AN6225FHN

800 MHz quadrature modulation IC for PDC

■ Overview

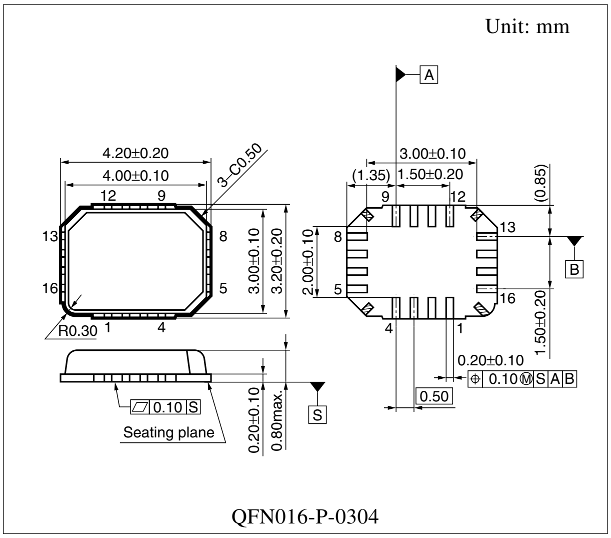
The AN6225FHN is an IC incorporating a quadrature modulator, a phase shifter and APC circuit for a mobile telephone.

■ Features

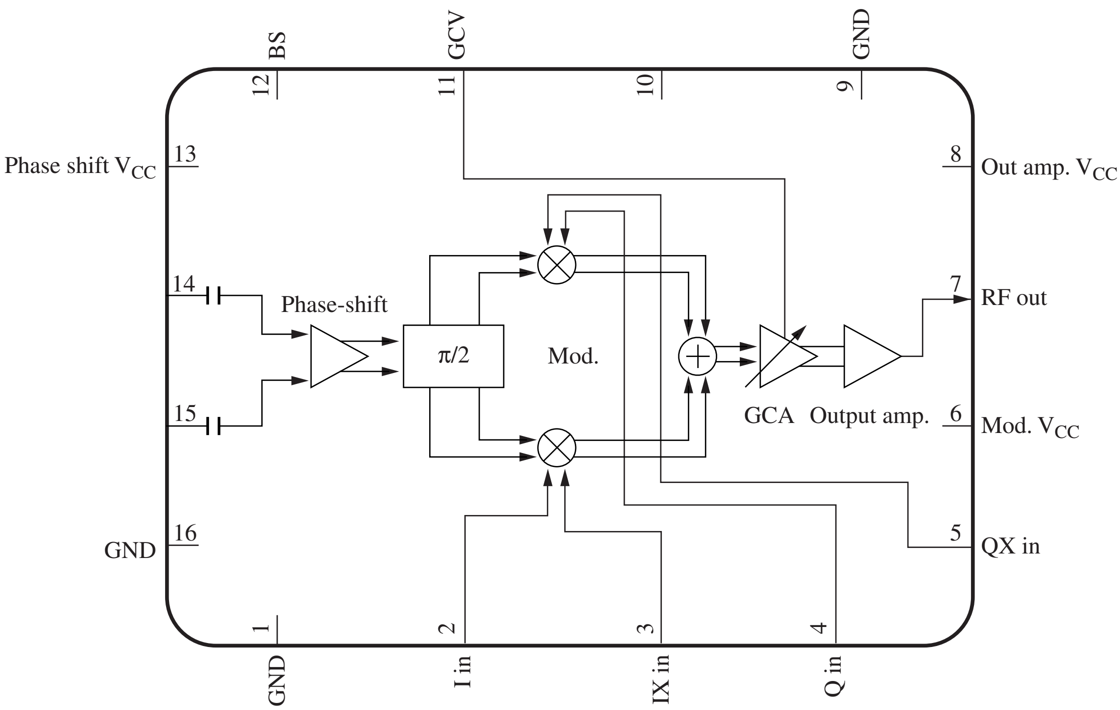
- Transmission output: −1 dBm
- Ultra mini-type 3 mm × 4 mm leadless package
- Quadrature modulation system

