

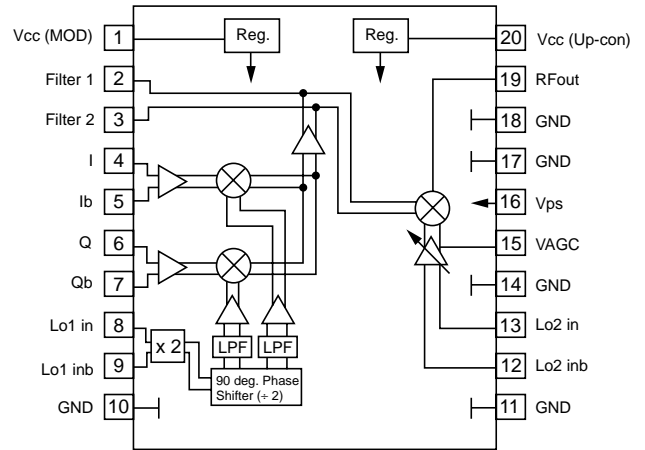
FEATURES

- **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 |
| Icc | Total Circuit Current (no input signal) | mA | | 36 | |
| Icc(PS) | Total Circuit Current at Sleep Mode Vps ≤ 0.5 V (Low) | μA | | 0.3 | 10 |
| PRFout 1 | Total Output Power 1 VAGC = 3.0 V | dBm | | -10 | |
| PRFout 2 | Total Output Power 2 VAGC = 0.5 V | dBm | | -50 | |
| LOL | Lo Carrier Leak fLO1 + fLO2 | dBc | | -37 | -30 |
| ImR | Image Rejection (Side Band leak) | dBc | | -35 | -30 |
| IM3 I/Q | I/Q 3rd Order Intermodulation Distortion ² | dBc | | -50 | -30 |
| GCR | AGC Amp. Gain control range VAGC = 3 V to 0.5 V | dB | 25 | 40 | |
| TPS(RISE) | Power Save Rise Time Vps (OFF) → Vps (ON) | μS | | 2 | 5 |
| TPS (FALL) | Power Save Fall Time Vps (ON) → Vps (OFF) | μS | | 2 | 5 |
| ZI/Q | Input Impedance I and Q Ports ² fI/Q = 24 KHz, I → Ib, Q → Qb | kΩ | | 200 | |
| Ii/Q | I/Q Bias Current I → Ib, Q → Qb | μA | | 5 | |
| ZLO1 | Lo1 Input VSWR fLO1 = 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. PIFIN = -20 dBm
2. VI/Q = 1.5 V (DC) + 0.5 Vp-p (AC)

ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

| SYMBOLS | PARAMETERS | UNITS | RATINGS |
|------------------|--------------------------------|-------|-------------|
| V _{CC} | Supply Voltage | V | 6.0 |
| V _{PS} | Power Save Control Voltage | V | 6.0 |
| V _{AGC} | AGC Control Voltage | V | 6.0 |
| P _D | Power Dissipation ² | mW | 430 |
| T _{OP} | Operating Temperature | °C | -40 to +85 |
| T _{STG} | Storage Temperature | °C | -55 to +150 |

Notes:

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

RECOMMENDED OPERATING CONDITIONS

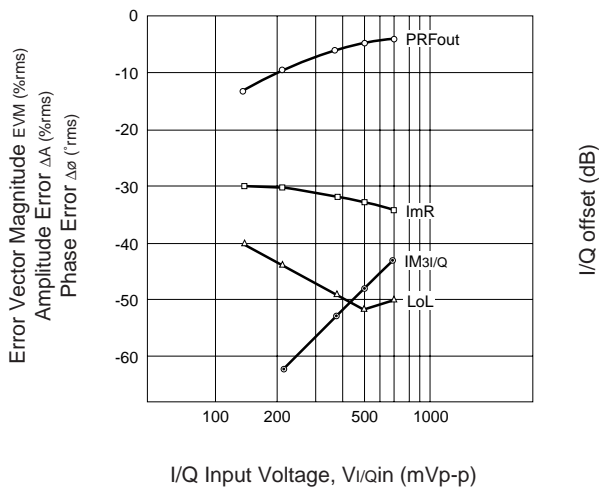
| SYMBOLS | PARAMETERS | UNITS | MIN | TYP | MAX |
|----------------------|--|-------|-------|-----|------|
| V _{CC} | Supply Voltage | V | 2.7 | 3.0 | 5.5 |
| T _{OP} | Operating Temperature | °C | -40 | +25 | +85 |
| f _{RFout} | Up Converter RF Frequency | GHz | 1.8 | | 2.0 |
| f _{UPCONin} | Up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

