CEL

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

UPC8191K

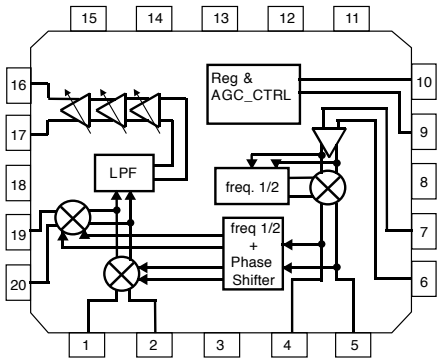
FEATURES

- **TX-IF:**
  570 MHz
- **LOW POWER CONSUMPTION:**
  V_{CC} = 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.

BLOCK DIAGRAM



APPLICATIONS

- **W-CDMA**

ELECTRICAL CHARACTERISTICS (unless otherwise specified, T_A = 25°C, V_{CC} = 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**	**TYP**	**MAX**
I_{CC}	Circuit Current, No Signals At power saving mode	mA μA	– –	30.5 0	38 1
P_{OUT}	Output Power, V_{CONT}= 2.3 V, I/Q = 400mVp-p balanced V_{CONT}= 0.3 V, I/Q = 400mVp-p balanced	dBm	-17 –	-13 -93	– -88
LoL	Local Leakage	dBc	–	–	-30
I_{mR}	Image Rejection	dBc	–	–	-30
H_{m1}	Output Harmonics 1, Leakage when IF output = 190 MHz	dBc	–	–	-20
H_{m2}	Output Harmonics 2, Leakage when IF output = 380 MHz	dBc	–	–	-30
$T_{PS(Rise)}$	Rise time from power-saving mode	us	–	–	10
$V_{PS(Rise)}$	Rising voltage from power-saving mode	V	2.2	–	–
$V_{PS(fall)}$	Falling voltage from power-saving mode	V	–	–	0.5

STANDARD CHARACTERISTICS FOR REFERENCE (unless otherwise specified, T_A = 25°C, V_{CC} = 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**	**TYP**	**MAX**
NFL_1	Output Noise Level 1,Pout = -25 dBm, fIF±20MHz	dBm/Hz	–	-148	–
NFL_2	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	–

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CC}	Supply Voltage	V	4.0
V_{PS}, V_{CONT}	Applied Voltage	V	-0.3 to V_{CC} +0.3
T_A	Operating Ambient Temperature	°C	-40 to +85
T_{STG}	Storage Temperature	°C	-55 to +150

