

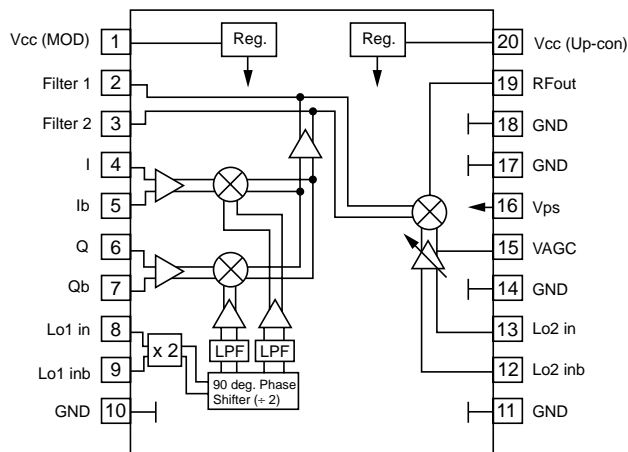
### FEATURES

- **WIDE SUPPLY VOLTAGE RANGE:** 2.7 to 5.5 V
- **OUTPUT FREQUENCY RANGE:** 1.8 to 2.0 GHz
- **INTERNAL LPF TO REJECT LO & SPURIOUS LEAKAGE**
- **PORTS FOR EXTERNAL IF FILTER**
- **AGC FUNCTION:** 40 dB RANGE
- **POWER SAVE FUNCTION**
- **SMALL 20 PIN SSOP PACKAGE**
- **TAPE AND REEL PACKAGING AVAILABLE**

### DESCRIPTION

The UPC8125GR is a Silicon MMIC manufactured with the NESAT III™ silicon bipolar process. The IC consists of a 1.8 - 2.0 GHz upconverter with AGC function and a 220 - 270 MHz IQ modulator. The device operates over a wide 2.7 - 5.5 V supply voltage range and features a power save function. The device

### INTERNAL BLOCK DIAGRAM (Top View)



was specifically designed for digital mobile communication applications such as 1900 MHz PCS and PHS handsets.

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

### ELECTRICAL CHARACTERISTICS (TA = 25°C, VCC = 3.0 V, unless otherwise specified)

PART NUMBER PACKAGE OUTLINE			UPC8125GR S20 (SSOP 20)		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I <sub>CC</sub>	Total Circuit Current (no input signal)	mA		36	
I <sub>CC(PS)</sub>	Total Circuit Current at Sleep Mode V <sub>PS</sub> ≤ 0.5 V (Low)	μA		0.3	10
PR <sub>Fout 1</sub>	Total Output Power 1 V <sub>AGC</sub> = 3.0 V	dBm		-10	
PR <sub>Fout 2</sub>	Total Output Power 2 V <sub>AGC</sub> = 0.5 V	dBm		-50	
LOL	Lo Carrier Leak f <sub>LO1</sub> + f <sub>LO2</sub>	dBc		-37	-30
ImR	Image Rejection (Side Band leak)	dBc		-35	-30
IM <sub>3 I/Q</sub>	I/Q 3rd Order Intermodulation Distortion <sup>2</sup>	dBc		-50	-30
GCR	AGC Amp. Gain control range V <sub>AGC</sub> = 3 V to 0.5 V	dB	25	40	
TPS(RISE)	Power Save Rise Time V <sub>PS</sub> (OFF) → V <sub>PS</sub> (ON)	μS		2	5
TPS (FALL)	Power Save Fall Time V <sub>PS</sub> (ON) → V <sub>PS</sub> (OFF)	μS		2	5
Z <sub>I/Q</sub>	Input Impedance I and Q Ports <sup>2</sup> f <sub>I/Q</sub> = 24 KHz, I → I <sub>b</sub> , Q → Q <sub>b</sub>	kΩ		200	
I <sub>I/Q</sub>	I/Q Bias Current I → I <sub>b</sub> , Q → Q <sub>b</sub>	μA		5	
Z <sub>LO1</sub>	Lo1 Input VSWR f <sub>LO1</sub> = 220 MHz to 270 MHz			1.2:1	
EVM	Error Vector Magnitude MOD Pattern : PN9	%rms		2.5	
Padj	Adjacent Channel Power Δf = 600 KHz MOD Pattern : PN9	dBc		-68	

