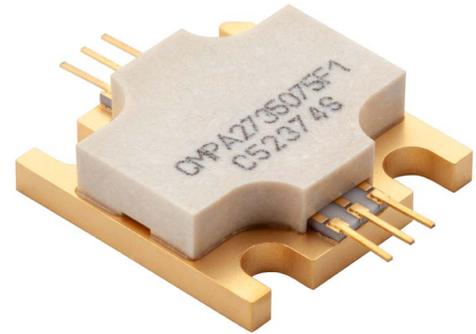


# CMPA2735075F1

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

## 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.



Package Type: 440219  
PN: CMPA2735075F1

## Typical Performance Over 2.7 - 3.5 GHz ( $T_c = 25^\circ\text{C}$ )

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

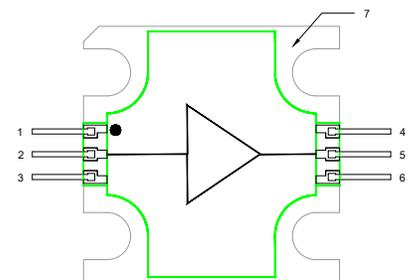
$P_{IN} = 28 \text{ dBm}$

### 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



### 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	$\tau$	40	in-oz	
Thermal Resistance, Junction to Case (packaged) <sup>1</sup>	$R_{\theta JC}$	0.77	°C/W	300µsec, 20%, 85°C
Thermal Resistance, Junction to Case (packaged) <sup>2</sup>		2.0		CW, 85°C

Notes:

<sup>1</sup> Measured for the CMPA2735075F1 at  $P_{DISS} = 64$  W (pulsed)

<sup>2</sup> Measured for the CMPA2735075F1 at  $P_{DISS} = 56$  W (CW)

### Electrical Characteristics (Frequency = 2.7 GHz to 3.5 GHz unless otherwise stated; $T_c = 25^\circ\text{C}$ )

Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
<b>DC Characteristics</b>						
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 <sup>1</sup>	$I_{DS}$	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
<b>RF Characteristics<sup>2,3</sup></b>						
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	$\Psi$	

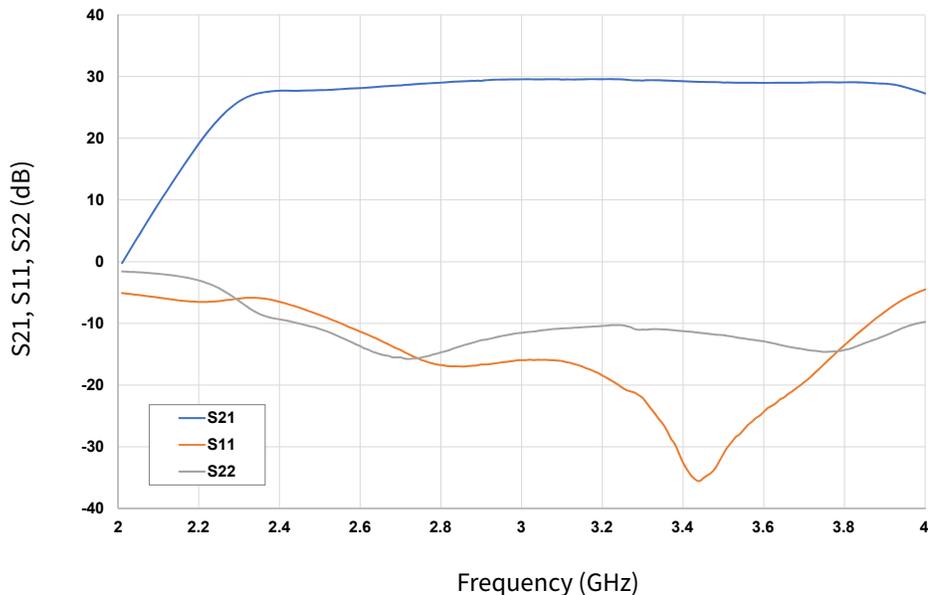
Notes:

<sup>1</sup> Scaled from PCM data

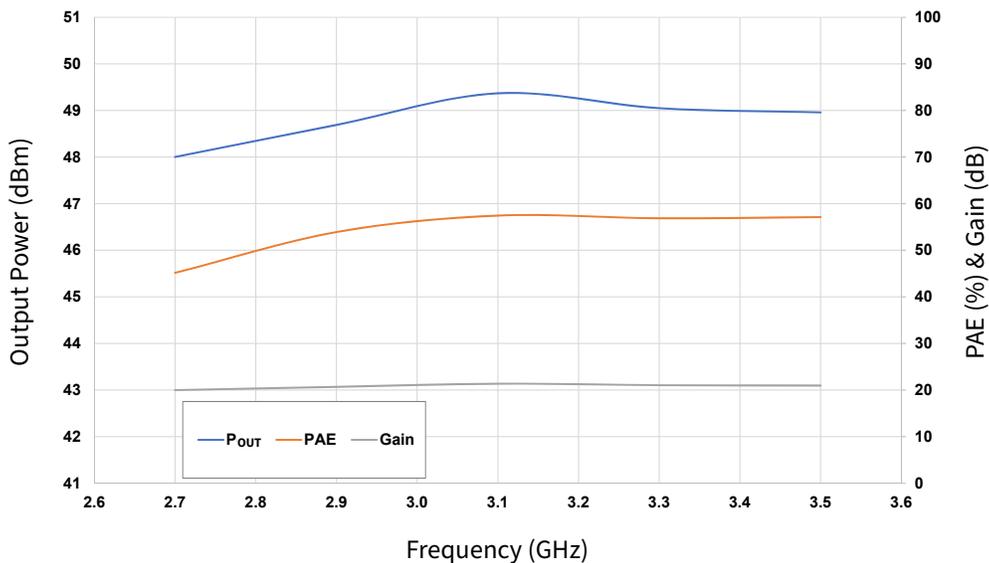
<sup>2</sup> All data pulse tested in CMPA2735075F1-AMP

<sup>3</sup> Pulse Width = 300µs, Duty Cycle = 20%

**Typical Performance of the CMPA2735075F1**

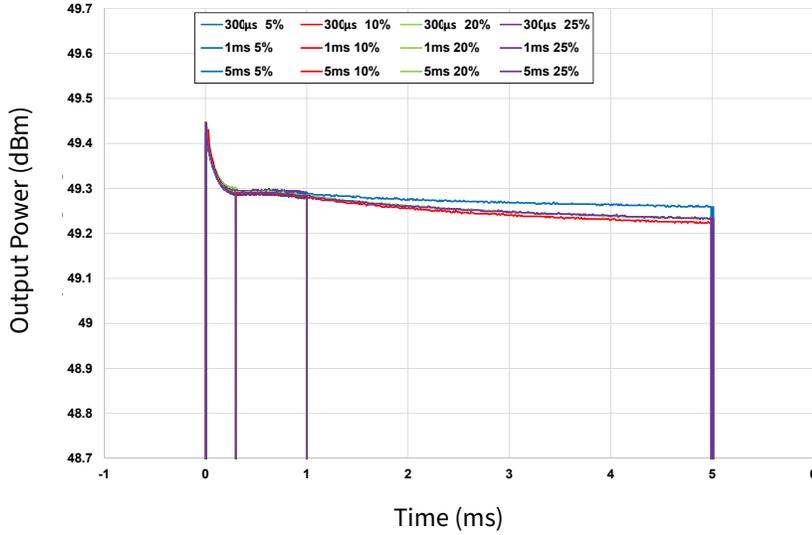


**Figure 1.** Gain and Return Losses vs Frequency of the CMPA2735075F1 Measured in CMPA2735075F1-AMP Amplifier Circuit  
 $V_{DS} = 28\text{ V}$ ,  $I_{DS} = 800\text{ mA}$



