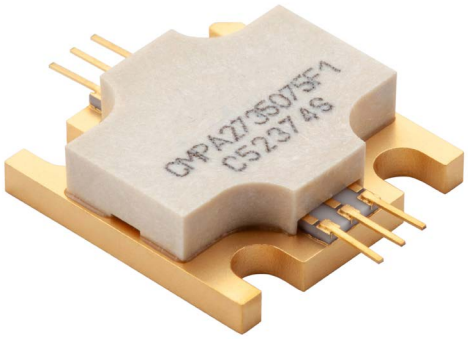
CMPA2735075F1

75 W, 2.7 - 3.5 GHz, GaN MMIC, Power Amplifier



Package Type: 440219
PN: CMPA2735075F1

Description

The CMPA2735075F1 is a gallium nitride (GaN) High Electron Mobility Transistor (HEMT) based monolithic microwave integrated circuit (MMIC). GaN has superior properties compared to silicon or gallium arsenide, including higher breakdown voltage, higher saturated electron drift velocity and higher thermal conductivity. GaN HEMTs also offer greater power density and wider bandwidths compared to Si and GaAs transistors. This MMIC contains a two-stage reactively matched amplifier design approach enabling very wide bandwidths to be achieved.

Typical Performance Over 2.7 - 3.5 GHz (T_C = 25°C)

Parameter	2.7 GHz	2.9 GHz	3.1 GHz	3.3 GHz	3.5 GHz	Units
Small Signal Gain	29	29	30	29	29	dB
Saturated Output Power	63	74	86	80	79	W
PAE @ P_{SAT}	45	54	57	57	57	%

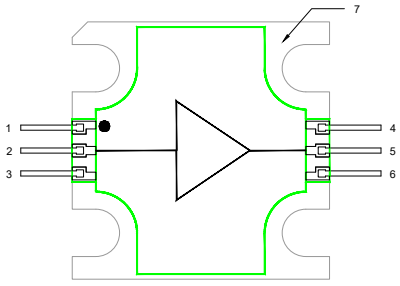
Notes
P_{IN} = 28 dBm

Features

- 29 dB Small Signal Gain
- 76 W Typical P_{SAT}
- 28 V Operation
- High Breakdown Voltage
- High Temperature Operation
- 0.5” x 0.5” Total Product Size

Applications

- Civil and Military Pulsed Radar Amplifiers



RoHS compliant

Absolute Maximum Ratings (not simultaneous) at 25°C

Parameter	Symbol	Rating	Units	Conditions
Drain-source Voltage	V_{DSS}	84	V_{DC}	25˚C
Gate-source Voltage	V_{GS}	-10, +2		
Storage Temperature	T_{STG}	-65, +150	°C	
Operating Junction Temperature	T_J	225		
Maximum Forward Gate Current	I_G	28	mA	25˚C
Screw Torque	τ	40	in-oz	
Thermal Resistance, Junction to Case (packaged)[1]	$R_{\theta JC}$	0.77	°C/W	300µsec, 20%, 85°C
Thermal Resistance, Junction to Case (packaged)[2]		2.0		CW, 85°C

Notes:
[1] Measured for the CMPA2735075F1 at P_{DISS} = 64 W (pulsed)
[2] Measured for the CMPA2735075F1 at P_{DISS} = 56 W (CW)

Electrical Characteristics (Frequency = 2.7 GHz to 3.5 GHz unless otherwise stated; T_C = 25°C)

Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
DC Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	-3.8	-3.0	-2.3	V	V_{DS} = 10 V, I_D = 28 mA
Gate Quiescent Voltage	$V_{GS(Q)}$	–	-2.7	–	V_{DC}	V_{DD} = 28 V, I_{DQ} = 800 mA
Saturated Drain Current[1]	I_{DS}	19.6	27.4	–	A	V_{DS} = 6.0 V, V_{GS} = 2.0 V
Drain-Source Breakdown Voltage	V_{BD}	84	–	–	V	V_{GS} = -8 V, I_D = 28 mA
RF Characteristics[2,3]						
Small Signal Gain	S21	26.5	28.6	–	dB	V_{DD} = 28 V, I_{DQ} = 800 mA
Input Return Loss	S11	–	-14.4	-10		
Output Return Loss	S22	–	-10.3	-7		
Output Power at 2.7 GHz	P_{OUT1}	45.7	63	–	W	V_{DD} = 28 V, I_{DQ} = 800 mA, P_{IN} = 28 dBm,
Output Power at 2.9 GHz	P_{OUT2}	60.2	74	–		
Output Power at 3.1 GHz	P_{OUT3}	66.1	86	–		
Output Power at 3.3 GHz	P_{OUT4}		80	–		
Output Power at 3.5 GHz	P_{OUT5}		79	–		
Power Added Efficiency at 2.7 GHz	PAE_1	–	45	–	%	
Power Added Efficiency at 2.9 GHz	PAE_2	45	54	–		
Power Added Efficiency at 3.1 GHz	PAE_3	49	57	–		
Power Added Efficiency at 3.3 GHz	PAE_4	48		–		
Power Added Efficiency at 3.5 GHz	PAE_5			–		
Output Mismatch Stress	VSWR	–	–	5:1	Ψ	No damage at all phase angles, V_{DD} = 28 V, I_{DQ} = 800 mA, P_{OUT} = 75 W

