



MC13142

Prototype Information

Low Power DC - 1.8 GHz LNA, Mixer and VCO

The MC13142 is intended to be used as a first amplifier, voltage controlled oscillator and down converter for RF applications. It features wide band operation, low noise, high gain and high linearity while maintaining low current consumption. The circuit consists of a Low Noise Amplifier (LNA), a Voltage Controlled Oscillator (VCO), a buffered oscillator output, a mixer, an Intermediate Frequency amplifier (IF_{amp}) and a dc control section. The wide mixer IF bandwidth allows this part also to be used as an up converter and exciter amplifier.

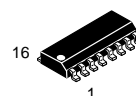
- Wide RF Bandwidth: DC–1.8 GHz
- Wide LO Bandwidth: DC–1.8 GHz
- Wide IF Bandwidth: DC–1.8 GHz
- Low Power: 13 mA @ V_{CC} = 2.7–6.5 V
- High Mixer Linearity: P_{i1.0} dB = + 3.0 dBm
- Linearity Adjustment Increases IP_{3in} (TQFP–20 Package Only)
- Single–Ended 50 Ω Mixer Input
- Double Balanced Mixer Operation
- Open Collector Mixer Output
- Single Transistor Oscillator with Collector, Base and Emitter Pinned Out
- Buffered Oscillator Output
- Mixer and Oscillator Can be Enabled Independently

ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC13142D	T _A = –40 ° to +85°C	SO–16
MC13142FTB		TQFP–20

LOW POWER DC – 1.8 GHz LNA, MIXER and VCO

SEMICONDUCTOR TECHNICAL DATA

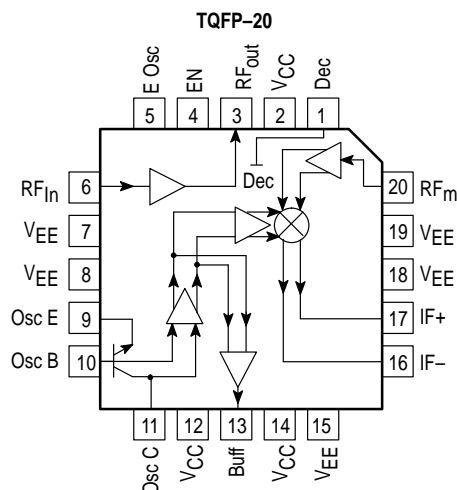
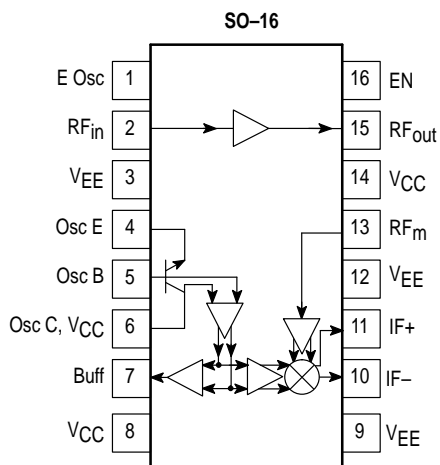


D SUFFIX
PLASTIC PACKAGE
CASE 751B
(SO–16)



FTB SUFFIX
PLASTIC PACKAGE
CASE 976
(Thin QFP)

PIN CONNECTIONS



MC13142

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

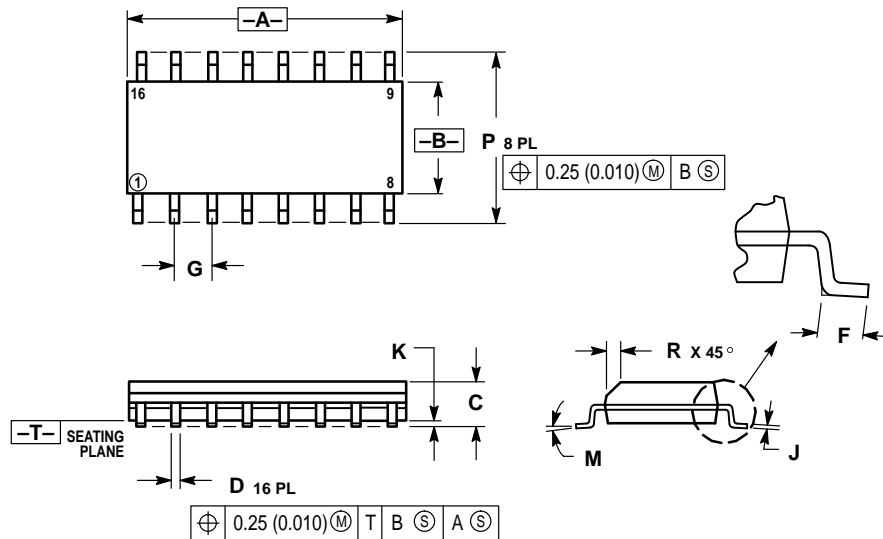
Rating	Symbol	Value	Unit
Power Supply Voltage	V _{CC}	7.0 (max)	Vdc
Operating Supply Voltage Range	V _{CC}	2.7–6.5	Vdc