Notes:

1. P<sub>IFIN</sub> = -20 dBm
2. V<sub>I/Q</sub> = 1.5 V (DC) + 0.5 V<sub>p-p</sub> (AC)

**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>** (T<sub>A</sub> = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CC</sub>	Supply Voltage	V	6.0
V <sub>PS</sub>	Power Save Control Voltage	V	6.0
V <sub>AGC</sub>	AGC Control Voltage	V	6.0
P <sub>D</sub>	Power Dissipation <sup>2</sup>	mW	430
T <sub>OP</sub>	Operating Temperature	°C	-40 to +85
T <sub>STG</sub>	Storage Temperature	°C	-55 to +150

Notes:

1. Operation in excess of any one of these conditions may result in permanent damage.
2. T<sub>A</sub> = 25°C Mounted on a 50x50x1.6 mm double copper clad epoxy glass board.

**RECOMMENDED OPERATING CONDITIONS**

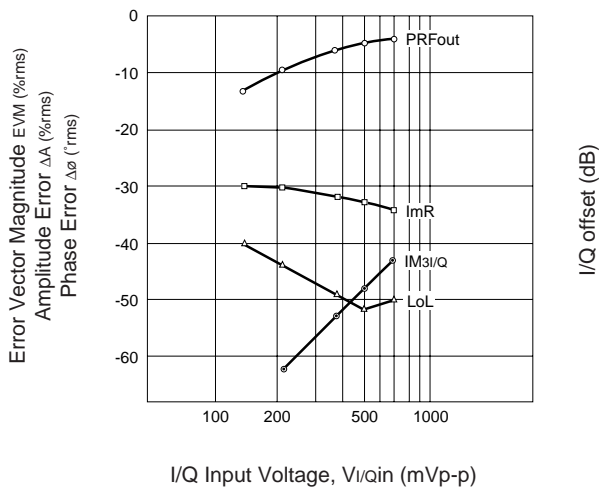
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V <sub>CC</sub>	Supply Voltage	V	2.7	3.0	5.5
T <sub>OP</sub>	Operating Temperature	°C	-40	+25	+85
f <sub>RFout</sub>	Up Converter RF Frequency	GHz	1.8		2.0
f <sub>UPCONin</sub>	Up Converter Input Freq.	MHz	220		270
f <sub>MODout</sub>	Modulator Output Frequency				
f <sub>LO1in</sub>	Lo1 Input Frequency, P <sub>LO1in</sub> = -10 dBm				
f <sub>LO2in</sub>	Lo2 Input Frequency, P <sub>LO2in</sub> = -10 dBm	MHz	1500		1800
f <sub>I/Qin</sub>	I/Q Input Frequency, V <sub>I/Qin</sub> = 500 mVp-p MAX (Single ended)	MHz	DC		10
P <sub>LO1in</sub>	Lo1 Input Level	dBm	(-13)	-10	-5
P <sub>LO2in</sub>	Lo2 Input Level	dBm	(-15)	-10	-5
V <sub>I/Qin</sub>	I/Q Input Amplitude, Single ended Input	mVp-p			500
	Differential Input				250

Notes:

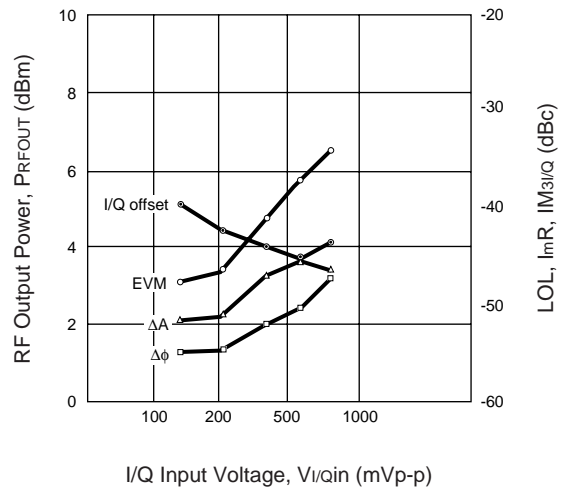
1. IF frequency range includes Up-Converter IF input, Modulator IF Output and Modulator LO Input Frequency (LO1).
2. V<sub>I/QIN</sub> = 600 mVp-p maximum.

