NEC

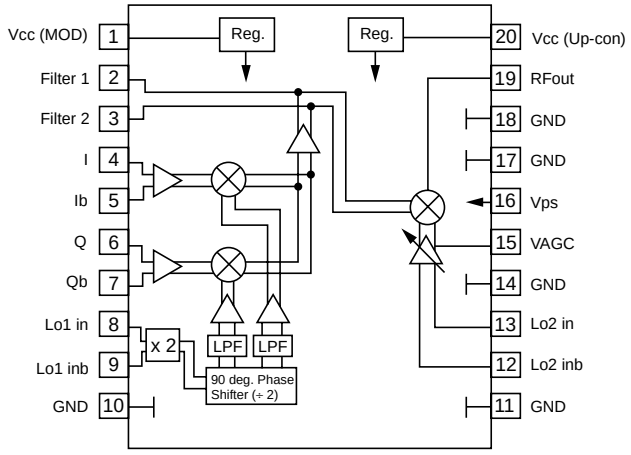
SILICON MMIC UPCONVERTER WITH AGC + IQ MODULATOR

UPC8125GR

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**

INTERNAL BLOCK DIAGRAM (Top View)



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 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 (T_A = 25°C, V_{CC} = 3.0 V, unless otherwise specified)

	PART NUMBER PACKAGE OUTLINE			UPC8125GR S20 (SSOP 20)		
	SYMBOLS	**PARAMETERS AND CONDITIONS**	**UNITS**	**MIN**	**TYP**	**MAX**
UP CONVERTER + QUADRATURE MODULATOR TOTAL	I_{CC}	Total Circuit Current (no input signal)	mA		36	
	$I_{CC(PS)}$	Total Circuit Current at Sleep Mode	$V_{PS} \leq$ 0.5 V (Low)	µA		0.3	10
	$P_{RFout\ 1}$	Total Output Power 1	V_{AGC} = 3.0 V	dBm		-10	
	$P_{RFout\ 2}$	Total Output Power 2	V_{AGC} = 0.5 V	dBm		-50	
	LOL	Lo Carrier Leak	$f_{LO}1 + f_{LO}2$	dBc		-37	-30
	ImR	Image Rejection (Side Band leak)		dBc		-35	-30
	$IM_{3\ I/Q}$	I/Q 3rd Order Intermodulation Distortion[2]		dBc		-50	-30
	GCR	AGC Amp. Gain control range	V_{AGC} = 3 V to 0.5 V	dB	25	40	
	$T_{PS(RISE)}$	Power Save Rise Time	$V_{PS\ (OFF)} \rightarrow V_{PS\ (ON)}$	µS		2	5
	$T_{PS\ (FALL)}$	Power Save Fall Time	$V_{PS\ (ON)} \rightarrow V_{PS\ (OFF)}$	µS		2	5
	$Z_{I/Q}$	Input Impedance I and Q Ports[2]	$f_{I/Q}$ = 24 KHz, I → Ib, Q → Qb	kΩ		200	
	$I_{I/Q}$	I/Q Bias Current	I → Ib, Q → Qb	µA		5	
	$Z_{LO}1$	Lo1 Input VSWR	$f_{LO}1$= 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_{IFIN} = -20 dBm
2. $V_{I/Q}$ = 1.5 V (DC) +0.5 Vp-p (AC)

ABSOLUTE MAXIMUM RATINGS[1] (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.