■ Applications

- Cellular telephone (PDC800 MHz)



■ Block Diagram



■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	GND	9	GND
2	I in	10	N.C.
3	IX in	11	GCV
4	Q in	12	Battery save
5	QX in	13	Phase shift V_{CC}
6	Modulator V_{CC}	14	TX local in 1
7	RF out	15	TX local in 2
8	Output amplifier V_{CC}	16	GND

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	5.0	V
Supply current	I_{CC}	60	mA
Power dissipation *2	P_D	113	mW
Operating ambient temperature *1	T_{opr}	−30 to +80	°C
Storage temperature *1	T_{stg}	−55 to +125	°C

Note) *1: Except for the operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.

*2: P_D is the value at T_a = 80°C without a heatsink. Use this device within the range of allowable power dissipation referring to "■ Technical Data • P_D — T_a curves of QFN016-P-0304".

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V_{CC}	2.6 to 4.0	V

■ Electrical Characteristics at T_a = 25°C

Unless otherwise specified, V_{CC1} , V_{CC2} , V_{CC3} = 3.0 V, BS = 2.5 V, Lo input level is the setting value of a signal source (output impedance 50 Ω).

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Transmission output level 1 *1	P_{O1}	Lo = 889 MHz, −20 dBm GCV = 2.2 V	−8.5	−5.5	−2.5	dBm
Transmission output level 2 *1	P_{O2}	Lo = 960 MHz, −20 dBm GCV = 2.2 V	−8.5	−5.5	−2.5	dBm
Current consumption *1	I_{CC}	Lo = 950 MHz, −20 dBm GCV = 2.2 V	20	26	34	mA
Sleep current *1	I_{SLP}	BS = 0 V, GCV = 2.2 V	—	0	10	µA
Image leak *1	IL	Lo = 950 MHz, −20 dBm GCV = 2.2 V	—	−35	−30	dBc

■ Electrical Characteristics at T_a = 25°C (continued)

Unless otherwise specified, V_{CC1} , V_{CC2} , V_{CC3} = 3.0 V, BS = 2.5 V, Lo input level is the setting value of a signal source (output impedance 50 Ω).

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Carrier leak *1	CL	Lo = 950 MHz, –20 dBm GCV = 2.2 V	—	–30	–25	dBc
Base band secondary distortion *1	BD	Lo = 950 MHz, –20 dBm GCV = 2.2 V	—	–40	–30	dBc
Output level deviation *1	DPO	Lo = 889 MHz to 960 MHz, –20 dBm GCV = 2.2 V	–1.5	0	1.5	dB
GC variable width *1	PGC	Lo = 950 MHz, –20 dBm GCV = 0.9 V to 2.2 V	—	–35	–25	dB
Modulation precision *2	EVM	Lo = 950 MHz, –20 dBm GCV = 2.2 V	—	2.0	3.5	%

• Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Adjacent channel leak power suppression 1 (50 kHz detuning) *4	ACP1	Lo = 950 MHz, –20 dBm GCV = 2.2 V	—	–68	–60	dBc
Adjacent channel leak power suppression 1 (100 kHz detuning) *4	ACP2	Lo = 950 MHz, –20 dBm GCV = 2.2 V	—	–75	–65	dBc
Minimum output level *1	Pmin	Lo = 950 MHz, –20 dBm GCV = 0.9 V	–50	–40	–30	dBm
LOX2 leak *1	LOL	Lo = 950 MHz, –20 dBm GCV = 2.2 V	—	–40	–30	dBc
Transmission output level 3 *5	P_{O3}	Lo = 889 MHz, –20 dBm GCV = 2.2 V	–4.5	–1.0	2.5	dBm
Transmission output level 4 *5	P_{O4}	Lo = 960 MHz, –20 dBm GCV = 2.2 V	–4.5	–1.0	2.5	dBm
Adjacent channel leak power suppression 2 (50 kHz detuning) *6	ACP3	Lo = 950 MHz, –20 dBm GCV = 2.2 V	—	–60	–50	dBc
Adjacent channel leak power suppression 2 (100 kHz detuning) *6	ACP4	Lo = 950 MHz, –20 dBm GCV = 2.2 V	—	–75	–65	dBc
Receiving band noise *3	NRX	Lo = 893 MHz, –20 dBm GCV = 2.2 V, f = 885 MHz	—	–131	–127	dBm/Hz