Notes:

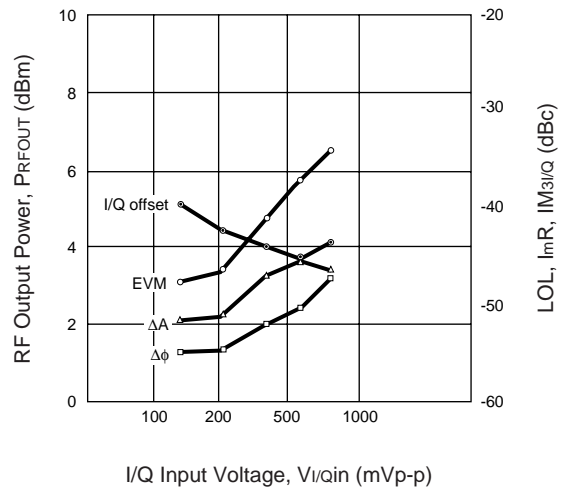
1. IF frequency range includes Up-Converter IF input, Modulator IF Output and Modulator LO Input Frequency (LO1).
2. V_{I/QIN} = 600 mVp-p maximum.

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

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

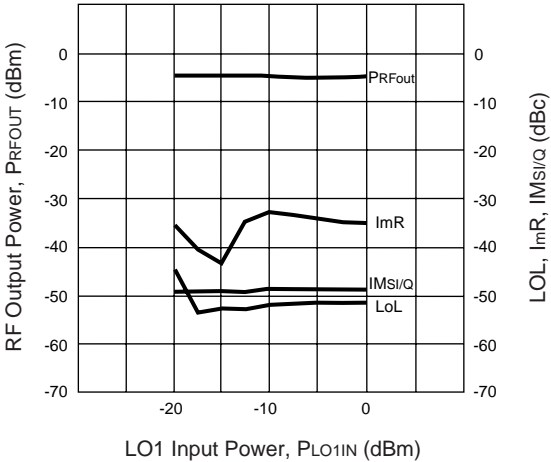


RF OUTPUT POWER vs. I/Q INPUT VOLTAGE

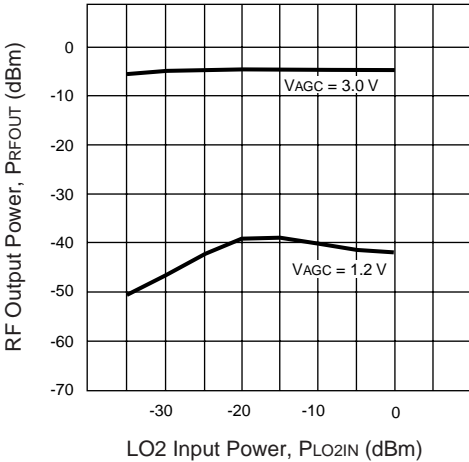


TYPICAL PERFORMANCE CURVES (TA = 25°C)