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

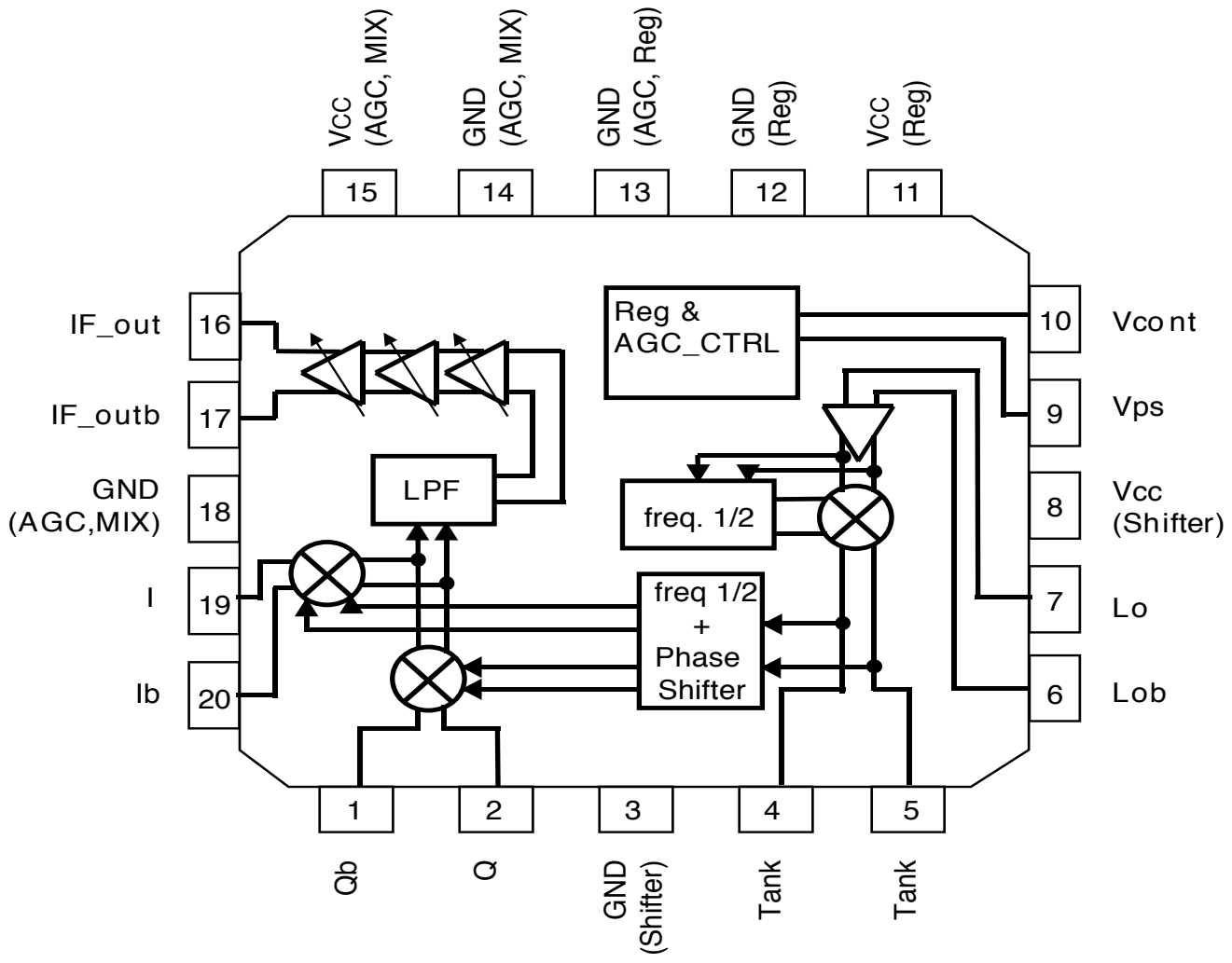
RECOMMENDED OPERATING CONDITIONS

SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V_{CC}	Supply Voltage	V	2.7	3.0	3.3
T_A	Operating Ambient Temperature	°C	-25	+25	+85
fIF	IF Frequency	MHz	–	570	–
f_{LO}	Local Frequency	MHz	–	760	–
P_{LO}	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)	V_{p-p}	–	0.4	1

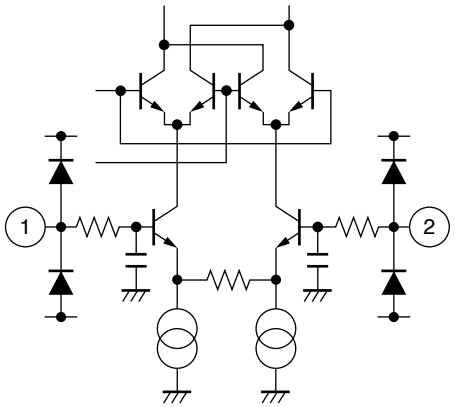
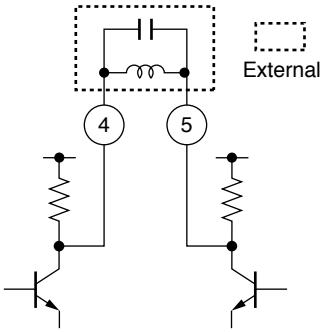
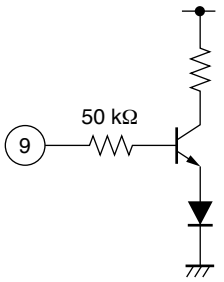
ORDERING INFORMATION

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

BLOCK DIAGRAM (Units in mm)

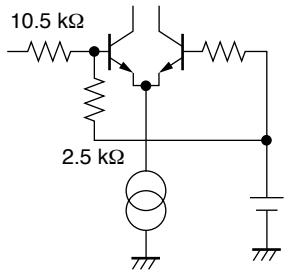
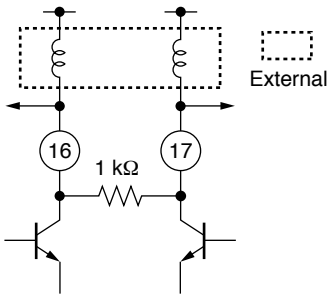
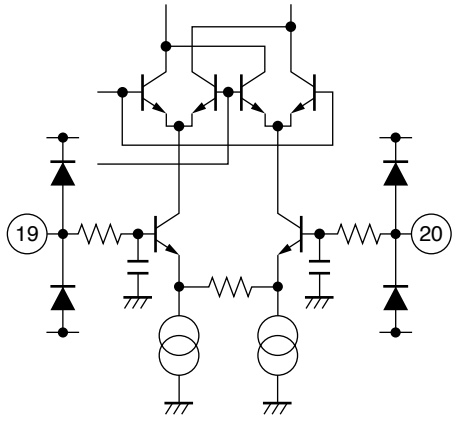