**TYPICAL PERFORMANCE CURVES** (T<sub>A</sub> = 25°C)

**ERROR VECTOR MAGNITUDE, AMPLITUDE ERROR, PHASE ERROR, AND I/Q OFFSET vs. I/Q INPUT VOLTAGE**

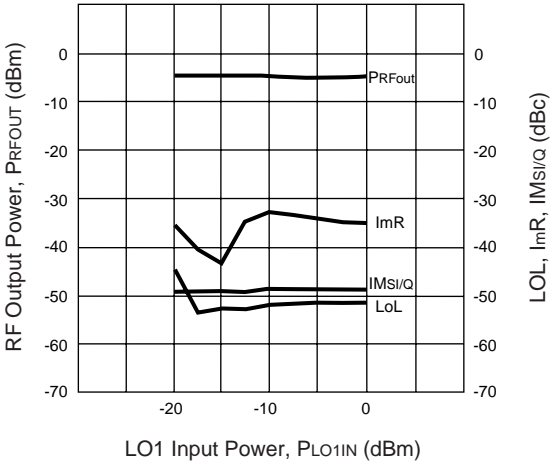


**RF OUTPUT POWER vs. I/Q INPUT VOLTAGE**

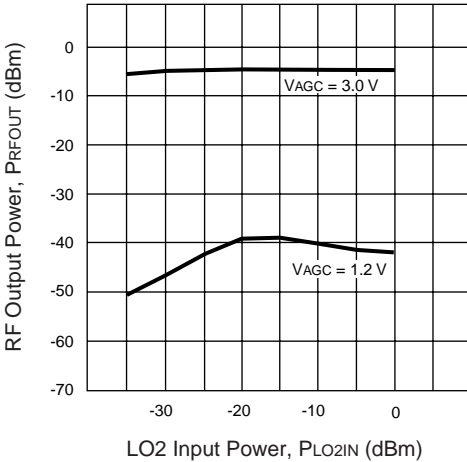


TYPICAL PERFORMANCE CURVES (TA = 25°C)