Notes:
[1] Scaled from PCM data
[2] All data pulse tested in CMPA2735075F1-AMP
[3] Pulse Width = 300µs, Duty Cycle = 20%

Typical Performance of the CMPA2735075F1

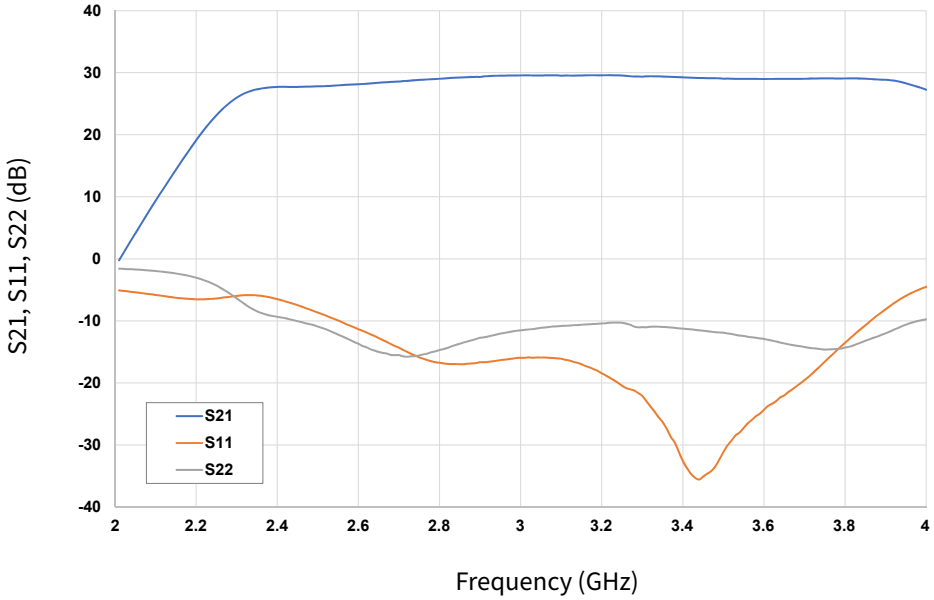


Figure 1. Gain and Return Losses vs Frequency of the CMPA2735075F1
Measured in CMPA2735075F1-AMP Amplifier Circuit
V_{DS} = 28 V, I_{DS} = 800 mA