PIN FUNCTIONS (Pin Voltage is measured at V_{CC} = 2.85 V)

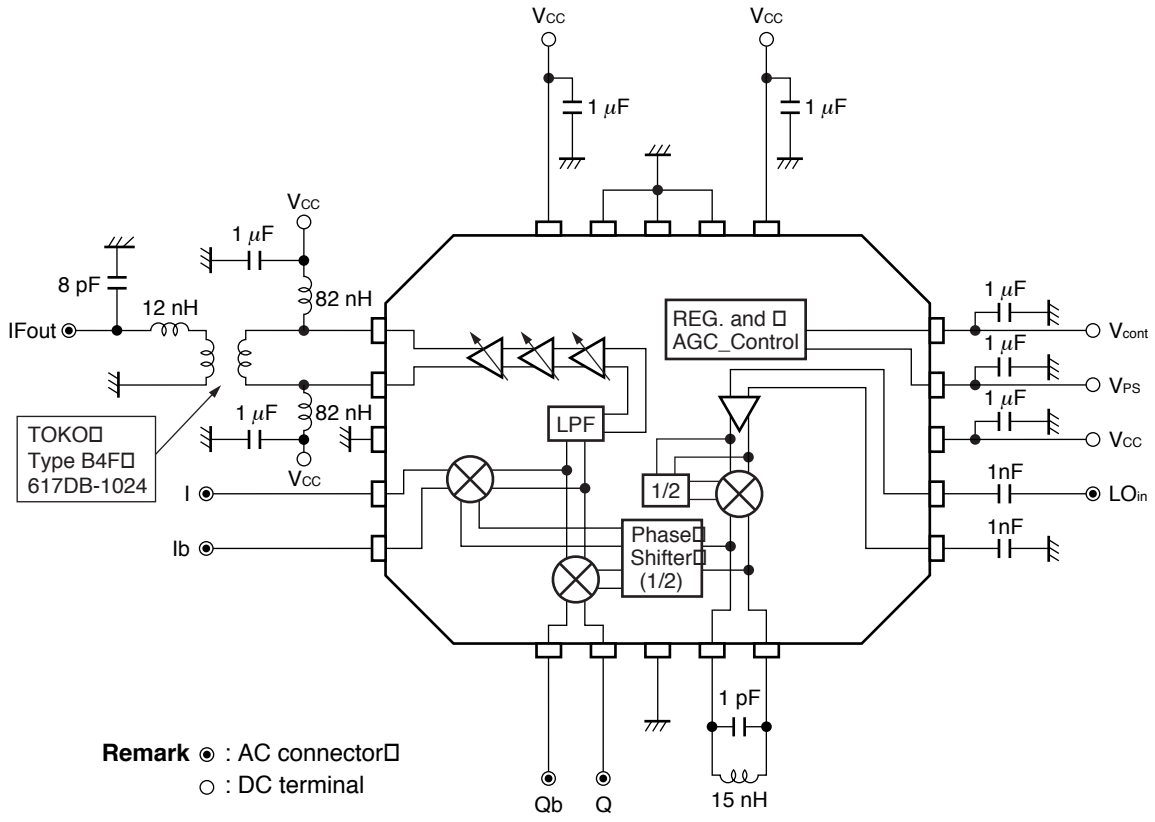
Pin No.	Pin Name	Applied Voltage (V)	Pin Voltage (V)	Functions and Applications	Internal Equivalent Circuits
1	Qb	VCC/2	-	Q signal input pin. Apply bias voltage externally. Maximum balance input voltage is 1 000 mVP-P (balance).	
2	Q	VCC/2	-		
3	GND (Shifter)	0	-	Ground pin of I/Q modulator. This pin 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.	
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)	State
0 to 0.5	Sleep Mode
2.2 to 3	Active Mode