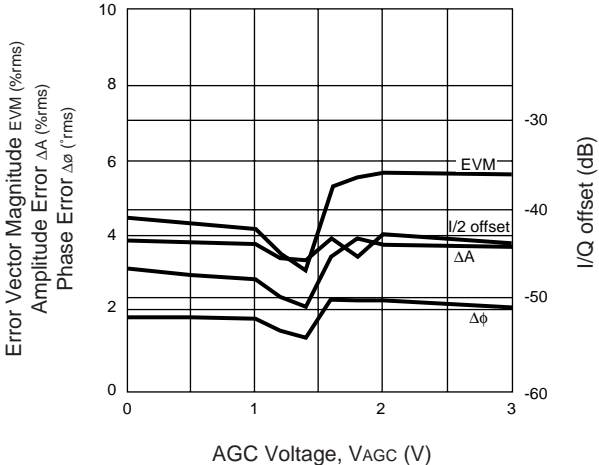
RF OUTPUT POWER vs. LO1 INPUT POWER



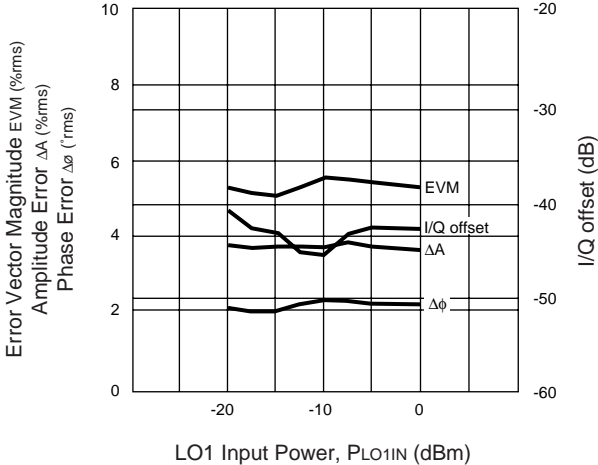
RF OUTPUT POWER vs. LO2 INPUT POWER



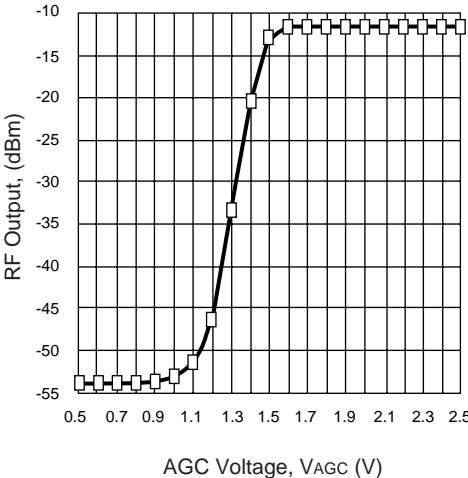
ERROR VECTOR MAGNITUDE, AMPLITUDE ERROR, PHASE ERROR, AND I/Q OFFSET vs. AGC VOLTAGE



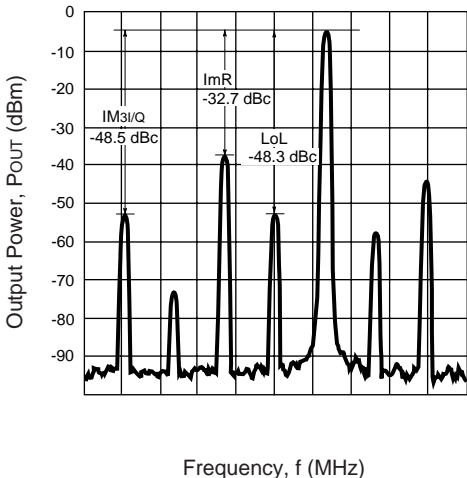
ERROR VECTOR MAGNITUDE, AMPLITUDE ERROR, PHASE ERROR, AND I/Q OFFSET vs. LO1 INPUT POWER