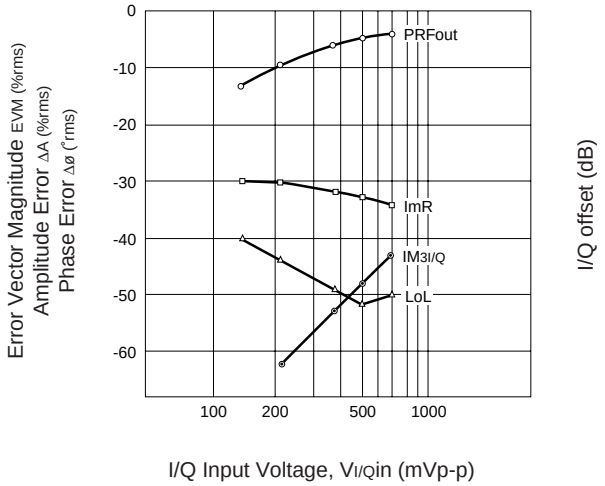
RECOMMENDED OPERATING CONDITIONS

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

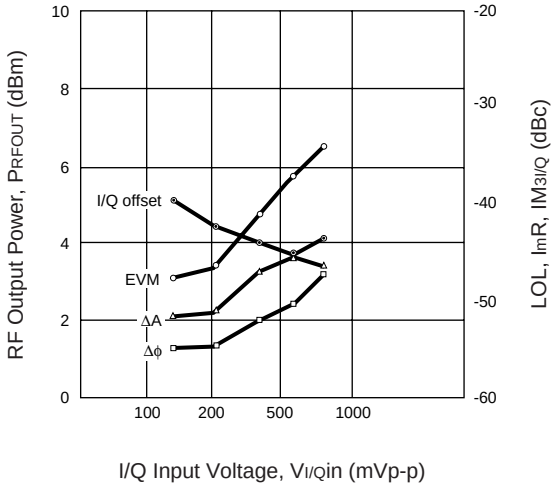
Notes:
1. IF frequency range includes Up-Converter IF input, Modulator IF Output and Modulator LO Input Frequency (LO1).
2. $V_{I/QIN}$ = 600 mVp-p maximum.

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

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

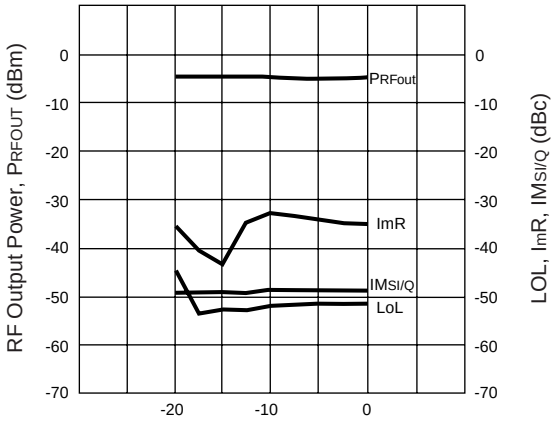


RF OUTPUT POWER vs. I/Q INPUT VOLTAGE



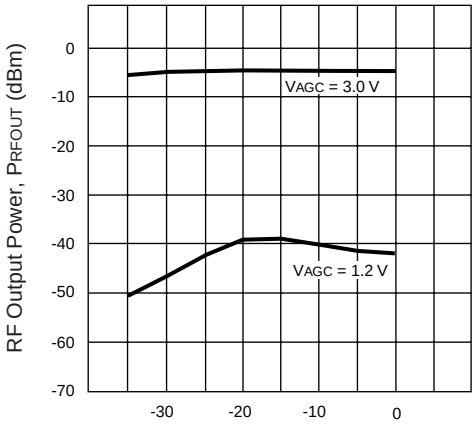
TYPICAL PERFORMANCE CURVES (T_A = 25°C)

RF OUTPUT POWER vs. LO1 INPUT POWER



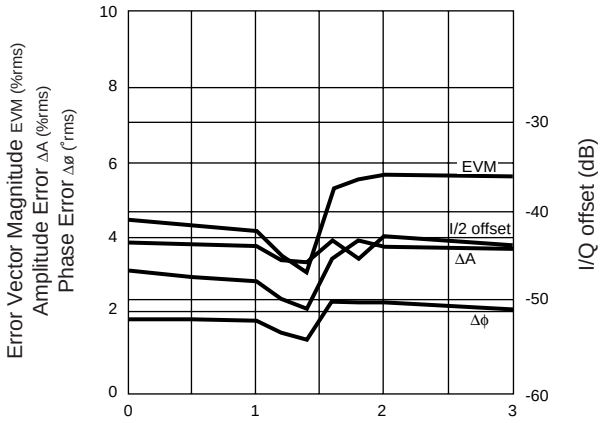
LO1 Input Power, P_{LO1IN} (dBm)