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

### 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

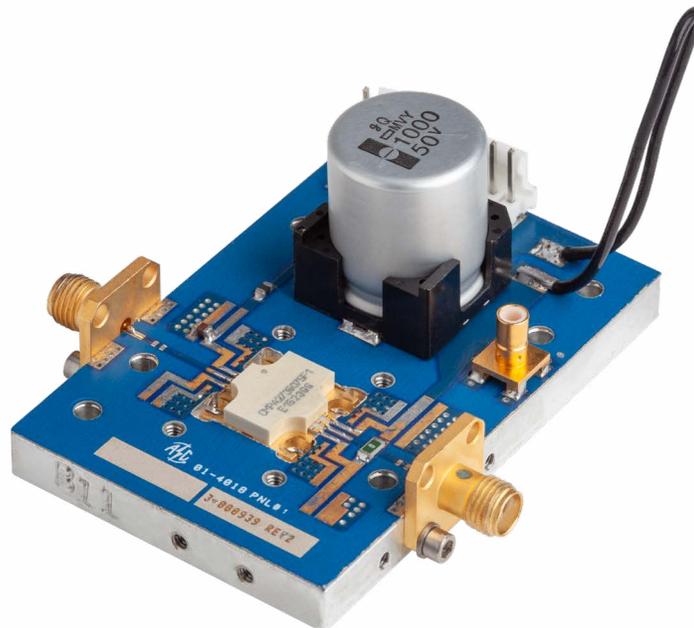
### Electrostatic Discharge (ESD) Classifications

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

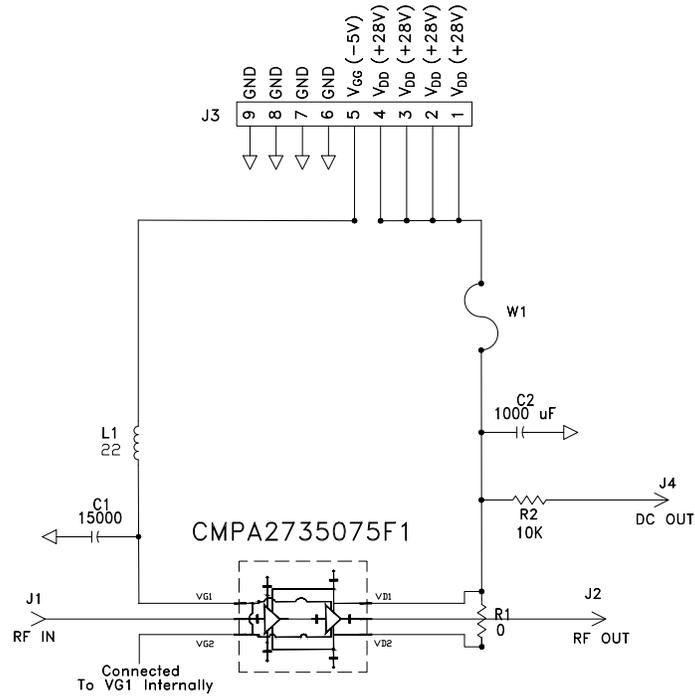
**CGHV37400F-AMP Application Circuit Bill of Materials**

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, MCV, 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

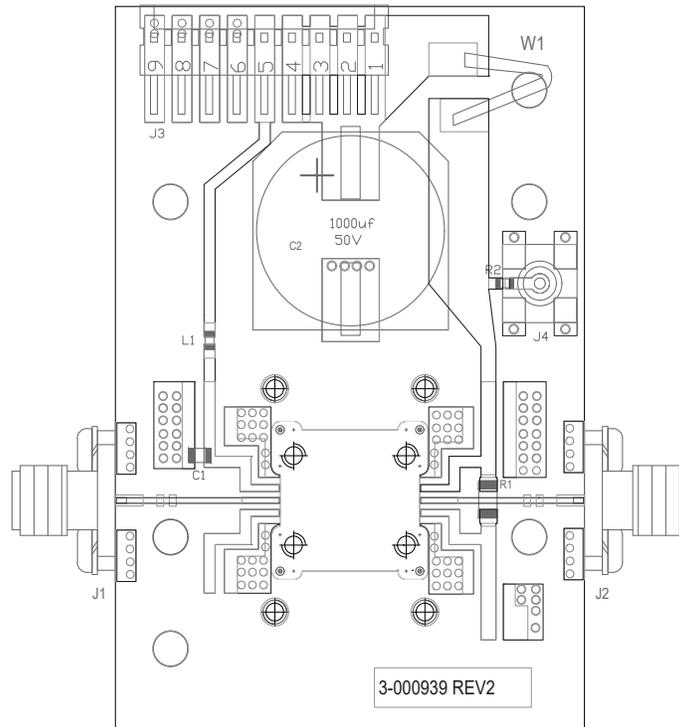
**CMPA2735075F1-AMP Demonstration Amplifier Circuit Bill of Materials**



