Filtronic

FPD7612

Datasheet v3.0

GENERAL PURPOSE PHEMT

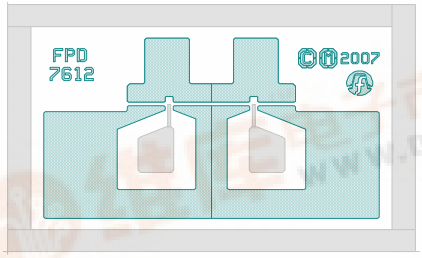
FEATURES:

- 20.5 dBm Output Power (P1dB)
- 13 dB Power Gain at 12 GHz
- 17 dB Maximum Stable Gain at 12 GHz
- 11 dB Maximum Stable Gain at 18 GHz
- 45% Power-Added Efficiency

GENERAL DESCRIPTION:

The FPD7612 is an AlGaAs/InGaAs pseudomorphic High Electron Mobility Transistor (PHEMT), featuring a 0.25 µm by 200 µm Schottky barrier gate, defined by high -resolution stepper-based photolithography. The recessed gate structure minimizes parasitics to optimize performance. The epitaxial structure and processing have been optimized for reliable high-power applications.

LAYOUT:



TYPICAL APPLICATIONS:

- Narrowband and broadband high-performance amplifiers
- SATCOM uplink transmitters
- PCS/Cellular low-voltage high-efficiency output amplifiers
- Medium-haul digital radio transmitters

ELECTRICAL SPECIFICATIONS[1]:

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Power at 1dB Gain Compression	P1dB	VDS = 5 V; IDS = 50% IDSS	19	20.5		dBm
Power Gain at P1dB	G1dB	VDS = 5 V; IDS = 50% IDSS	11.0	13.0		dB
Noise FIgure	N.F. min	VDS = 5 V; IDS = 50% IDSS		1.2		dB
Power-Added Efficiency	PAE	VDS = 5V; IDS = 50% IDSS; POUT = P1dB		45		%
Maximum Stable Gain (S21/S12) *f* = 12 GHz *f* = 24 GHz	MSG	VDS = 5 V; IDS = 50% IDSS	 16 9.5	 17 11		dB
Saturated Drain-Source Current	IDSS	VDS = 1.3 V; VGS = 0 V	45	60	75	mA
Maximum Drain-Source Current	IMAX	VDS = 1.3 V; VGS ≅ +1 V		120		mA
Transconductance	GM	VDS = 1.3 V; VGS = 0 V		80		mS
Gate-Source Leakage Current	IGSO	VGS = -5 V		1	10	µA
Pinch-Off Voltage	|VP|	VDS = 1.3 V; IDS = 0.2 mA	0.7	1.0	1.3	V
Gate-Source Breakdown Voltage	|VBDGS|	IGS = 0.2 mA	12.0	14.0		V
Gate-Drain Breakdown Voltage	|VBDGD|	IGD = 0.2 mA	14.5	16.0		V
Thermal Resistivity (see Notes)	θJC	VDS > 3V		280		°C/W
Thermal Resistivity (see Notes)	θJC	VDS > 6V		20		°C/W

Note:[1] $T_{Ambient}$ = 22°C; RF specifications measured at *f* = 12 GHz using CW signal

Specifications subject to change without notice
Filtronic Compound Semiconductors Ltd
Tel: +44 (0) 1325 301111 Fax: +44 (0) 1325 306177 Email: sales@filcs.com Website: www.filtronic.com

ABSOLUTE MAXIMUM RATING[1]:

PARAMETER	SYMBOL	TEST CONDITIONS	ABSOLUTE MAXIMUM
Drain-Source Voltage	VDS	-3V < VGS < -0.5V [6]	8V
Gate-Source Voltage	VGS	0V < VDS < +8V	-3V
Drain-Source Current	IDS	For VDS < 2V	IDss
Gate Current	IG	Forward or reverse current	10mA
RF Input Power	PIN	Under any acceptable bias state	20dBm
Channel Operating Temperature	TCH	Under any acceptable bias state	175°C
Storage Temperature	TSTG	Non-Operating Storage	-65°C to 150°C
Total Power Dissipation	PTOT	See De-Rating Note below	0.5W
Gain Compression	Comp.	Under any bias conditions	5dB
Simultaneous Combination of Limits [4]		2 or more Max. Limits	80%

Notes:

[1] $T_{Ambient}$ = 22°C unless otherwise noted; exceeding any one of these absolute maximum ratings may cause permanent damage to the device

[2] Total Power Dissipation defined as: $P_{TOT} \equiv (P_{DC} + P_{IN}) - P_{OUT}$,
where P_{DC}: DC Bias Power, P_{IN}: RF Input Power, P_{OUT}: RF Output Power

[3] Total Power Dissipation to be de-rated as follows above 22°C:

P_{TOT}= 0.5 - (0.0036W/°C) x T_{HS}

where T_{HS}= heatsink or ambient temperature above 22°C

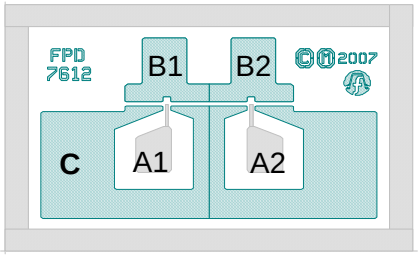
Example: For a 85°C carrier temperature: P_{TOT} = 0.5 - (0.0036 x (85 – 22)) = 0.27W

[4] Users should avoid exceeding 80% of 2 or more Limits simultaneously

[5] Thermal Resitivity specification assumes a Au/Sn eutectic die attach onto a Au-plated copper heatsink or rib.