RF OUTPUT POWER vs. LO2 INPUT POWER



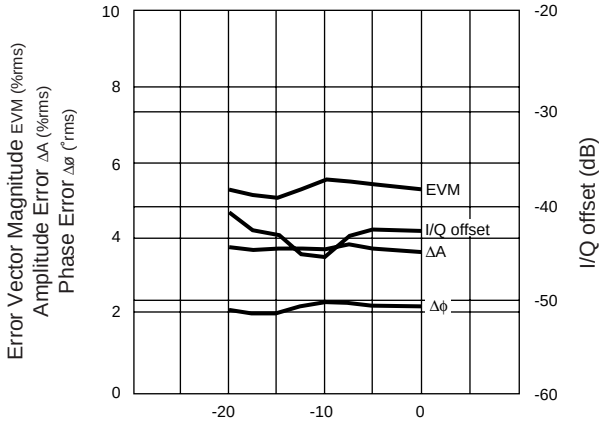
LO2 Input Power, P_{LO2IN} (dBm)

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



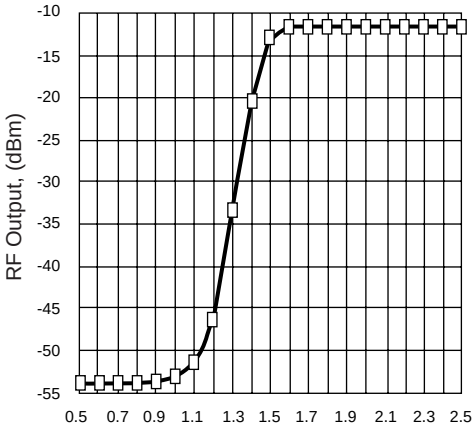
AGC Voltage, V_{AGC} (V)

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



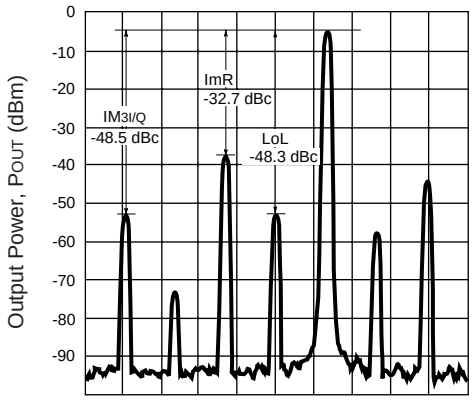
LO1 Input Power, P_{LO1IN} (dBm)

RF OUTPUT vs. AGC VOLTAGE



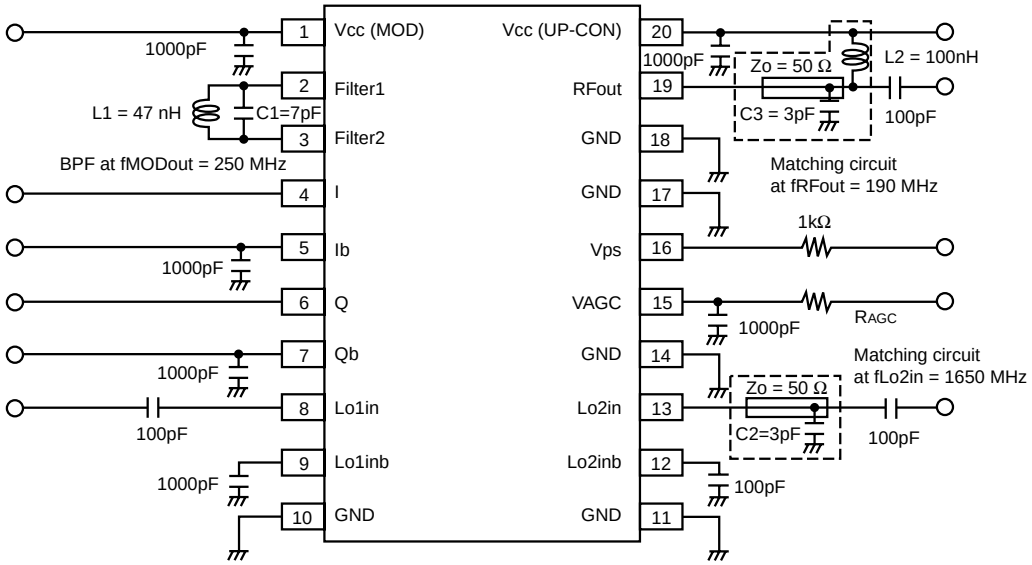
AGC Voltage, V_{AGC} (V)

