

DCS/PCS 2 W power amplifier**CGY2021G****FEATURES**

- Power Amplifier (PA) overall efficiency 48% (DCS)
- 33 dB gain
- 0 dBm input power
- Gain control range >50 dB
- Integrated power sensor driver
- Low output noise floor of PA <-121 dBm/Hz in DCS/PCS RX band
- Wide operating temperature range -20 to +85 °C
- LQFP 48-pin package
- Compatible with power ramping controller PCA5075 and GaAs power controller UBA1710.

APPLICATIONS

- Hand-held transceivers for DCS/PCS applications (DCS: 1710 to 1785 MHz and PCS: 1850 to 1910 MHz)
- 1800 MHz Time Division Multiple Access (TDMA) systems.

QUICK REFERENCE DATA

SYMBOL	PARAMETER ⁽¹⁾	MIN.	TYP.	MAX.	UNIT
V _{DD}	positive supply voltage	-	4.5	-	V
I _{DD}	positive peak supply current	-	1.1	-	A
P _{o(max)}	maximum output power	-	33	-	dBm
T _{amb}	operating ambient temperature	-20	-	+85	°C

Note

1. For conditions, see Chapters "AC characteristics" and "DC characteristics".

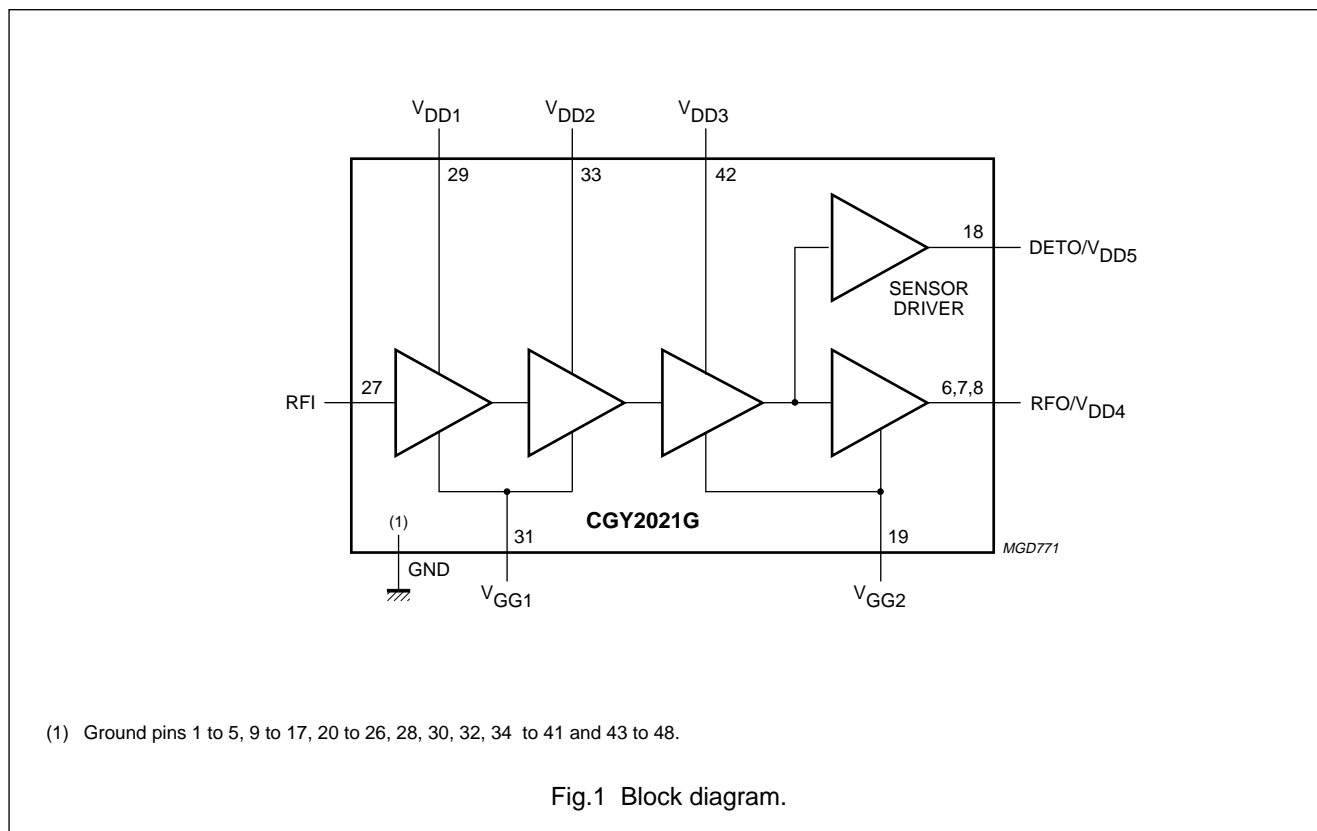
ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
CGY2021G	LQFP48	plastic low profile quad flat package; 48 leads; body 7 × 7 × 1.4 mm	SOT313-2