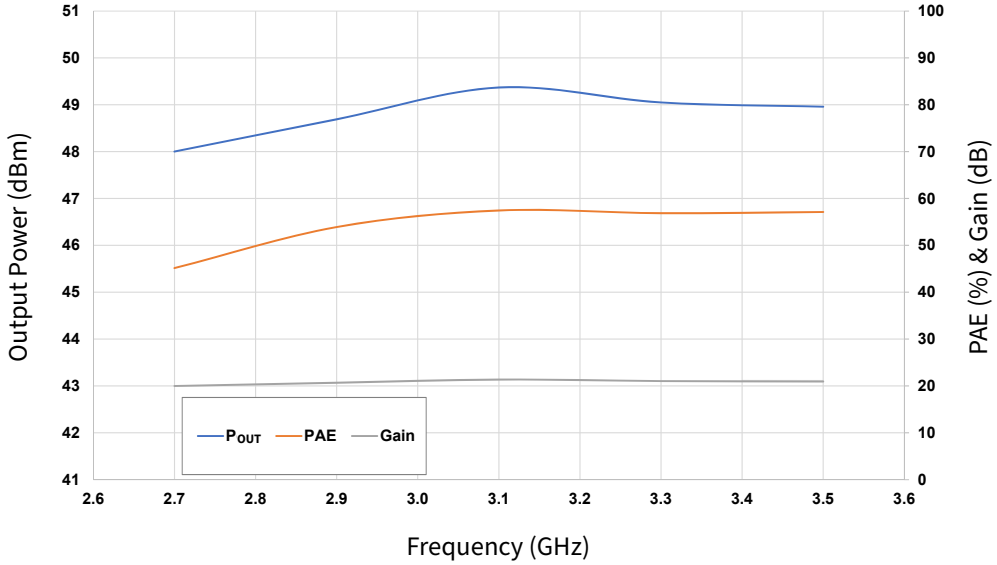
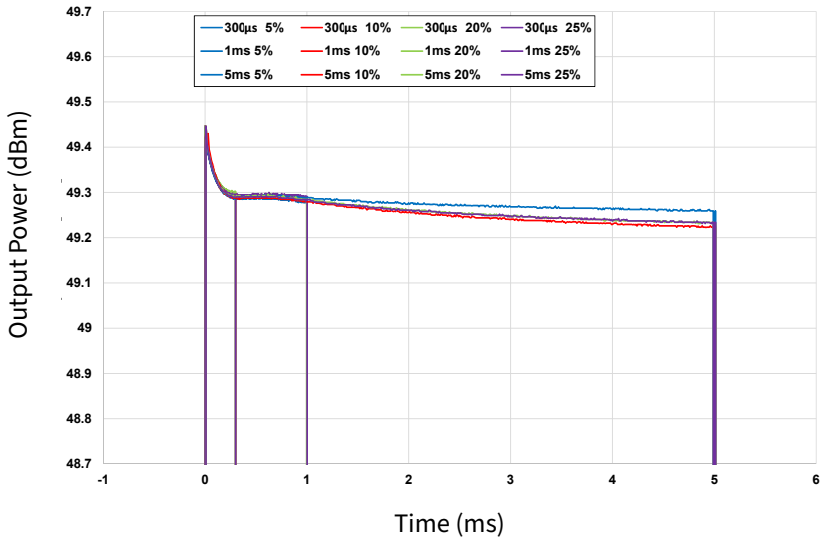


Figure 2. Output Power, Gain and PAE vs Frequency of the CMPA2735075F1
Measured in CMPA2735075F1-AMP Amplifier Circuit
V_{DS} = 28 V, I_{DS} = 800 mA

Typical Pulse Droop Performance



Pulse Width	Duty Cycle (%)	Droop (dB)
10µs	5-25	0.10
50µs	5-25	0.10
100µs	5-25	0.10
300µs	5-25	0.20
1 ms	5-25	0.20
5 ms	5-25	0.20

Electrostatic Discharge (ESD) Classifications

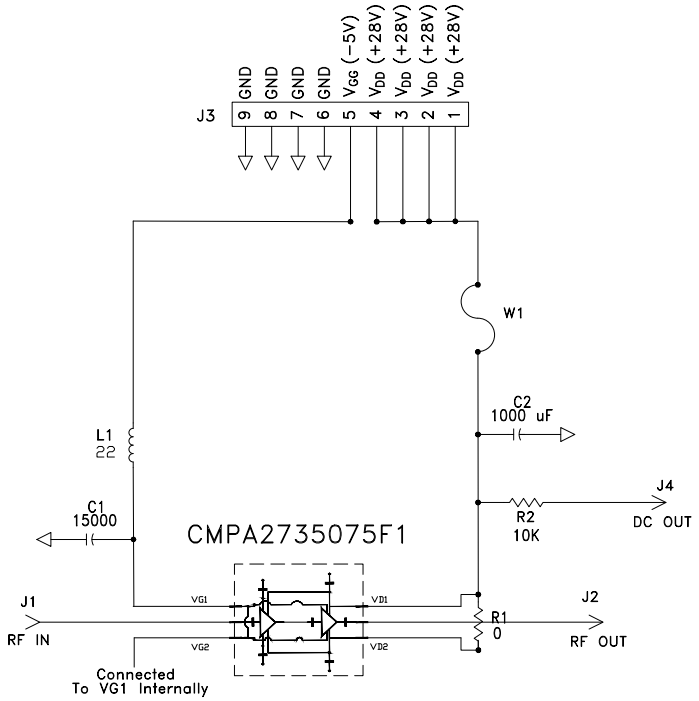
Parameter	Symbol	Class	Classification Level	Test Methodology
Human Body Model	HBM	3A	ANSI/ESDA/JEDEC JS-001 Table 3	JEDEC JESD22 A114-D
Charge Device Model	CDM	C3	ANSI/ESDA/JEDEC JS-002 Table 3	JEDEC JESD22 C101-C