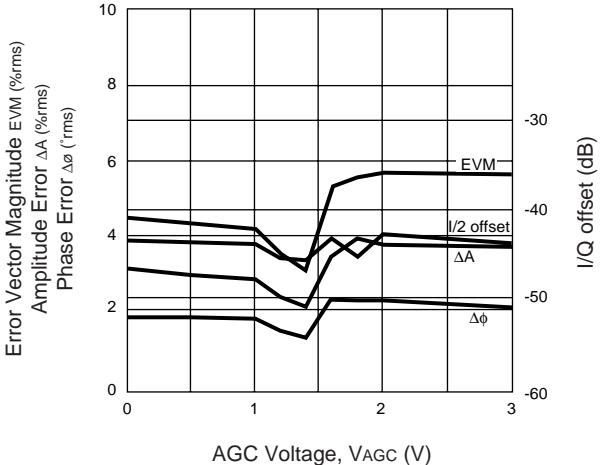
RF OUTPUT POWER vs. LO1 INPUT POWER



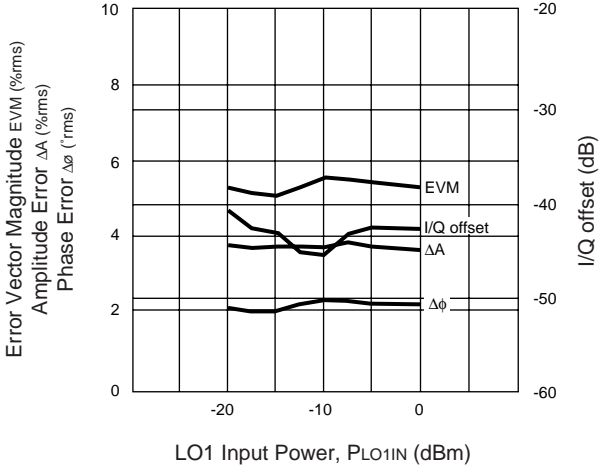
RF OUTPUT POWER vs. LO2 INPUT POWER



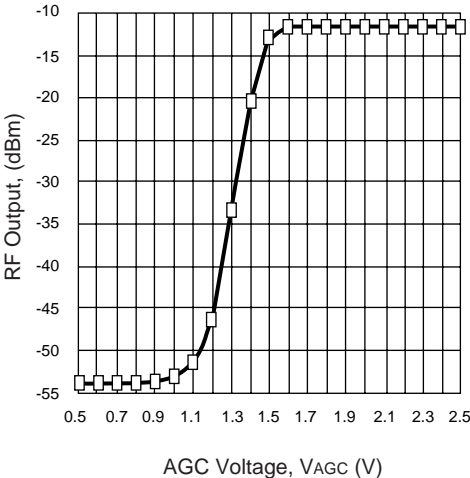
ERROR VECTOR MAGNITUDE, AMPLITUDE ERROR, PHASE ERROR, AND I/Q OFFSET vs. AGC VOLTAGE



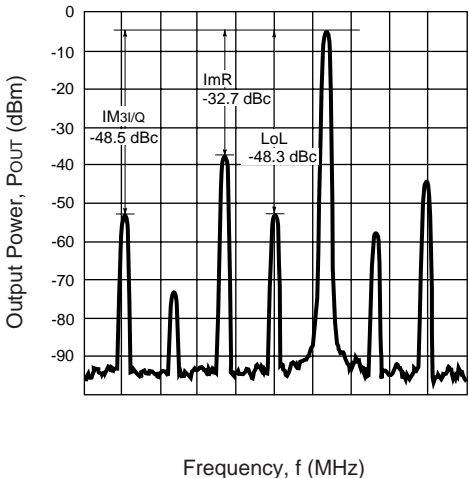
ERROR VECTOR MAGNITUDE, AMPLITUDE ERROR, PHASE ERROR, AND I/Q OFFSET vs. LO1 INPUT POWER