Note) *1: IQ signal amplitude: 0.18 V[p-p] (both phases), DC bias: 1.5 V, π/4 QPSK-modulated [0000] continuous wave input.
P_{O1} output frequency: 889.002625 MHz, P_{O2} output frequency: 960.002625 Hz, P_{min} output frequency: 950.002625 MHz
An output level be measured by a spectrum analyzer.
Setting of a spectrum analyzer: SPAN = 20 kHz, RBW = 300 Hz, VBW = 30 Hz, ST = 5 s
(When inputting π/4 QPSK-modulated [0000] continuous wave as IQ signal, the frequency for P_{O1} , P_{O2} and P_{min} becomes Lo frequency + IQ signal frequency, which leads to the above value.)
Lo input level is the setting value of a signal source (output impedance 50 Ω).

*2: IQ signal amplitude: 0.18 V[p-p] (double phases), DC bias: 1.5 V, π/4 QPSK-modulated [PN9] continuous wave input.
The output level be measured by a spectrum analyzer. (By using a modulation precision measurement function.)

■ Electrical Characteristics at T_a = 25°C (continued)

Unless otherwise specified, V_{CC1} , V_{CC2} , V_{CC3} = 3.0 V, BS = 2.5 V, Lo input level is the setting value of a signal source (output impedance 50 Ω).

Note) (continued)

∗3: IQ signal amplitude: 0.31 V[p-p] (both phases), DC bias: 1.5 V, π/4 QPSK-modulated [PN9] continuous wave input.
A receiving band noise (dBm/Hz) can be determined by deducting 10 log (3 kHz) = 34.77 from 885 MHz floor noise level (dBm) measured beforehand.
Setting of a spectrum analyzer: SPAN = 5 kHz, RBW = 3 kHz, VBW = 100 Hz, ST = 50 ms, REFLEV = −20 dBm, ATT = 0 dB

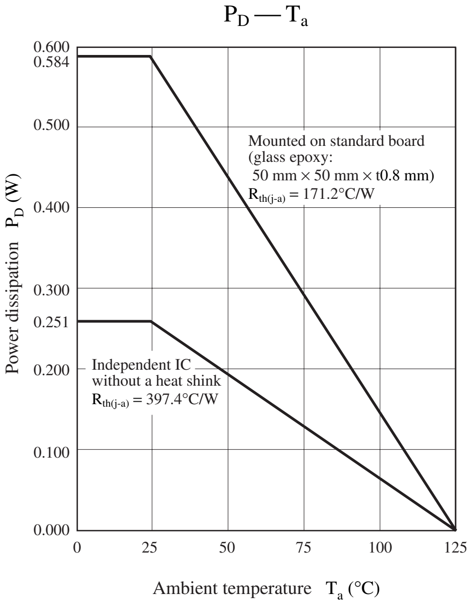
∗4: IQ signal amplitude: 0.18 V[p-p] (both phases), DC bias: 1.5 V, π/4 QPSK-modulated [PN9] continuous wave input.
To be measured by a spectrum analyzer. (By using a leak power measurement function for an adjacent channel.)
Setting of a spectrum analyzer: SPAN = 250 kHz, RBW = 1 kHz, VBW = 1 kHz, ST = 2 s

∗5: IQ signal amplitude: 0.31 V[p-p] (both phases), DC bias: 1.5 V, π/4 QPSK-modulated [0000] continuous wave input.
P_{O3} output frequency: 889.002625 MHz, P_{O4} output frequency: 960.002625 Hz.
An output level be measured by a spectrum analyzer.
Setting of a spectrum analyzer: SPAN = 20 kHz, RBW = 300 Hz, VBW = 30 Hz, ST = 5 s
(When inputting π/4 QPSK-modulated [0000] continuous wave as IQ signal, the frequency for P_{03} , P_{04} and P_{min} becomes Lo frequency + IQ signal frequency, which leads to the above value.)
Lo input level is the setting value of a signal source (output impedance 50 Ω).

