 mm
- aqueous washable

Applications

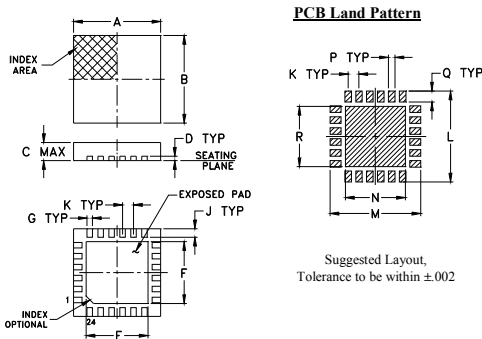
- synthesizers
- local oscillators

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

| | |
|--|-----------------------------|
| Available Tape and Reel at no extra cost | |
| Reel Size | Devices/Reel |
| 7" | 20, 50, 100, 200, 500, 1000 |
| 13" | 2000, 4000 |

Outline Drawing



Outline Dimensions (inch/mm)

| | | | | | | | | |
|------|------|------|------|------|------|------|----|-------|
| A | B | C | D | E | F | G | H | J |
| .157 | .157 | .039 | .008 | .104 | .104 | .009 | -- | .016 |
| 4.0 | 4.0 | 1.0 | 0.20 | 2.64 | 2.64 | 0.23 | -- | 0.41 |
| K | L | M | N | P | Q | R | | wt |
| .020 | .166 | .166 | .102 | .020 | .020 | .102 | | grams |
| 0.50 | 4.22 | 4.22 | 2.59 | 0.30 | 0.51 | 2.59 | | 0.04 |

Electrical Specifications at 25°C

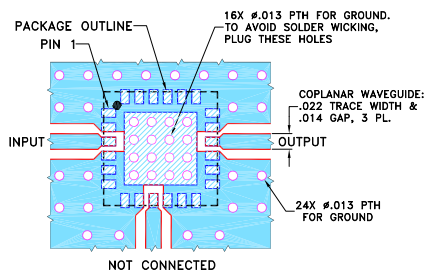
| Parameter | Input Frequency (GHz) | Min. | Typ. | Max. | Unit |
|------------------------------|-----------------------|-------|------|------|------|
| Multiplier Factor | | | 2 | | |
| Frequency Range, Input (F1) | | 2 | — | 4 | GHz |
| Frequency Range, Output (F2) | | 4 | — | 14 | GHz |
| Input Power | | 12 | — | 18 | dBm |
| Conversion Loss | 2 - 4 | — | 12 | 14.5 | dB |
| | 4 - 7 | — | 13 | 19.2 | |
| Harmonic Output* | F1 | 2 - 4 | 19 | 30 | — |
| | | 4 - 7 | 17 | 27 | — |
| | F3 | 2 - 4 | 20 | 32 | — |
| | | 4 - 7 | 21 | 39 | — |
| | F4 | 2 - 4 | 11 | 17 | — |
| | | 4 - 7 | 12 | 27 | — |

* Harmonics of input frequency below the power level of F2

Typical Performance Data

| Input Frequency (MHz) | INPUT RF= 12 dBm | | | | INPUT RF= 18 dBm | | | |
|-----------------------|----------------------|---------------------------------|-------|-------|----------------------|---------------------------------|-------|-------|
| | Conversion Loss (dB) | Harmonic Output Below F2 (-dBc) | | | Conversion Loss (dB) | Harmonic Output Below F2 (-dBc) | | |
| | F2 | F1 | F3 | F4 | F2 | F1 | F3 | F4 |
| 2000 | 12.51 | 40.92 | 33.76 | 15.87 | 13.75 | 30.50 | 22.90 | 14.10 |
| 2500 | 10.53 | 37.94 | 37.00 | 14.66 | 12.11 | 26.75 | 24.89 | 16.92 |
| 3000 | 11.08 | 33.46 | 37.04 | 15.55 | 11.39 | 25.83 | 24.69 | 22.32 |
| 3500 | 12.38 | 28.64 | 35.79 | 16.22 | 11.95 | 22.50 | 24.04 | 17.78 |
| 4000 | 11.79 | 30.37 | 38.63 | 25.62 | 11.68 | 23.85 | 27.03 | 21.81 |
| 4500 | 12.96 | 26.72 | 36.23 | 38.06 | 12.06 | 22.28 | 28.45 | 28.64 |
| 4750 | 13.13 | 26.39 | 36.75 | 40.80 | 12.30 | 22.55 | 30.69 | 26.12 |
| 5000 | 14.02 | 26.78 | 38.07 | 38.98 | 12.74 | 23.84 | 33.88 | 22.71 |
| 5250 | 14.28 | 27.98 | 49.62 | 28.39 | 12.32 | 27.27 | 38.61 | 21.76 |
| 5500 | 14.73 | 29.00 | 60.05 | 20.95 | 11.95 | 30.39 | 43.81 | 19.50 |
| 5750 | 15.24 | 29.17 | 48.47 | 21.47 | 12.57 | 32.24 | 49.94 | 18.66 |
| 6000 | 13.82 | 30.24 | 42.36 | 29.24 | 11.98 | 33.03 | 46.20 | 23.98 |
| 6250 | 13.95 | 29.08 | 45.37 | 35.00 | 12.12 | 31.30 | 45.25 | 28.35 |
| 6500 | 13.23 | 28.77 | 42.70 | 33.39 | 12.64 | 29.29 | 42.22 | 30.69 |
| 6750 | 14.46 | 26.94 | 41.63 | 34.68 | 14.18 | 26.93 | 38.24 | 32.55 |
| 7000 | 15.86 | 26.02 | 39.73 | 32.68 | 16.02 | 25.38 | 37.86 | 31.60 |

Demo Board MCL P/N: TB-851-143+ Suggested PCB Layout (PL-476)



NOTES:

1. TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010±.001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
 - DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
 - DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

ESD rating

Human body model (HBM): Class 1C (1000 to <2000 V) in accordance with ANSI/ESD STM 5.1-2001