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BLOCK DIAGRAM



PINNING

SYMBOL	PIN	DESCRIPTION
GND	1 to 5	ground
RFO/V _{DD4}	6 to 8	PA output and fourth stage supply voltage
GND	9 to 17	ground
DETO/V _{DD5}	18	power sensor output and supply voltage
V _{GG2}	19	third and fourth stage negative gate supply voltage
GND	20 to 26	ground
RFI	27	PA input
GND	28	ground
V _{DD1}	29	first stage supply voltage
GND	30	ground
V _{GG1}	31	first and second stage negative gate supply voltage
GND	32	ground
V _{DD2}	33	second stage supply voltage
GND	34 to 41	ground
V _{DD3}	42	third stage supply voltage
GND	43 to 48	ground

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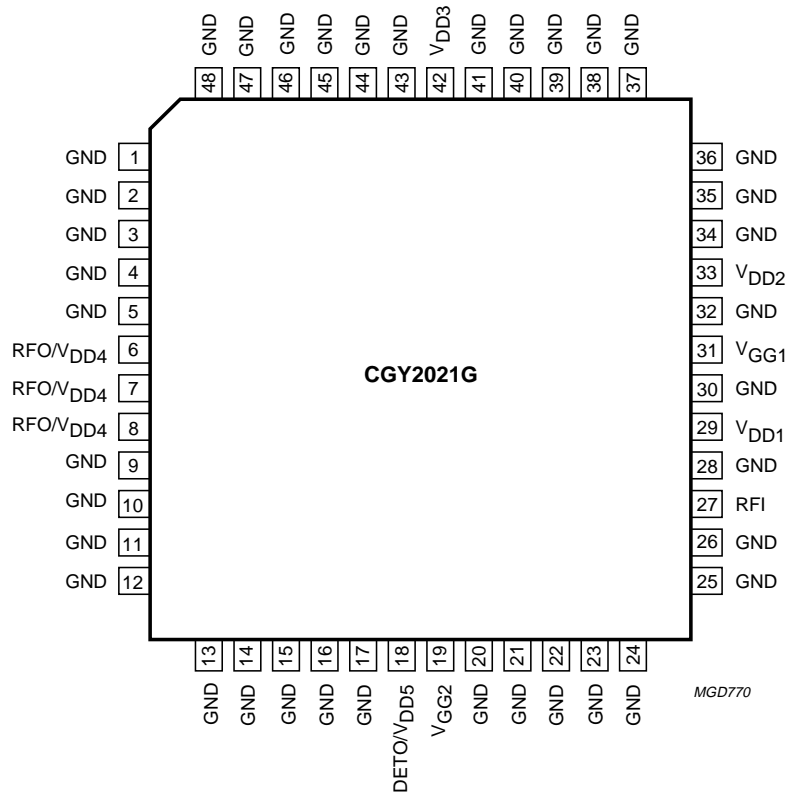


Fig.2 Pin configuration.

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FUNCTIONAL DESCRIPTION**Operating conditions**

The CGY2021G is designed to meet the European Telecommunications Standards Institute (ETSI) DCS documents, the ETS 300 577 specification, which are defined as follows:

- $t_{on} = 542.8 \mu s$
- $T = 4.3 ms$
- Duty cycle = 1/8.

This amplifier is specifically designed for pulse operation allowing the use of a LQFP48 plastic package.

Power amplifier

The Power Amplifier (PA) consists of four cascaded gain stages with an open-drain configuration. Each drain has to be loaded externally by an adequate reactive circuit which also has to be a DC path to the supply.

