MOTOROLA

# MC13143

*Product Preview*

# Ultra Low Power DC – 2.4 GHz Linear Mixer

The MC13143 is a high compression linear mixer with single–ended RF input, differential IF output and differential LO inputs which consumes as little as 1.8 mW. A new circuit topology is used to achieve a high third order intermodulation intercept point, high linearity and high 1.0 dB output compression point while maintaining a linear 50 Ω input impedance. It is designed for Up or Down conversion anywhere from dc to 2.4 GHz.

**Ultra Low Power: 1.0 mA @ $V_{CC}$ = 1.8–6.5 V**

- Wide Input Bandwidth: DC–2.4 GHz
- Wide Output Bandwidth: DC–2.4 GHz
- Wide LO Bandwidth: DC–2.4 GHz
- High Mixer Linearity: $P_{i1.0\ dB}$ = + 3.0 dBm

**Linearity Adjustment of up to $IP_{3in}$ = +20 dBm**

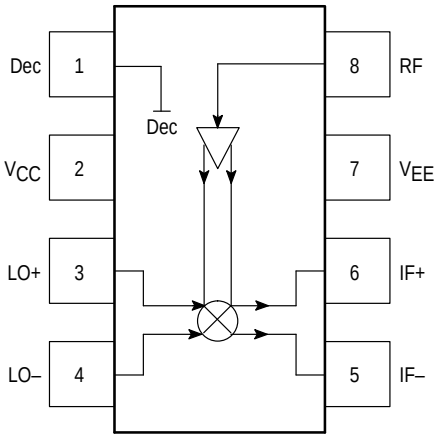
- 50 Ω Mixer Input
- Single–Ended Mixer Input
- Double Balanced Mixer Operation
- Differential Open Collector Mixer Output

**ULTRA LOW POWER DC – 2.4 GHz LINEAR MIXER**

**SEMICONDUCTOR TECHNICAL DATA**


**D SUFFIX**
PLASTIC PACKAGE
CASE 751
(SO–8)

**PIN CONNECTIONS**




(Top View)

**ORDERING INFORMATION**

| Device | Operating Temperature Range | Package |
|---|---|---|
| MC13143D | $T_A$ = –40 ° to +85°C | SO–8 |

**MAXIMUM RATINGS** ($T_A$ = 25°C, unless otherwise noted.)

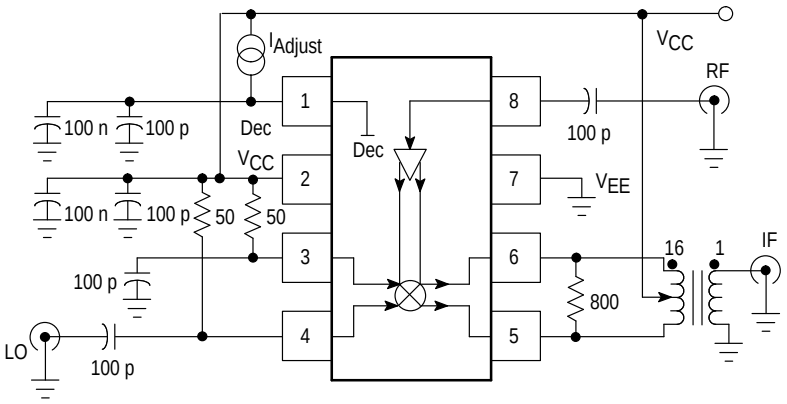
| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Power Supply Voltage | $V_{CC}$ | 7.0 (max) | Vdc |
| Operating Supply Voltage Range | $V_{CC}$ | 1.8–6.5 | Vdc |

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

**ELECTRICAL CHARACTERISTICS** ($V_{CC}$ = 2.0 V, $T_A$ = 25°C, RF = – 30 dBm @ 900 MHz, LO = 0 dBm @ 950 MHz, IF @ 50 MHz.)

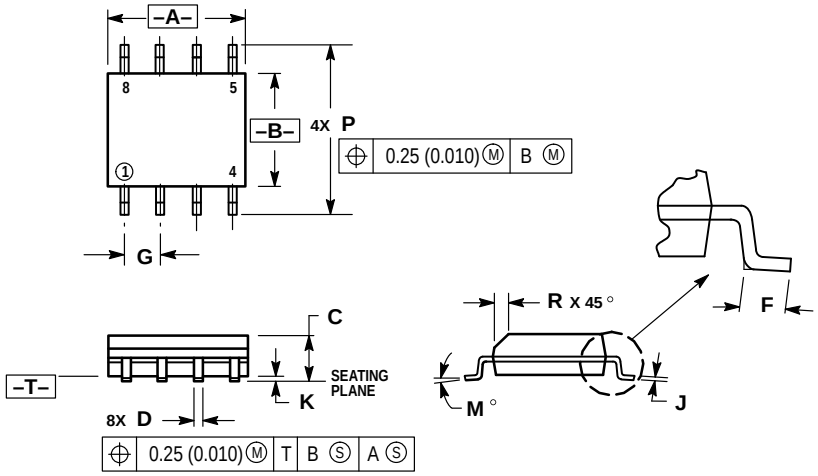
| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Supply Current | $I_{CC}$ | – | 0.7–1.3 | – | mA |
| Mixer Voltage Conversion Gain ($R_P$ = $R_L$ = 800 Ω) | $VG_C$ | – | 9.0 | – | dB |
| Mixer Power Conversion Gain ($R_P$ = $R_L$ = 800 Ω) | $PG_C$ | – | – 3.0 | – | dB |
| Mixer Input Match | $\Gamma_{in}$ | – | – 20 | – | dB |
| Mixer SSB Noise Figure | $NF_{SSB}$ | – | 12 | – | dB |
| Mixer 1.0 dB Gain Compression | $PIn_{–1.0\ dB}$ | – | 3.0 | – | dBm |
| Mixer Input Third Order Intercept | $IP3_{in}$ | – | – 3.0 | – | dBm |
| LO Drive Level | $LO_{in}$ | – | – 5.0 | – | dBm |
| LO Feedthrough to Mixer Out | $P_{LO–IF}$ | – | – 25 | – | dB |
| Mixer Input Feedthrough Output | $P_{RFm–IF}$ | – | – 25 | – | dB |
| Mixer Input Feedthrough to LO | $P_{RFm–LO}$ | – | – 25 | – | dB |

**Test Circuit**



## OUTLINE DIMENSIONS

**D SUFFIX**
PLASTIC PACKAGE
CASE 751–05
(SO–8)
ISSUE N




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 4.80 | 5.00 | 0.189 | 0.196 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27 BSC | | 0.050 BSC | |
| J | 0.18 | 0.25 | 0.007 | 0.009 |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0 ° | 7 ° | 0 ° | 7 ° |
| P | 5.80 | 6.20 | 0.229 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |



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