

# TX-IF SIMMIC FOR W-CDMA ACG + I/Q MODULATOR

### FEATURES

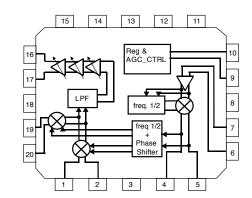
- TX-IF: 570 MHz
- LOW POWER CONSUMPTION: VCC = 3.0 V
- SMALL 20 PIN QFN PACKAGE: Flat lead style for better performance
- TAPE AND REEL PACKAGING AVAILABLE

## DESCRIPTION

NEC's UPC8191K is a Silicon Microwave Monolithic Integrated Circuit designed as a transmitter/TX section for W-CDMA. The UPC8191K is a TX-IF IC including IF-AGC amplifier and modulator. This IC is suitable for kit-use for W-CDMA IF section.

This IC was developed using NEC's new ultra high seed silicon bipolar process.

NEC's stringent quality assurance and test procedures ensure the highest reliability and perormance.



**UPC8191K** 

# APPLICATIONS

W-CDMA

ELECTRICAL CHARACTERISTICS (unless otherwise specified, TA = 25°C, Vcc = 3.0 V, fIF = 570 MHz, fLO = 760 MHz,	
PLO = -15 dBm, fl/Q =10 kHz, 400 mVp-p balanced sine-wave)	

	PART NUMBER PACKAGE OUTLINE	UPC8191K QFN-20			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	ТҮР	MAX
lcc	Circuit Current, No Signals At power saving mode	mA μA		30.5 0	38 1
Роит	Output Power, VCONT= 2.3 V, I/Q = 400mVp-p balanced VCONT= 0.3 V, I/Q = 400mVp-p balanced	dBm	-17 _	-13 -93	- -88
LoL	Local Leakage	dBc	_	_	-30
lmR	Image Rejection	dBc	_	_	-30
Hm1	Output Harmonics 1, Leakage when IF output = 190 MHz	dBc	_	_	-20
Hm2	Output Harmonics 2, Leakage when IF output = 380 MHz	dBc	_	_	-30
TPS(Rise)	Rise time from power-saving mode	us	_	_	10
VPS(Rise)	Rising voltage from power-saving mode	V	2.2	_	-
VPS(fall)	Falling voltage from power-saving mode	V	_	_	0.5

# **STANDARD CHARACTERISTICS FOR REFERENCE** (unless otherwise specified, TA = $25^{\circ}$ C, Vcc = 3.0 V,

fIF = 570 MHz, fLO = 760 MHz, PLO = -15 dBm, fI/Q =10 kHz, 400 mVp-p balanced sine-wave)

	PART NUMBER PACKAGE OUTLINE			UPC8191K QFN-20	
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	ТҮР	MAX
NFL1	Output Noise Level 1,Pout = -25 dBm, fIF±20MHz	dBm/Hz	-	-148	-
NFL2	Output Noise Level 2,Pout = -65 dBm, fIF±20MHz	dBm/Hz	-	-162	-
GF	Gain Flatness, fIF±2.5MHz	dB	-	_	0.5
EVM	Error Vector Magnitude, I/Q = 3.84 Msps QPSK	%rms	-	3	-
ACPR	Adjacent Channel Power Ratio, fIF±5 MHz	dBc	-	-55	_

# California Eastern Laboratories

#### **BLOCK DIAGRAM**

# ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (TA = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
Vcc	Supply Voltage	V	4.0
VPS, VCONT	Applied Voltage	V	-0.3 to Vcc +0.3
Та	Operating Ambient Temperature	°C	-40 to +85
Тѕтс	Storage Temperature	°C	-55 to +150

Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.