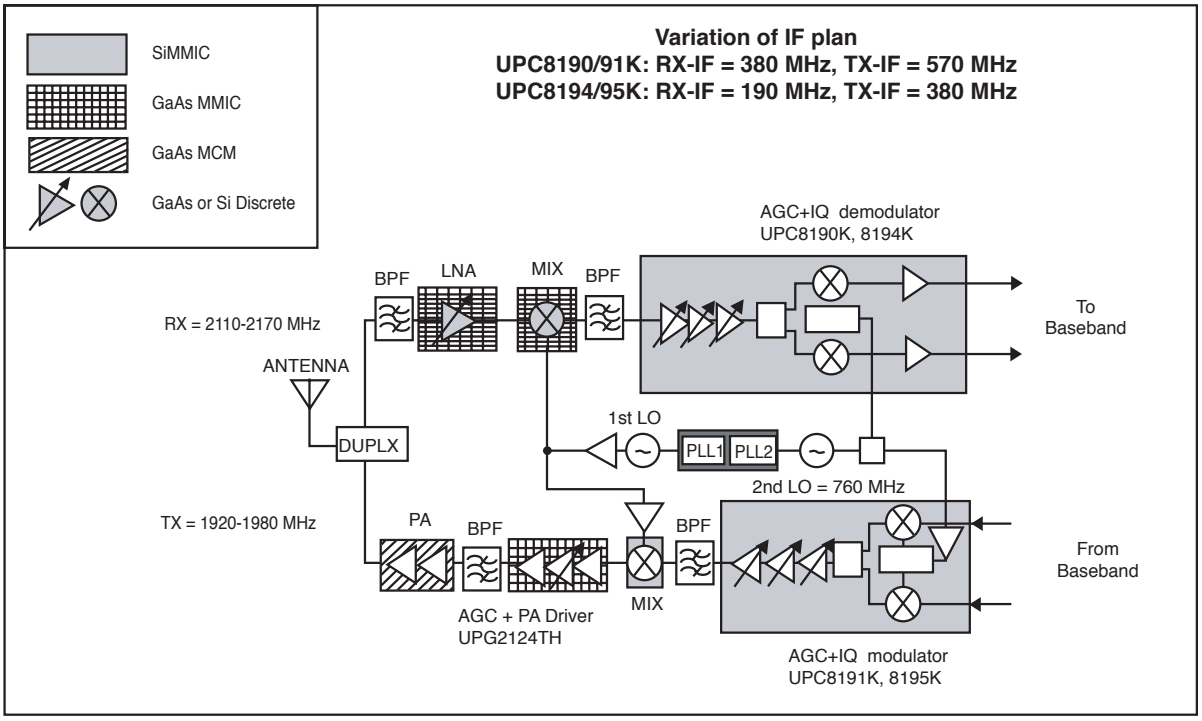
PIN FUNCTIONS (Pin Voltage is measured at V_{CC} = 2.85 V)

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

MEASUEMENT CIRCUIT (Units in mm)

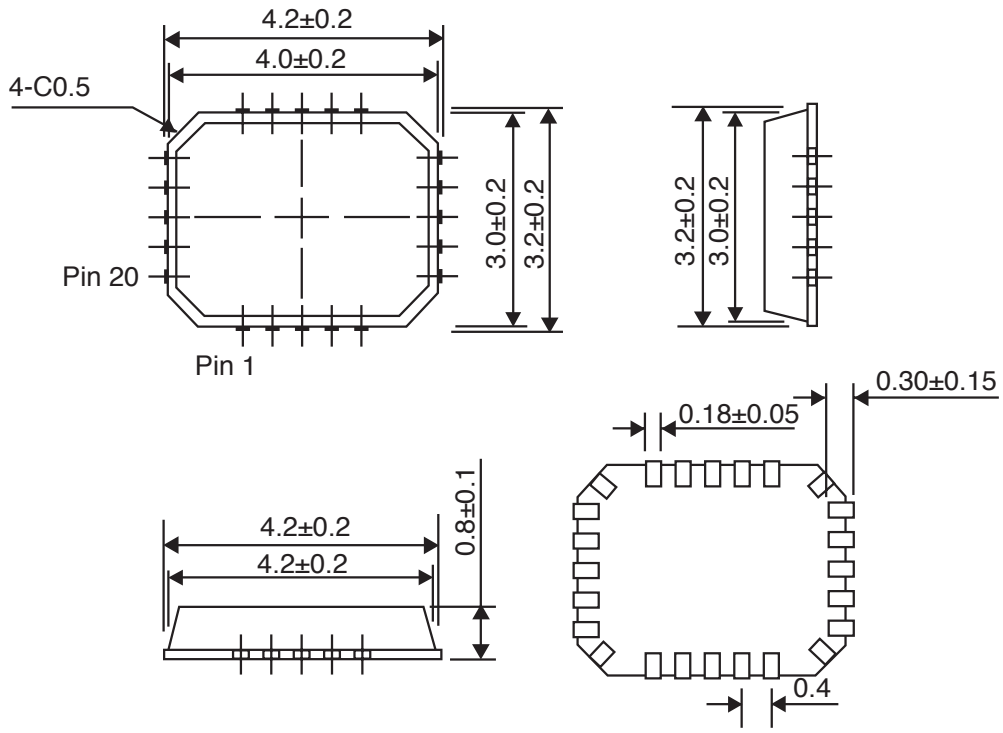


APPLICATION EXAMPLE: W-CDMA



OUTLINE DIMENSIONS (Units in mm)

Package Outline QFN-20



Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

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	-AZ
		Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.