TYPICAL OUTPUT SPECTRUM

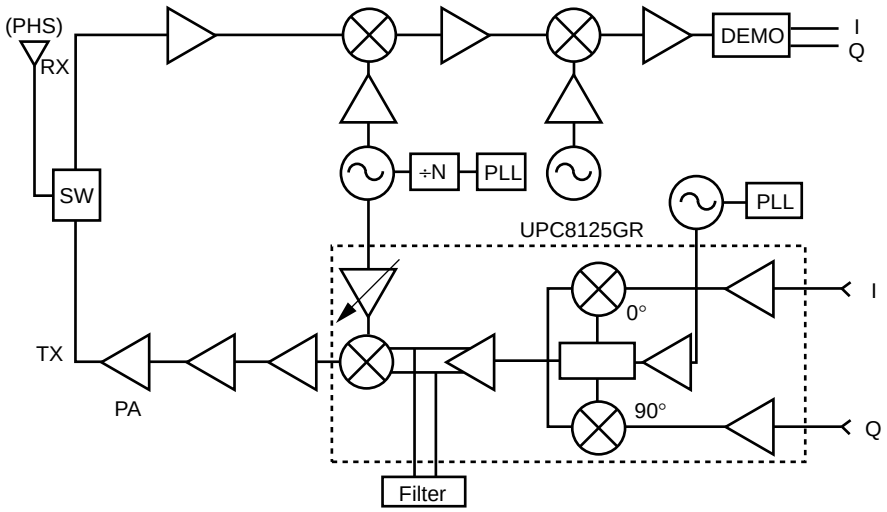


Frequency, f (MHz)

APPLICATION CIRCUIT

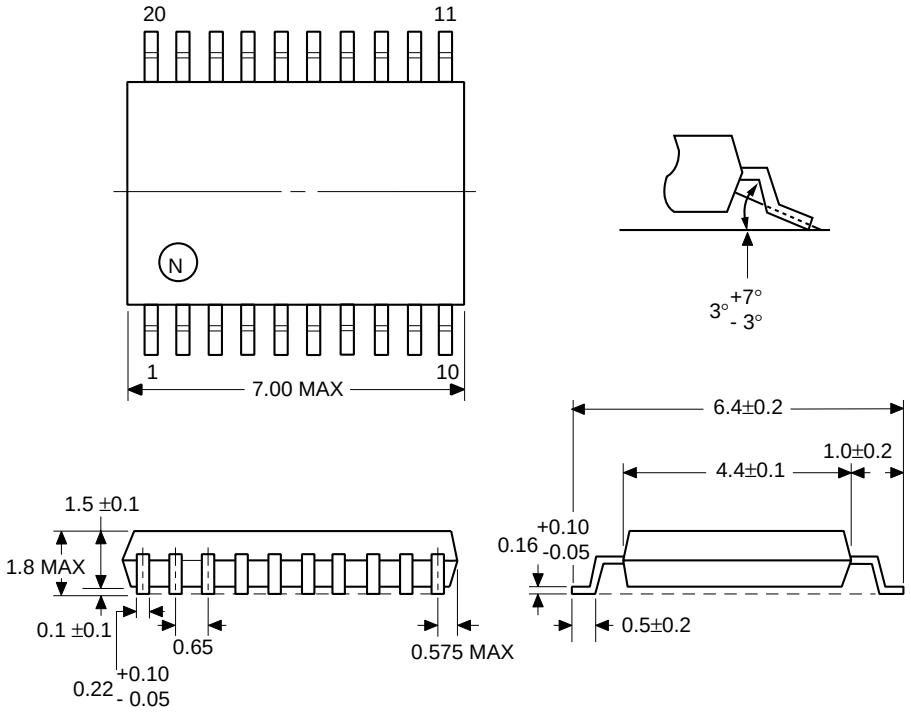


APPLICATION CIRCUIT



PACKAGE DIMENSIONS (Units in mm)

PACKAGE OUTLINE SSOP 20



ORDERING INFORMATION

PART NUMBER	QUANTITY
UPC8125GR-E1	2500/Reel