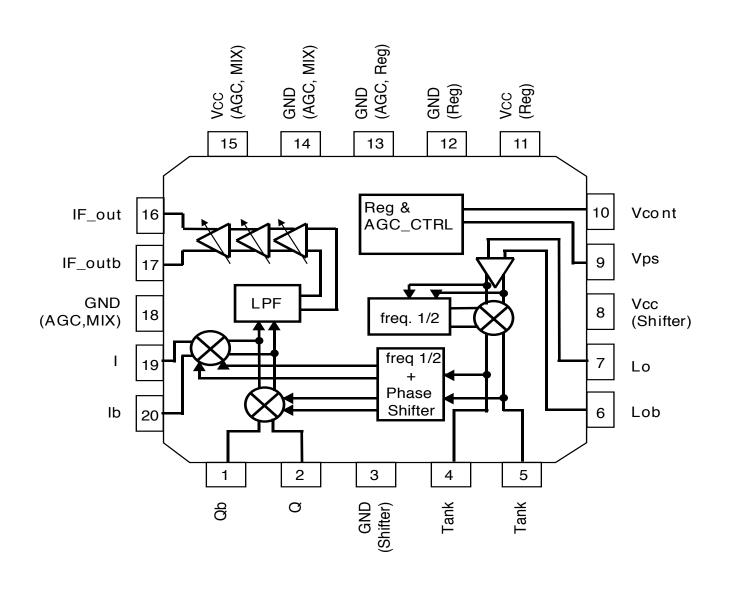
#### RECOMMENDED OPERATING CONDITIONS

SYMBOLS	PARAMETERS	UNITS	MIN	ТҮР	MAX
Vcc	Supply Voltage	V	2.7	3.0	3.3
Та	Operating Ambient Temperature	°C	-25	+25	+85
fIF	IF Frequency	MHz	-	570	-
flo	Local Frequency	MHz	-	760	-
Plo	Local input Level	dBm	-18	-15	-12
ZIF	IF output impedance, Balanced output internal resistance	kΩ	_	1	-
VI/Q	I/Q Maximum Input Voltage (balanced input)	Vp-p	-	0.4	1

#### **ORDERING INFORMATION**

Part Number	Package
UPC8191K-E1-A	20 Pin plastic QFN

# BLOCK DIAGRAM (Units in mm)



Pin No.	Pin Name	Applied Voltage	Pin Voltage	Functions and Applications	Internal Equivalent Circuits
1	Qb	(V) VCC/2	(V) -	Q signal input pin. Apply bias voltage externally. Maximum balance input voltage is 1 000 mVP-P (balance).	
2	Q	VCC/2	-		
3	GND (Shifter)	0	-	Ground pin of I/Q modulator. This pin should be grounded with minimum inductance. Form the ground pattern as widely as possible to minimize ground impedance.	
4 5	Tank	0	2.65	External inductor and capacitor can supress harmonics spurious of LO frequency. LC value should be determined according to LO input frequency and suppression level.	4 5 External
6	LOb	0	2.02	Bypass pin of local signal input for I/Q modulator. In the case of single local input, this pin must be decoupled with capacitor ex. 1 000 pF.	_
7	LO	0	2.02	Local signal input of I/Q modulator. The DC cut capacitor ex. 1 000 pF must be attaced to this pin.	_
8	VCC (Shifter)	2.7 to 3.3	-	Supply voltage pin of I/Q modulator.	
9	VPS	0 to 3.0	-	Power saving pin of I/Q modulator + AGC amplifier.This pin modulator can control Active/Sleep state with bias as follows.VPS (V)State0 to 0.5Sleep Mode2.2 to 3Active Mode	9 50 kΩ 9 

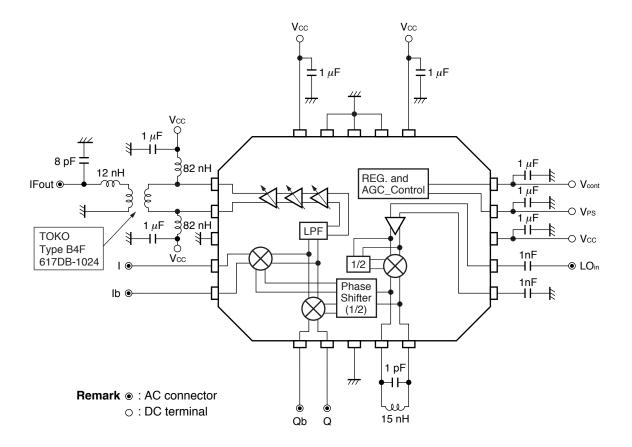
# PIN FUNCTIONS (Pin Voltage is measured at Vcc = 2.85 V)