CGHV37400F-AMP Application Circuit Bill of Materials

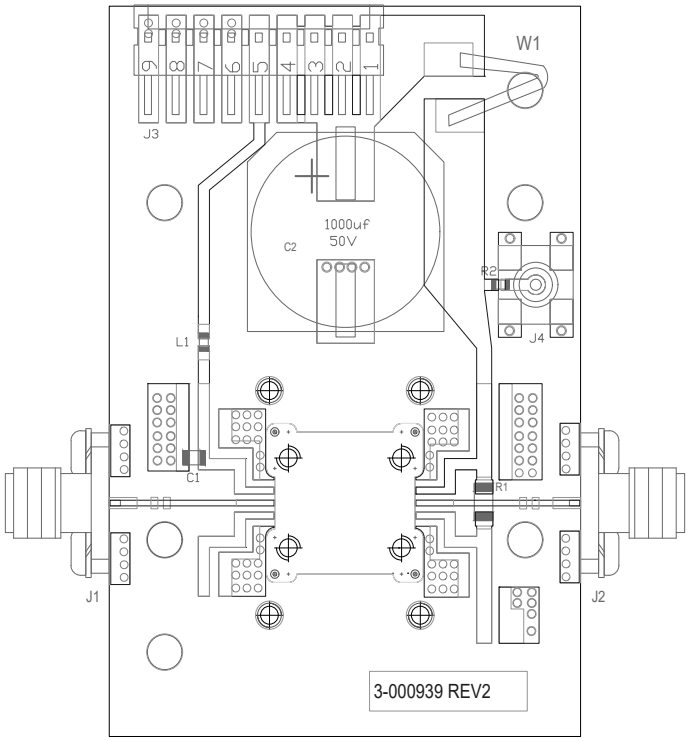
Designator	Description	Qty
L1	FERRITE, 22 OHM, 0805	1
R1	RES, 1/8W, 1206, 5%, 0 OHM	1
R2	RES, 1/16W, 0603, 5%, 10K	1
C1	CAP, 15000pF, 100V, 0805, X7R	1
C2	CAP, 1000µF, 20%, 50V, ELECT, MVY, SMD	1
W1	CABLE, 18 AWG, 4.2	1
J4	CONNECTOR; SMB, Straight JACK, SMD	1
J1,J2	CONN, N, FEM, W/.500 SMA FLNG	2
J3	DC CONN, HEADER RT>PLZ .1CEN LK 9POS	1
Q1	CMPA2735075F1	1
	2-56 SOC HD SCREW 1/4 SS (For Device)	4
	WIRE ASSEMBLY, 9-PIN, TEST FIXTURE	1
	LEAD CLAMP, DELRIN	2
	2-56 SOC HD SCREW 1/2 SS (For Clamps)	4
	INDIUM TIM, AL CLAD, .47”x .30” x .003”	1
	TEST FIXTURE INSTRUCTIONS	1

CMPA2735075F1-AMP Demonstration Amplifier Circuit Bill of Materials

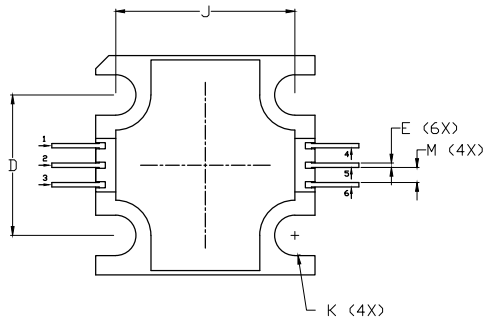
CMPA2735075F1-AMP Demonstration Amplifier Circuit Schematic

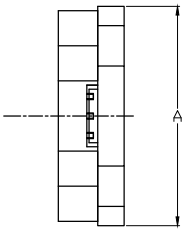


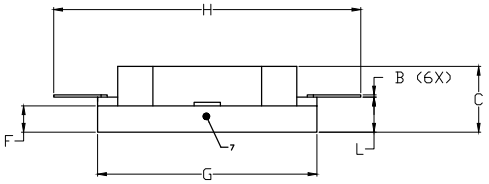
CMPA2735075F1-AMP Demonstration Amplifier Circuit Outline