ELECTRICAL CHARACTERISTICS (V_{CC} = 3.0 V, T_A = 25°C, LO_{in} = –10 dBm @ 950 MHz, IF @ 50 MHz.)

Characteristic	Symbol	Min	Typ	Max	Unit
Supply Current (Power Down)	I _{CC}	–	100	–	pA
Supply Current (Power Up)	I _{CC}	–	10–16	–	mA
Amplifier Gain	S ₂₁	–	17	–	dB
Amplifier Reverse Isolation	S ₁₂	–	– 25	–	dB
Amplifier Input Match	Γ _{in amp}	–	–10	–	dB
Amplifier Output Match	Γ _{out amp}	–	–15	–	dB
Amplifier 1.0 dB Gain Compression	Pin _{–1.0 dB}	–	–15	–	dBm
Amplifier Input Third Order Intercept	IP _{3in}	–	– 5.0	–	dBm
Amplifier Noise Figure (50 Ω)	NF	–	2.5	–	dB
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	Γ _{in M}	–	– 20	–	dB
Mixer SSB Noise Figure	NF _{SSBM}	–	12	–	dB
Mixer 1.0 dB Gain Compression	Pin _{–1.0 dBm}	–	3.0	–	dBm
Mixer Input Third Order Intercept	IP _{3InM}	–	– 2.0	–	dBm
Oscillator Buffer Drive (50 Ω)	P _{VCO}	–	–16	–	dBm
Oscillator Phase Noise @ 25 kHz Offset	N _Φ	–	– 90	–	dBc/Hz
RF _{in} Feedthrough to RF _m	P _{RFin–RFm}	–	– 35	–	dB
RF _{out} Feedthrough to RF _m	P _{RFout–RFm}	–	– 35	–	dB
LO Feedthrough to IF	P _{LO–IF}	–	– 35	–	dBm
LO Feedthrough to RF _{in}	P _{LO–RFin}	–	– 35	–	dBm
LO Feedthrough to RF _m	P _{LO–RFm}	–	– 35	–	dBm
Mixer RF Feedthrough to IF	P _{RFm–IF}	–	– 25	–	dB
Mixer RF Feedthrough to RF _{in}	P _{RFm–RFin}	–	– 25	–	dB