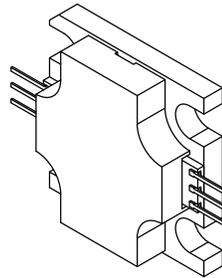
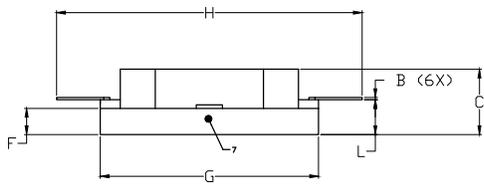
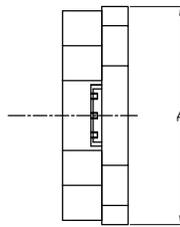
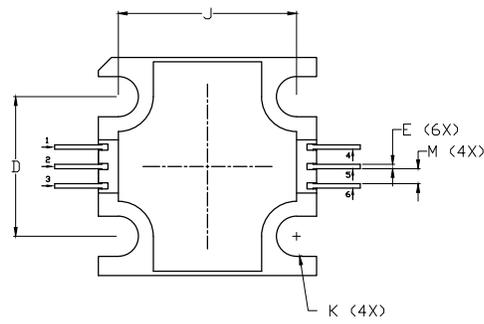
### CMPA2735075F1-AMP Demonstration Amplifier Circuit Schematic



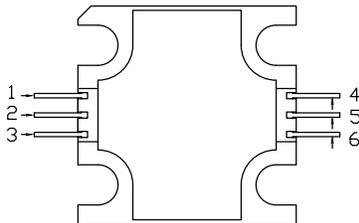
### CMPA2735075F1-AMP Demonstration Amplifier Circuit Outline



**Product Dimensions CMPA2735075F1 (Package Type – 440219)**



NOT TO SCALE



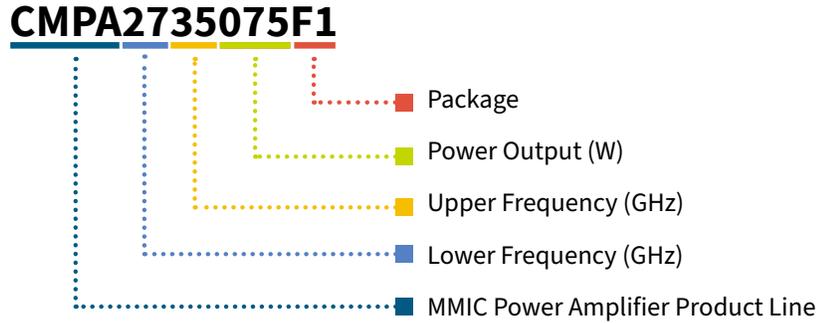
NOTES:

1. DIMENSIONING AND TOLERANCING 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

DIM	INCHES		MILLIMETERS	
	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	∅ .092		2.34	
L	0.075	0.085	1.905	2.159
M	0.032	0.040	0.82	1.02

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

**Part Number System**



**Table 1.**

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

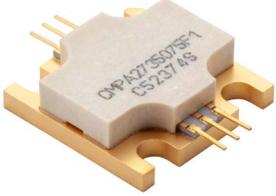
Note:

<sup>1</sup> 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

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