[6] Operating at absolute maximum VD continuously is not recommended. If operation at 8V is considered then IDS must be reduced in order to keep the part within it's thermal power dissipation limits. Therefore VGS is restricted to < -0.5V.

PAD LAYOUT



:

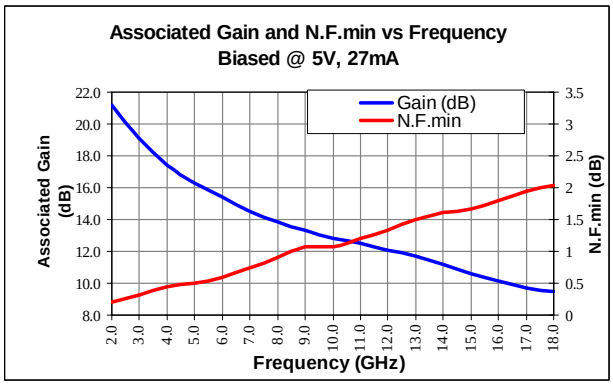
PAD	DESCRIPTION	PIN COORDINATES (µm)
A1/A2	Gate Pads	190/330, 120
B1/B2	Drain Pads	200/320, 240
C	Source Pad	

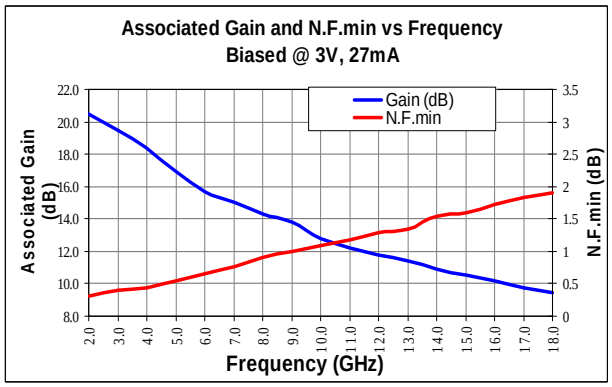
Note: Co-ordinates are referenced from the bottom left hand corner of the die to the centre of bond pad opening

DIE SIZE (µm)	DIE THICKNESS (µm)	MIN. BOND PAD OPENING (µm x µm)
520 x 335	75	45 x 45

Specifications subject to change without notice
Filtronic Compound Semiconductors Ltd
Tel: +44 (0) 1325 301111 Fax: +44 (0) 1325 306177 Email: sales@filcs.com Website: www.filtronic.com

TYPICAL MEASURED PERFORMANCE :





NOISE PARAMETERS : (BIASED @ VDS=3.0V, IDS=27MA)

Freq	N.F.min	Rn/50	Gamma Opt.	
(GHz)	(dB)	(Ohms)	Mag.	Angle
2.00	0.31	0.28	0.78	9.63
3.00	0.39	0.28	0.70	18.43
4.00	0.44	0.26	0.74	28.57
5.00	0.54	0.24	0.61	35.40
6.00	0.65	0.23	0.63	44.37
7.00	0.75	0.23	0.54	51.10
8.00	0.90	0.22	0.49	58.43
9.00	1.07	0.21	0.44	68.47
10.00	1.08	0.20	0.43	73.30
11.00	1.09	0.20	0.44	80.63
12.00	1.28	0.20	0.38	92.87
13.00	1.55	0.19	0.34	104.10
14.00	1.66	0.17	0.32	111.83
15.00	1.60	0.15	0.30	120.60
16.00	1.72	0.15	0.32	124.47
17.00	1.83	0.14	0.28	144.77
18.00	1.90	0.13	0.20	158.23

Filtronic Compound Semiconductors Ltd

Tel: +44 (0) 1325 301111 Fax: +44 (0) 1325 306177 Email: sales@filcs.com Website: www.filtronic.com

PREFERRED ASSEMBLY INSTRUCTIONS:

GaAs devices are fragile and should be handled with great care. Specially designed collets should be used where possible.

The recommended die attach is gold/tin eutectic solder under a nitrogen atmosphere. Stage temperature should be 280-290°C; maximum time at temperature is one minute. The recommended wire bond method is thermo-compression wedge bonding with 0.7 or 1.0 mil (0.018 or 0.025 mm) gold wire. Stage temperature should be 250-260°C.

HANDLING PRECAUTIONS:

To avoid damage to the devices care should be exercised during handling. Proper Electrostatic Discharge (ESD) precautions should be observed at all stages of storage, handling, assembly, and testing. These devices should be treated as Class 0 (0-250 V) as defined in JEDEC Standard No. 22-A114. Further information on ESD control measures can be found in MIL-STD-1686 and MIL-HDBK-263.

APPLICATION NOTES & DESIGN DATA:

Application Notes and design data including S-parameters, noise parameters and device model are available on request

DISCLAIMERS:

This product is not designed for use in any space based or life sustaining/supporting equipment.

ORDERING INFORMATION:

PART NUMBER	DESCRIPTION
FPD7612	Die

Specifications subject to change without notice
Filtronic Compound Semiconductors Ltd
Tel: +44 (0) 1325 301111 Fax: +44 (0) 1325 306177 Email: sales@filcs.com Website: www.filtronic.com