DECT 0.6 W power amplifier CGY2030M

FEATURES

- 3.3 V supply voltage operation
- High efficiency
- 28 dBm output power
- Operation possible without negative supply
- SSOP16 package.

GENERAL DESCRIPTION

The CGY2030M is a GaAs monolithic microwave 600 mW power amplifier designed for a 3.3 V supply voltage. When power control is not required, it can be operated without negative supply voltage. The IC is suitable for DECT and DCS1800 applications.

APPLICATIONS

- 1.7 to 1.9 GHz transceivers for DECT applications
- 1.710 to 1.785 GHz transceivers for DCS1800 hand-held equipment.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
CGY2030M	SSOP16	plastic shrink small outline package; 16 leads; body width 4.4 mm	SOT369-1

BLOCK DIAGRAM

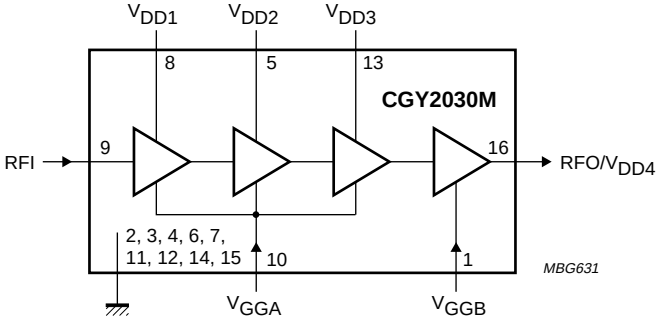

Fig.1 Block diagram.

PINNING

SYMBOL	PIN	DESCRIPTION
V_{GGB}	1	gate bias input voltage fourth stage
GND	2 to 4	ground
V_{DD2}	5	drain second stage and supply voltage 2
GND	6 and 7	ground
V_{DD1}	8	drain first stage and supply voltage 1
RFI	9	PA input
V_{GGA}	10	gate bias input voltage first second and third stages
GND	11 and 12	ground
V_{DD3}	13	drain third stage and supply voltage 3
GND	14 and 15	ground
RFO/V_{DD4}	16	PA output and supply voltage 4

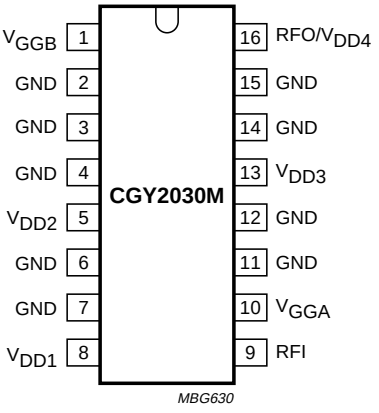

Fig.2 Pin configuration.

FUNCTIONAL DESCRIPTION

The CGY2030M is a 4-stage GaAs MESFET power amplifier capable of delivering 600 mW (typ.) at 1.9 GHz into a 50 Ω load. Each amplifier stage has an open-drain configuration. The drains have to be loaded externally by adequate reactive circuits which must also provide a DC path to the supply.

The amplifier can be switched off by means of an external PNP or PMOS switch connected in series with the DC path from the supply to the amplifier drains. This switch can also be used to vary the actual supply voltage applied to the amplifier and hence, control the output power.

The amplifier bias is set via the gate control voltage input pins V_{GGA} and V_{GGB}. Two modes of operation are possible. In one mode, the pins V_{GGA} and V_{GGB} can simply be connected to the ground via resistors.

The amplifier biases itself internally to a negative voltage by action of the incoming RF signal. In this mode, power control cannot be achieved by varying the amplifier drain voltage, so that it is suitable only for applications where power control is not required such as DECT. If a negative bias is available, another mode of operation is possible. Optimum amplifier biasing can thus be achieved by providing adequate negative voltages at pins V_{GGA} and V_{GGB}. In this mode, the amplifier internal bias does not now depend on the incoming RF level, nor on the drain voltage, so that power control is possible by variation of the drain voltage.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient in free air	tbf	K/W

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{DD}	supply voltage		–	–	4.6	V
$V_{DD\text{-}GG}$	voltage difference between supply voltage and gate bias voltage	no input signal	–	–	–8	V
$T_{ch(max)}$	maximum operating channel temperature		–	–	+150	°C
T_{amb}	operating ambient temperature		–20	–	+85	°C
T_{stg}	storage temperature		–55	–	+125	°C

DC CHARACTERISTICS

T_{amb} = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{DD}	operating drain voltage		tbf	3.3	tbf	V
MODE 1: with negative biasing						
I_{DD}	supply current		–	–	tbf	mA
V_{GGA}	gate bias voltage for input stages		–	–1.2	–	V
V_{GGB}	gate bias voltage for third stage		–	–1.8	–	V
I_{GG}	total gate current		–	–	1.5	mA
MODE 2: without negative biasing, V_{GGA} and V_{GGB} connected to ground						
I_{DD}	supply current		–	–	tbf	mA

AC CHARACTERISTICS

V_{DD} = 3.3 V; f_{RF} = 1900 MHz; P_{in} = 0 dBm; T_{amb} = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f_{RF}	RF input frequency		1700	–	1900	MHz
δ	duty factor		–	–	12.5	%
MODE 1: negative bias at pins V_{GGA} and V_{GGB}; note 1						
$P_{out(RF)}$	RF output power		tbf	28	–	dBm
η	DC to RF efficiency		tbf	40	–	%
H_{rej}	second and third harmonics rejection		–	30	–	dBc
	stability (spurious levels)	load VSWR 6 : 1; all phases	–	tbf	–	dBc
P_{leak}	RF leakage to output in power off state	V_{DD} = 0 V	–	tbf	–	dBm
MODE 2: V_{GGA} and V_{GGB} connected to ground						
$P_{out(RF)}$	RF output power		tbf	27	–	dBm
η	DC to RF efficiency		tbf	40	–	%
P_{leak}	RF leakage to output in power off state	V_{DD} = 0 V	–	tbf	–	dBm

Note

1. Negative voltages V_{GGA} and V_{GGB} must be applied before supply voltage V_{DD}.

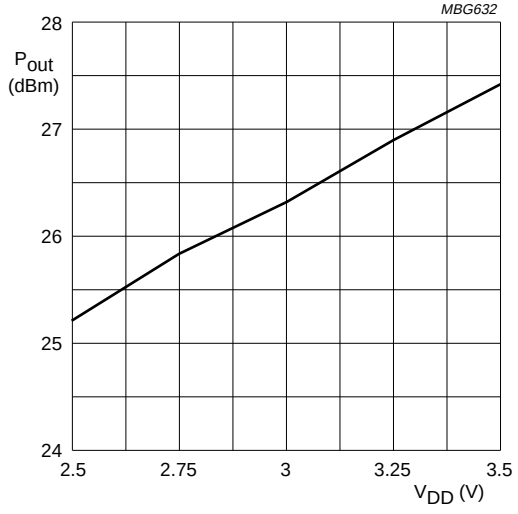

Fig.3 Typical power characteristic in MODE 2.