The amplifier bias is set by using a negative voltage applied at pins V_{GG1} and V_{GG2} . This negative voltage must be present before the supply voltage is applied to the drains to avoid current overstress of the amplifier.

Power sensor driver

The power sensor driver is a buffer amplifier that delivers an output signal at the DETO pin which is proportional to the amplifier power. This signal can be detected by external diodes for power control purpose. As the sensor signal is taken from the input of the last stage of the PA, it is isolated from disturbances at the output by the reverse isolation of the PA output stage. An impedance mismatch at the PA output therefore does not significantly influence the signal delivered by the power sensor as this normally occurs when power sense is made using a directional coupler. Consequently, the cost and space of using a directional coupler are saved.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134); general operating conditions applied.

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{DD}	positive supply voltage	–	7	V
V_{GG}	negative supply voltage	–	–10	V
$T_{j(max)}$	maximum operating junction temperature	–	150	°C
T_{stg}	IC storage temperature	–	150	°C
P_{tot}	total power dissipation	–	600	mW

THERMAL CHARACTERISTICS

General operating conditions applied.

SYMBOL	PARAMETER	VALUE	UNIT
R_{th-j-c}	thermal resistance from junction to case; note 1	tbf	K/W

Note

1. This thermal resistance is measured under DCS/PCS pulse conditions.

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DC CHARACTERISTICS

$V_{DD} = 4.5 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$; peak current values during burst; general operating conditions applied; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Pins RFO/V_{DD4}, V_{DD3}, V_{DD2}, V_{DD1} and DETO/V_{DD5}						
V_{DD}	positive supply voltage		–	4.5	–	V
I_{DD}	positive peak supply current		–	1.1	–	A
Pins V_{GG1} and V_{GG2}						
V_{GG1}	negative supply voltage	note 1	–	–1.8	–	V
V_{GG2}	negative supply voltage	note 1	–	–1.8	–	V
$I_{GG1} + I_{GG2}$	negative peak supply current		–	0.5	2	mA

Note

1. The negative bias V_{GG} must be applied $10 \mu\text{s}$ before the power amplifier is switched on, and must remain applied until the power amplifier has been switched off.

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AC CHARACTERISTICS

$V_{DD} = 4.5\text{ V}$; $T_{amb} = 25\text{ °C}$; general operating conditions applied; unless otherwise specified.
Measured and guaranteed on CGY2021G evaluation board.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Power amplifier						
P_i	input power		-2	-	+2	dBm
S_{11}	input return loss	50 Ω source; note 1	-	-	-10	dB
f_{RF}	RF frequency range	DCS	1710	-	1785	MHz
		PCS	1850	-	1910	MHz
$P_{o(max)}$	maximum output power	$T_{amb} = 25\text{ °C}$; $V_{DD} = 4.5\text{ V}$	-	33	-	dBm
		$T_{amb} = -20\text{ to }+85\text{ °C}$; $V_{DD} = 4.2\text{ V}$	31	-	-	dBm
η	efficiency	DCS; at $P_{o(max)}$	42	48	-	%
		PCS; at $P_{o(max)}$	-	45	-	%
R_S	optimum series load resistance		-	6	-	Ω
C_S	optimum series load capacitance		-	11	-	pF
$P_{o(off)}$	isolation	PA OFF; $P_i = 0\text{ dBm}$	-	-45	-	dBm
N_{RX}	output noise in RX band		-	-	-121	dBm/Hz
H2	2nd harmonic level		-	-	-40	dBc
H3	3rd harmonic level		-	-	-35	dBc
Stab	stability	note 2	-	-	tbf	dBc
Power sensor driver						
$P_{o(DET)}$	sensor driver output power	$R_L = 100\ \Omega$; relative to PA output power into 50 Ω load	-23	-20	-18	dBc
$\Delta P_{o(DET)}$	driver output power variation	load VSWR < 6 : 1 at PA output	-	-	tbf	dB

