



**MOTOROLA**

Semiconductor Products Sector

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## Information Brief



### First CDMA Upmixer and Exciter Amplifier with RF AGC Integrated on a Single Chip

*– Higher level of integration cuts digital cellular phone costs*

The MRFIC0954 and MRFIC1854 integrate the upmixer and exciter amplifier functions for dual-band/dual-mode CDMA cellular phones. These advanced BiCMOS ICs are the first devices to integrate the upmixer and exciter amplifier with RF AGC on a single chip. The MRFIC0954 is designed for use at 800 MHz for dual-mode CDMA/AMPS phones, while the MRFIC1854 functions at frequencies up to 1.9 GHz for PCS CDMA and Korean band CDMA cellular phones. These two devices are designed to be used together in dual-band/dual-mode CDMA phones. The exciter amplifiers in both ICs incorporate a linear gain control function, and a selectable bias control pin to reduce power consumption.

Both devices are packaged in a new high power surface mount package, a special 20-pin TSSOP with a backside metal contact. The package provides excellent thermal and electrical performance through this solderable metal contact. This large contact area is physically connected to ground of the MRFIC0954 or MRFIC1854, and is soldered to the pc board using the same standard reflow process used for other surface mount components, simplifying the system design and production processes. The high thermal conductivity of this special TSSOP-20EP package allows these devices to provide higher RF output power without consuming excessive board space.

## FEATURES

### COMMON FEATURES/SPECIFICATIONS

- Integrated upmixer and exciter amplifier with RF AGC
- Designed for dual-band/dual-mode operation
- Temperature compensated linear gain control
- On-chip bias select pin
- Packaged in a new high power TSSOP-20EP surface mount package
- Supply voltage from 2.7 to 3.6 V
- Advanced BiCMOS process provides superior performance in a cost effective monolithic device

SPECIFICATION DIFFERENCES	MRFIC0954	MRFIC1854
• Usable Frequency Range	800 to 960 MHz	1700 to 2000 MHz
• Gain Control Dynamic Range	30 dB	25 dB
• Cascoded Adjacent Channel Power		
@ 885 kHz Offset ( $P_{out} = +6$ dBm)	-50 dBc	-
@ 1.25 MHz Offset ( $P_{out} = +3$ dBm)	-	-50 dBc
@ 1.98 MHz Offset ( $P_{out} = +6$ dBm)	-62 dBc	-
• Upmixer Output $IP_3$	11 dBm	6.0 dBm
• Exciter Output $IP_3$	28 dBm	23 dBm
• Total Supply Current		
CDMA Mode	55 mA	60 mA
Low Current Mode	35 mA	35 mA

### TYPES OF APPLICATIONS

These integrated upmixers/exciter with on-chip gain and bias controls are ideal for use in dual-band/dual-mode CDMA cellular phones that operate in the 800 MHz and 1.9 GHz bands.

- The MRFIC0954 800 MHz Integrated Upmixer and Exciter Amplifier is designed specifically for use in CDMA and AMPS cellular phones.
- The MRFIC1854 1.9 GHz Upmixer/Exciter will find application in 1.9 GHz Personal Communication Systems (PCS) CDMA and Korean CDMA digital cellular phones.
- Both of these devices are designed to be used together in dual-band/dual-mode CDMA phones.

## **BENEFITS TO YOU**

- Reduced cost with higher level integration of upmixer and exciter RF AGC amplifier functions.
- Greatly simplifies achieving CDMA transmitter specifications by having RF AGC in the exciter amplifier.
- Simplified design of dual-band/dual-mode cellular phones with upmixer/exciter amplifier ICs specifically designed for CDMA frequencies.
- Reduces linearity requirement for power amplifier due to very low cascaded adjacent channel power.
- Improved efficiency of entire RF transmit chain with excellent cascaded adjacent channel power specification.
- Can drive power amplifier directly, without an additional amplifier stage, due to excellent output power and third order intercept point of exciter amplifier.
- Lowers system cost and manufacturing costs due to integrated, on-chip linear gain control and selectable bias control circuitry.
- Can be used in three-cell battery-powered applications with a power supply voltage as low as 2.7 V.
- Provides higher circuit and system density with the new high power TSSOP-20EP surface mount package.
- Smaller battery for portable applications with 2.7 V operation and selectable bias to reduce power consumption.
- Improved reliability due to lower power dissipation.

## **A SOLUTION FOR THESE QUESTIONS**

- Do you need to design a dual-band/dual-mode CDMA cellular phone using upmixers and exciter amplifiers with RF AGC specifically designed for CDMA frequencies?
- Do you want to reduce the parts count and lower your manufacturing costs by using an integrated upmixer and RF AGC (exciter) amplifier?
- Do you need to reduce the linearity requirement for your power amplifier, and improve the efficiency of the entire RF transmit chain?
- Would you like to eliminate an additional amplifier stage by driving the power amplifier directly with the exciter amplifier?
- Does your design require that the battery size be reduced with a supply voltage as low as 2.7 V and low power consumption?
- Do you want to reduce the parts count and lower your manufacturing costs with on-chip linear gain control and selectable bias control circuitry?
- Do you want to reduce the pc board area for your CDMA cellular phone?


## LITERATURE

Complete data sheets containing full specifications, characteristic curves, and application circuit configurations are available through Motorola's LDC as MRFIC0954/D and MRFIC1854/D. Alternately, call Mfax at 602/244-6609 and key-in MRFIC0954 and/or MRFIC1854.

## ORDERING INFORMATION

Device	Operating Temperature Range	Package in Tape & Reel
MRFIC0954R2 MRFIC1854R2	$T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	TSSOP-20EP*

\* (2,500 units per 16 mm, 13 inch reel)

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### How to reach us:

#### USA/EUROPE/Locations Unlisted:

Motorola Literature Distribution;  
P.O. Box 5405; Denver, CO. 80217 or call 1-800-441-2447

**Mfax™:** RMFAX0@email.sps.mot.com  
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#### JAPAN:

Nippon Motorola Ltd.;  
SPD, Strategic Planning Office 4-32-1,  
Nishi-Gotanda, Shinagawa-ku,  
Tokyo 141, Japan. 81-3-5487-8488

#### ASIA/PACIFIC:

Motorola Semiconductors H.K. Ltd.;  
Silicon harbour Centre, 2 Dai King Street,  
Tai Po Industrial Estate,  
Tai Po, N.T., Hong Kong. 852-26629298