### UPC8191K

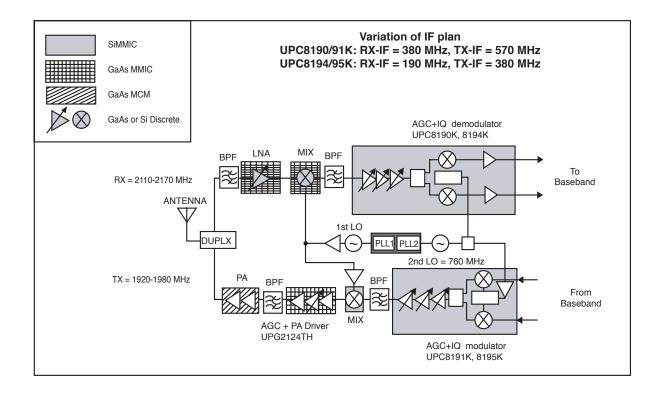
#### Applied Pin Functions and Applications Internal Equivalent Circuits Pin Pin Voltage Voltage Name No. (V) (V) 0 to 3.0 10 Vcont Gain control pin of AGC amplifier. -10.5 kΩ Variable gains are available in accordance with applied voltage between 0 to 3.0 V. 2.5 kΩ 11 VCC 2.7 to 3.3 \_ Supply voltage pin of internal regulator. (REG.) GND 0 Ground pin internal regulator. 12 \_ (REG.) This pin should be grounded with minimum inductance. Form the ground pattern as widely as possible to minimize ground impedance. 13 GND 0 Ground pin of AGC amplifier + I/Q Mixer. -14 (AGC, This pin should be grounded with MIX) 18 minimum inductance. Form the ground pattern as widely as possible to minimize ground impedance. VCC 2.7 to 3.3 15 Supply voltage pin of AGC amplifier + \_ \_ (AGC I/Q Mixer. , MIX) 2.7 to 3.3 16 IFout IF output pin. The inductor must be attached between External VCC and output pin due to open collector. Output frequency is 570 MHz which is 16 3/4 of local signal frequency 760 MHz. $1 \ k\Omega$ 17 IFoutb 2.7 to 3.3 Balance output of IFout pin. The inductor must be attached between VCC and output pin due to open collector. 19 VCC/2 I signal input pin. L Apply bias voltage externally. Maximum balance input voltage is 1 000 mVP-P (balance). 20 20 lb VCC/2 .

#### PIN FUNCTIONS (Pin Voltage is measured at Vcc = 2.85 V)

## MEASUEMENT CIRCUIT (Units in mm)



#### APPLICATION EXAMPLE: W-CDMA



#### OUTLINE DIMENSIONS (Units in mm)

Package Outline QFN-20 4.2±0.2 4.0±0.2 4-C0.5 2 3 3.0±0.2 Ņ 3.2±0.2 3.0±0. 3.2±0. Pin 20 Pin 1 0.30±0.15 **0.18±0.05** 0.8±0. 4.2±0.2 4.2±0.2 יח רעי סיי רעי ΠП

Life Support Applications

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04/15/2002



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CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices		
Lead (Pb)	< 1000 PPM	-A Not Detected	-AZ (*)	
Mercury	< 1000 PPM	Not Detected		
Cadmium	< 100 PPM	Not Detected		
Hexavalent Chromium	< 1000 PPM	Not Detected		
РВВ	< 1000 PPM	Not Detected		
PBDE	< 1000 PPM	Not Detected		

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