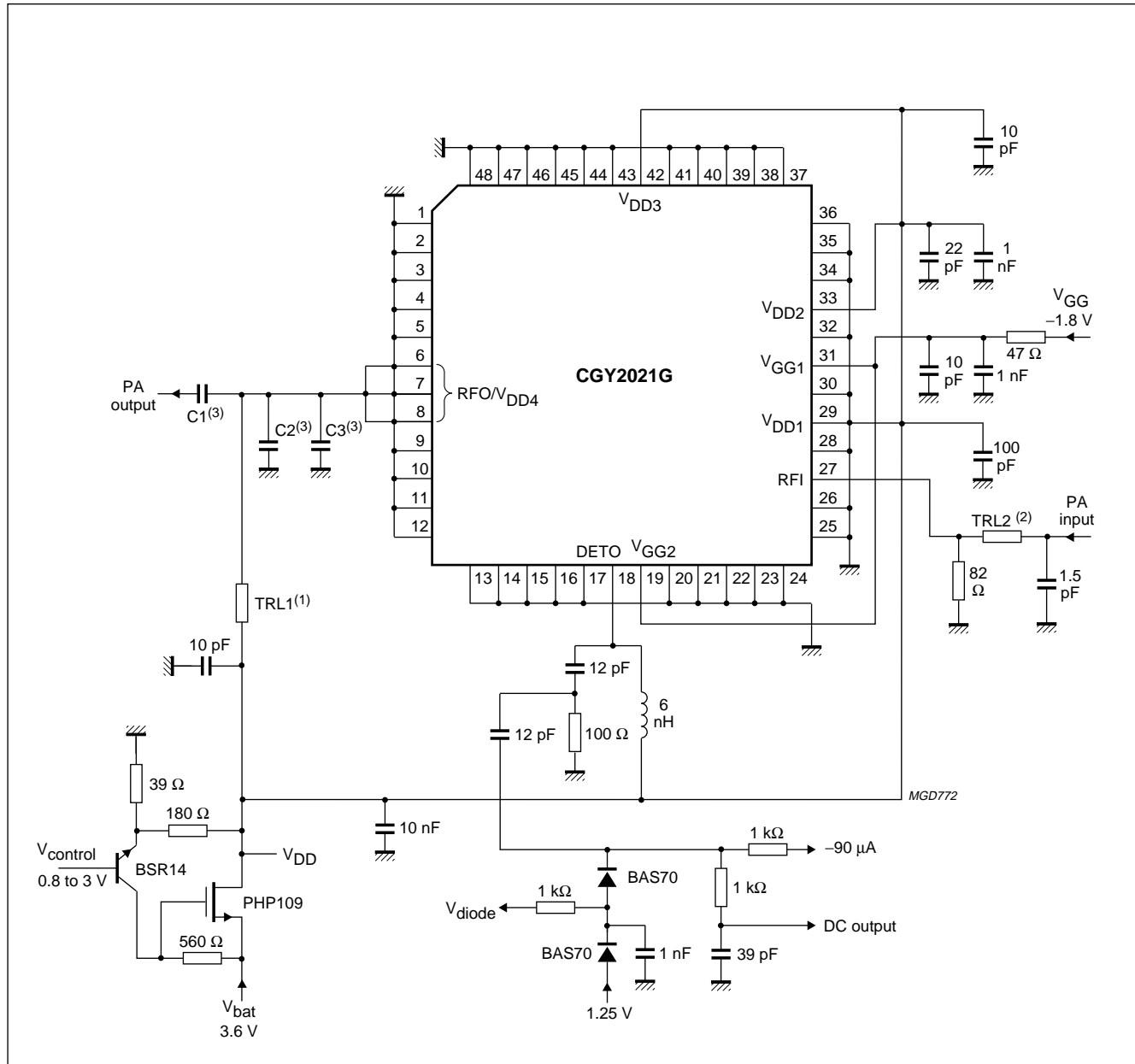
Notes

- Including the 82 Ω resistor connected in parallel at the power amplifier input on the evaluation board.
- The device is adjusted to provide nominal value of load power into a 50 Ω load. The device is switched off and a 6 : 1 load replaces the 50 Ω load. The device is switched on and the phase of the 6 : 1 load is varied 360 electrical degrees during a 60 seconds test period.

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APPLICATION INFORMATION



All capacitors are type: SMD0603.
 Thickness: 0.8 mm; substrate: FR4; $\epsilon_r = 4.7$.
 (1) TRL1: width = 0.3 mm; length = 16 mm.
 (2) TRL2: width = 0.5 mm; length = 10 mm.
 (3) the component values are:

SYSTEM	C1 (pF)	C2 (pF)	C3 (pF)
DCS	2.2	1.8	2.2
PCS	47	1.5	2.2

Fig.3 Evaluation board schematic.