OUTLINE DIMENSIONS


D SUFFIX
PLASTIC PACKAGE
CASE 751B-05
(SO-16)
ISSUE J



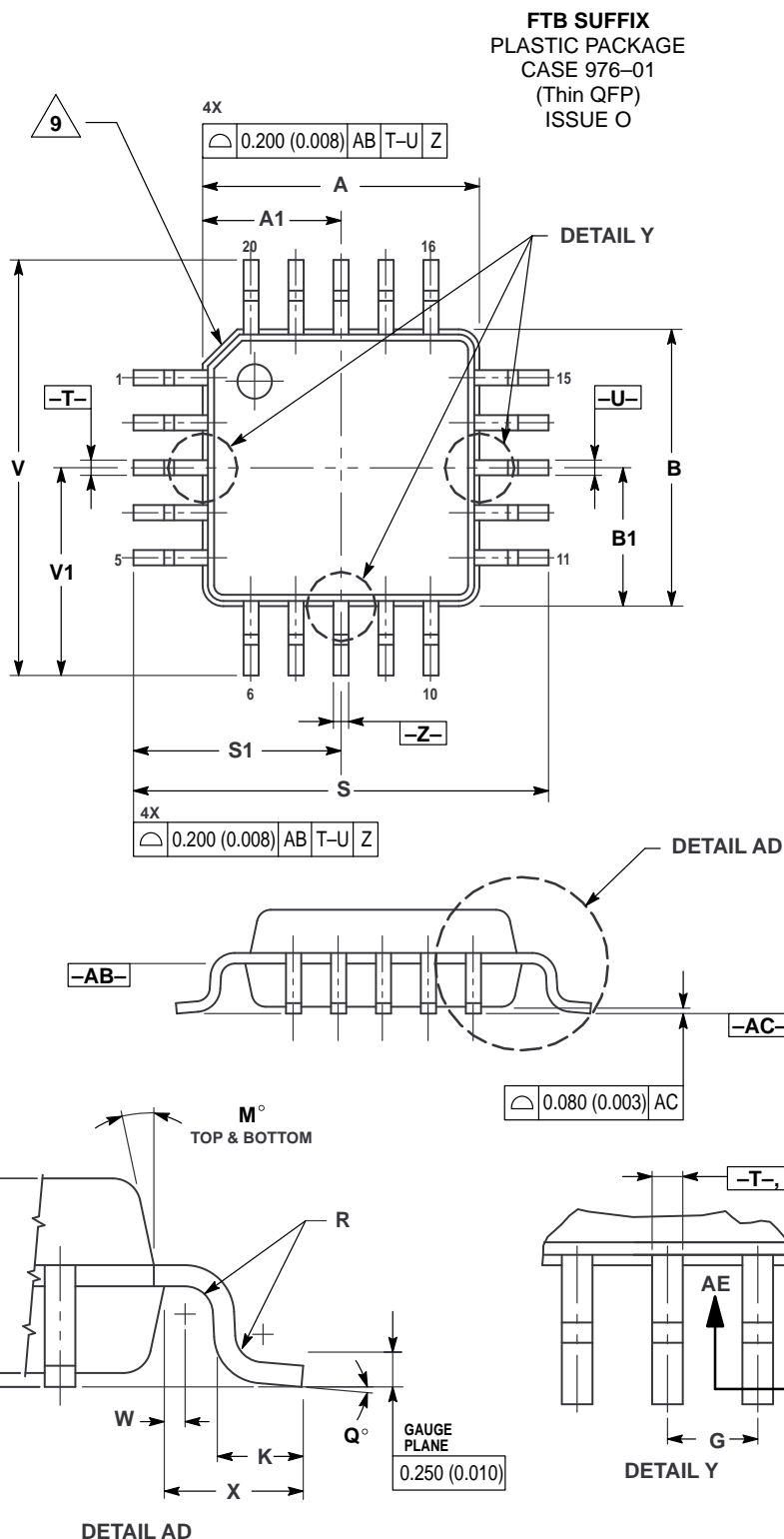
NOTES:

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.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
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	0.19	0.25	0.008	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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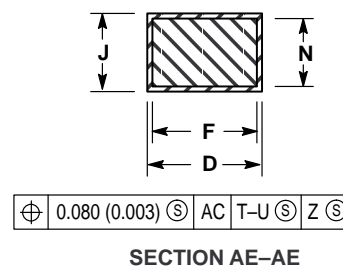
OUTLINE DIMENSIONS



NOTES:

- 1 DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- 2 CONTROLLING DIMENSION: MILLIMETER.
- 3 DATUM PLANE --B-- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
- 4 DATUMS --T--, --U--, AND --Z-- TO BE DETERMINED AT DATUM PLANE --B--.
- 5 DIMENSIONS S AND V TO BE DETERMINED AT DATUM PLANE --C--.
- 6 DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.250 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE --B--.
- 7 DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR PROTRUSION SHALL NOT CAUSE THE D DIMENSION TO EXCEED 0.350 (0.014).
- 8 MINIMUM SOLDER PLATE THICKNESS SHALL BE 0.0076 (0.0003).
- 9 EXACT SHAPE OF EACH CORNER IS OPTIONAL.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.000	BSC	0.157	BSC
A1	2.000	BSC	0.079	BSC
B	4.000	BSC	0.157	BSC
B1	2.000	BSC	0.079	BSC
C	1.400	1.600	0.055	0.063
D	0.170	0.270	0.007	0.011
E	1.350	1.450	0.053	0.057
F	0.170	0.230	0.007	0.009
G	0.650	BSC	0.026	BSC
H	0.050	0.150	0.002	0.006
J	0.090	0.200	0.004	0.008
K	0.500	0.700	0.020	0.028
M	12° REF		12° REF	
N	0.090	0.160	0.004	0.006
P	0.250	BSC	0.010	BSC
Q	1°	5°	1°	5°
R	0.150	0.250	0.006	0.010
S	6.000	BSC	0.236	BSC
S1	3.000	BSC	0.118	BSC
V	6.000	BSC	0.236	BSC
V1	3.000	BSC	0.118	BSC
W	0.200	REF	0.008	REF
X	1.000	REF	0.039	REF



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