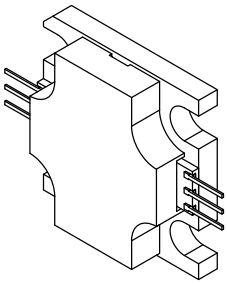


Product Dimensions CMPA2735075F1 (Package Type — 440219)

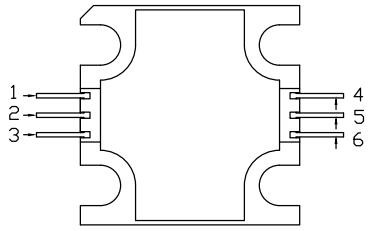








NOT TO SCALE



PIN	Function
1	Gate
2	RF In
3	Gate
4	Drain
5	RF Out
6	Drain
7	Source

NOTES:

1. DIMENSIONING AND TOLERANICING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. ADHESIVE FROM LID MAY EXTEND A MAXIMUM OF 0.020" BEYOND EDGE OF LID.
4. LID MAY BE MISALIGNED TO THE BODY OF THE PACKAGE BY A MAXIMUM OF 0.008" IN ANY DIRECTION.
5. ALL PLATED SURFACES ARE NI/AU

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.495	0.505	12.57	12.82
B	0.003	0.005	0.076	0.127
C	0.140	0.160	3.56	4.06
D	0.315	0.325	8.00	8.25
E	0.008	0.012	0.204	0.304
F	0.055	0.065	1.40	1.65
G	0.495	0.505	12.57	12.82
H	0.695	0.705	17.65	17.91
J	0.403	0.413	10.24	10.49
K	ø .092		2.34	
L	0.075	0.085	1.905	2.159
M	0.032	0.040	0.82	1.02

Part Number System

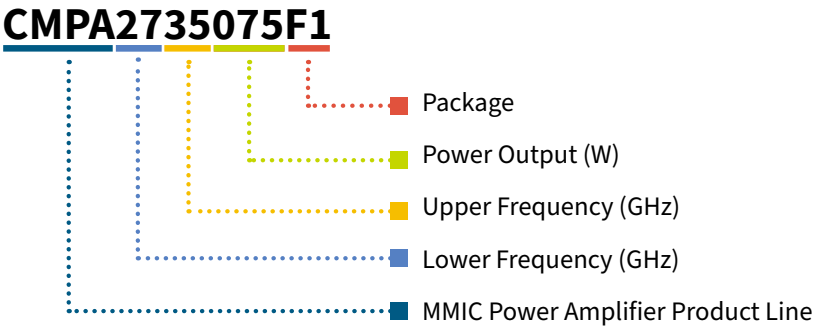


Table 1.

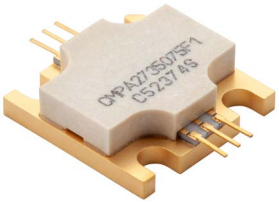
Parameter	Value	Units
Lower Frequency	2.7	GHz
Upper Frequency	3.5	
Power Output	75	W
Package	Flange	–

Note:
[1] Alpha characters used in frequency code indicate a value greater than 9.9 GHz. See Table 2 for value

Table 2.

Character Code	Code Value
A	0
B	1
C	2
D	3
E	4
F	5
G	6
H	7
J	8
K	9
Examples	1A = 10.0 GHz 2H = 27.0 GHz

Product Ordering Information

Order Number	Description	Unit of Measure	Image
CMPA2735075F1	GaN HEMT	Each	
CMPA2735075F1-AMP	Test board with GaN HEMT installed	Each	

Notes & Disclaimer

These materials are provided in connection with MACOM’s products as a service to its customers and may be used for informational purposes only. Except as provided in its Terms and Conditions of Sale or any separate agreement, MACOM assumes no liability or responsibility whatsoever, including for (i) errors or omissions in these materials; (ii) failure to update these materials; or (iii) conflicts or incompatibilities arising from future changes to specifications and product descriptions, which MACOM may make at any time, without notice. These materials grant no license, express or implied, to any intellectual property rights.

THESE MATERIALS ARE PROVIDED "AS IS" WITH NO WARRANTY OR LIABILITY, EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHT, ACCURACY OR COMPLETENESS, OR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

MACOM:

CMPA2735075F CMPA2735075F1-AMP CMPA2735075F1