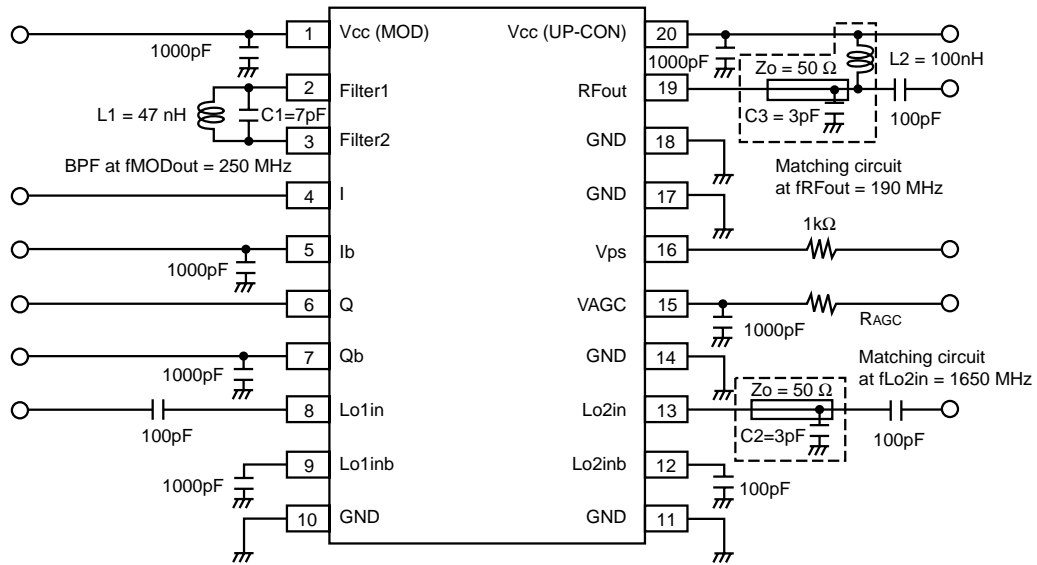
RF OUTPUT vs. AGC VOLTAGE



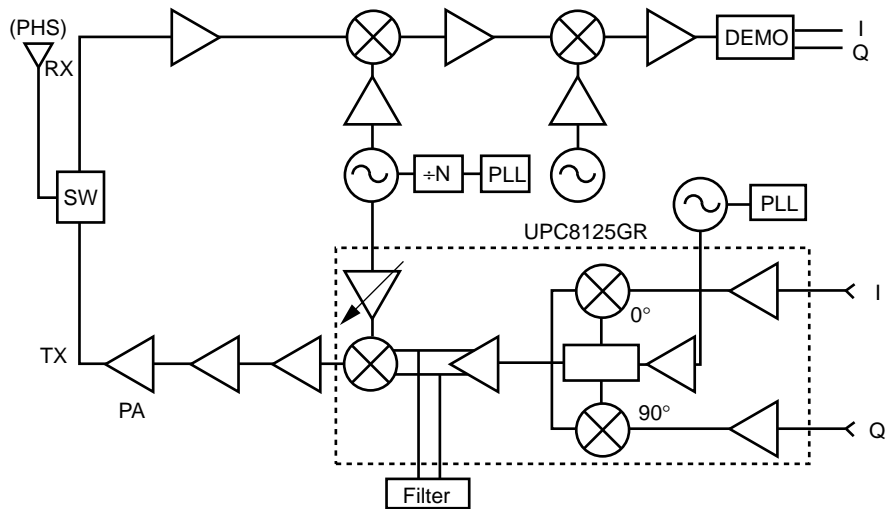
TYPICAL OUTPUT SPECTRUM



APPLICATION CIRCUIT

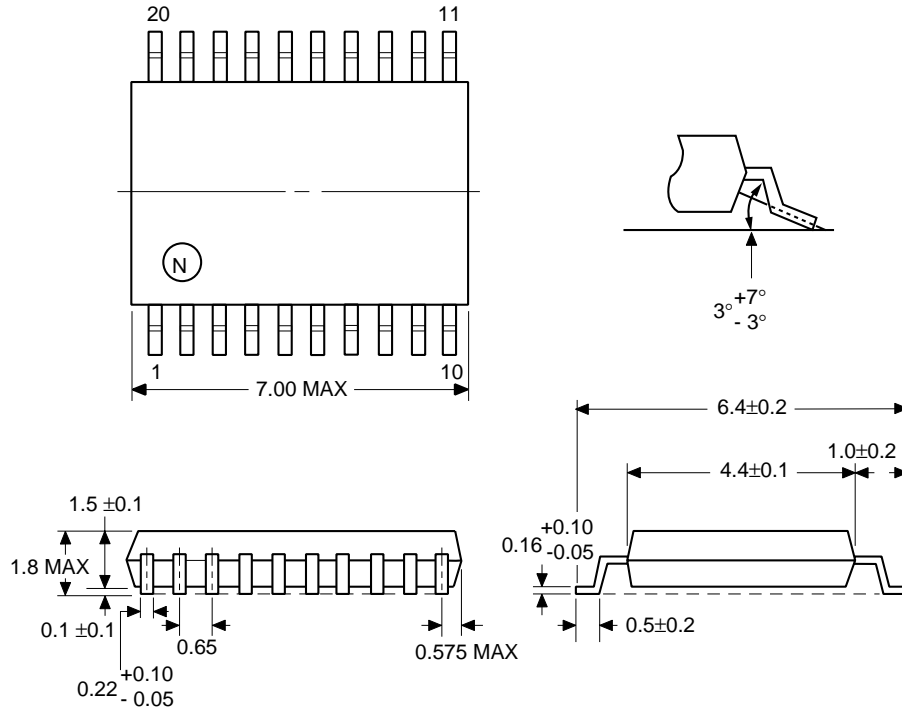


APPLICATION CIRCUIT



PACKAGE DIMENSIONS (Units in mm)

PACKAGE OUTLINE SSOP 20



ORDERING INFORMATION

| PART NUMBER | QUANTITY |
|--------------|-----------|
| UPC8125GR-E1 | 2500/Reel |

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