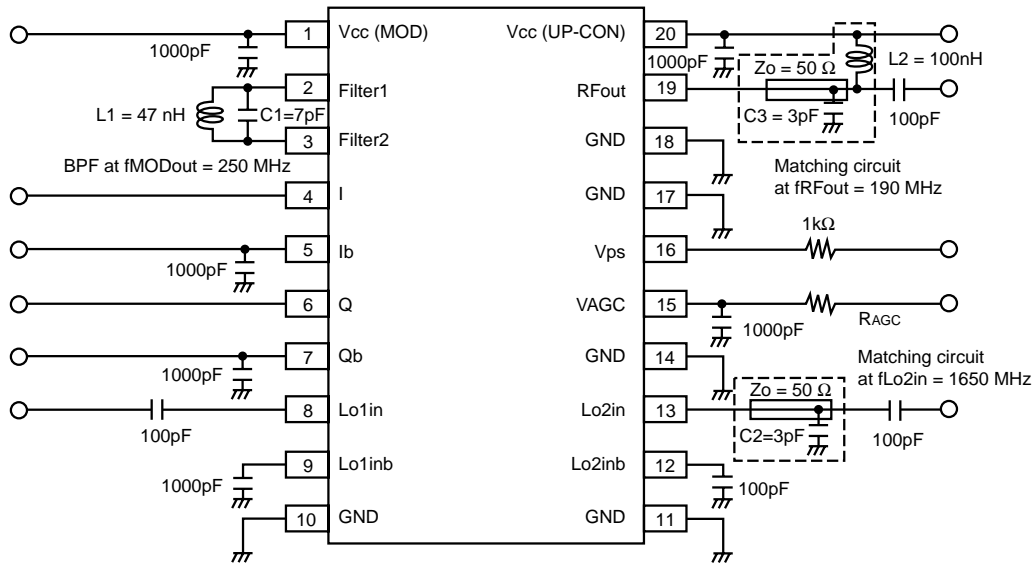
RF OUTPUT vs. AGC VOLTAGE



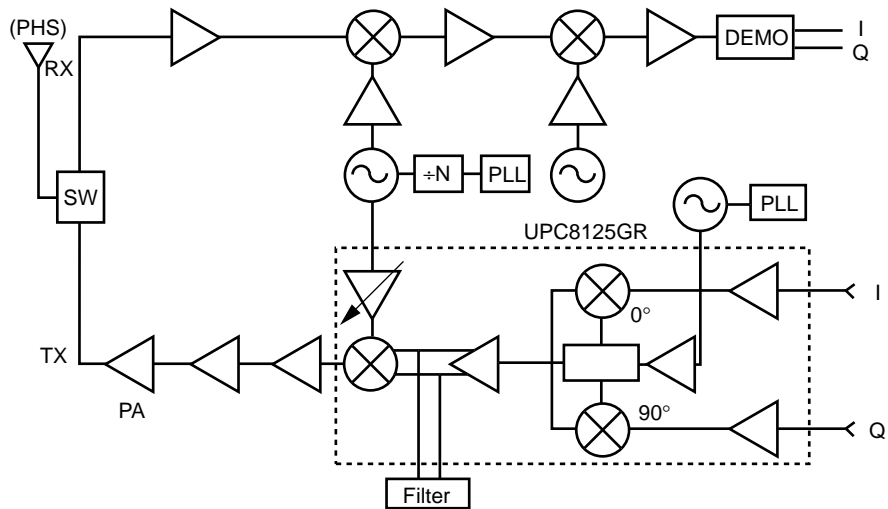
TYPICAL OUTPUT SPECTRUM



APPLICATION CIRCUIT

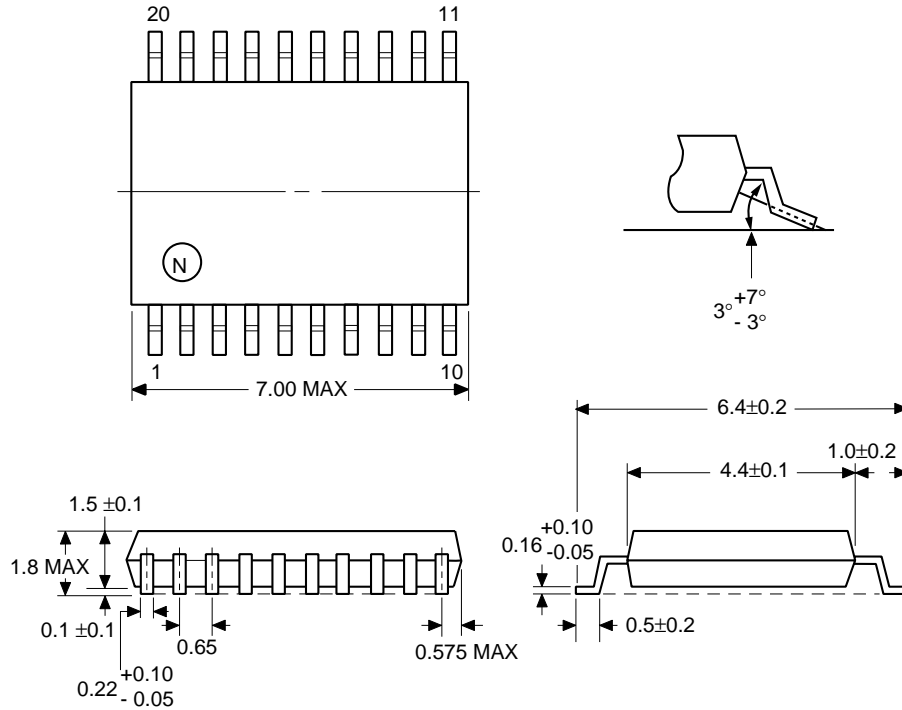


APPLICATION CIRCUIT



**PACKAGE DIMENSIONS** (Units in mm)

**PACKAGE OUTLINE SSOP 20**



**ORDERING INFORMATION**

PART NUMBER	QUANTITY
UPC8125GR-E1	2500/Reel

EXCLUSIVE NORTH AMERICAN AGENT FOR **NEC** RF, MICROWAVE & OPTOELECTRONIC SEMICONDUCTORS

**CEL** CALIFORNIA EASTERN LABORATORIES • Headquarters • 4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • Telex 34-6393 • FAX (408) 988-0279  
 24-Hour Fax-On-Demand: 800-390-3232 (U.S. and Canada only) • Internet: <http://WWW.CEL.COM>

DATA SUBJECT TO CHANGE WITHOUT NOTICE

PRINTED IN USA ON RECYCLED PAPER -7/97