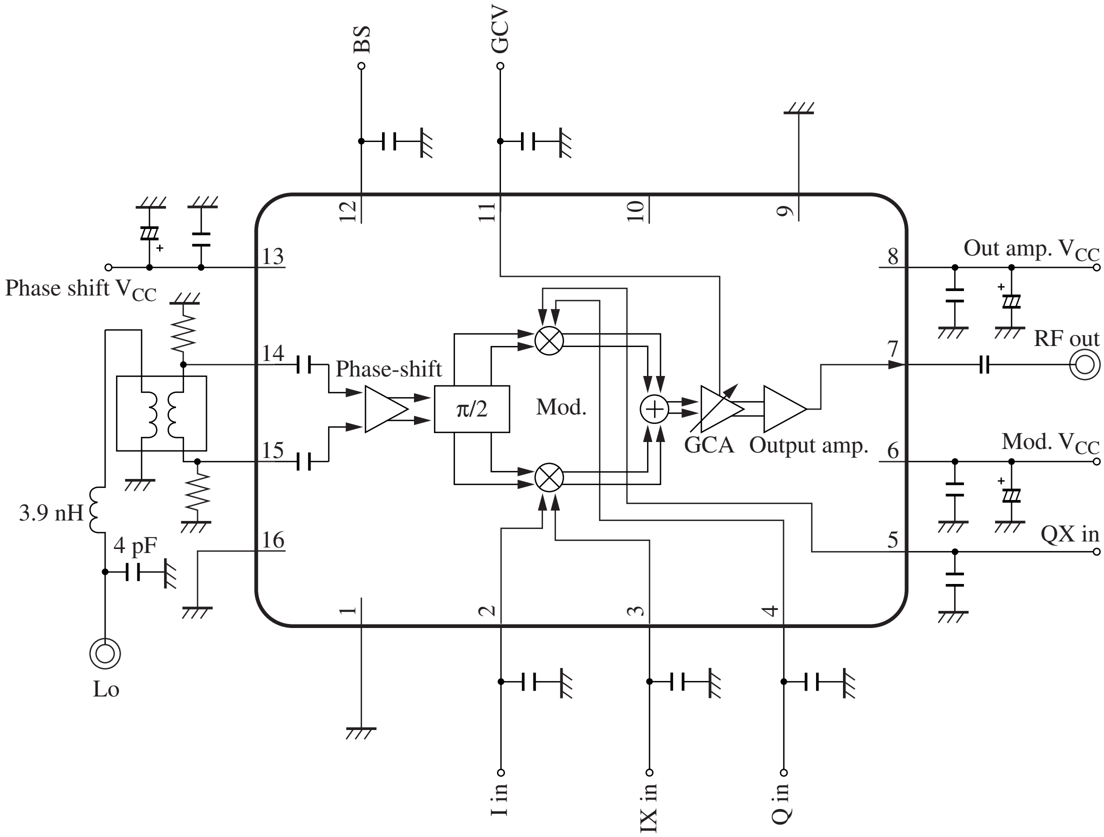
∗6: IQ signal amplitude: 0.31 V[p-p] (both phases), DC bias: 1.5 V, π/4 QPSK-modulated [PN9] continuous wave input.
To be measured by a spectrum analyzer. (By using a leak power measurement function for an adjacent channel.)
Setting of a spectrum analyzer: SPAN = 250 kHz, RBW = 1 kHz, VBW = 1 kHz, ST = 2 s

■ Technical Data

• P_D — T_a curves of QFN016-P-0304



■ Application Circuit Example



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