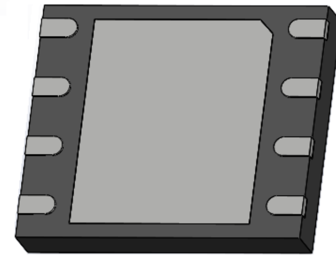
Dynax

DF1G0010-16N

RF GaN POWER AMPLIFIER for Wireless Infrastructure

20 – 1000 MHz, 12.5 W,
RF GaN POWER AMPLIFIER

DF1G0010-16N is a 12.5 W RF GaN HEMT Transistor with first generation RF GaN technology from Dynax, which is ideal for 20 MHz to 1000 MHz ultra wideband applications. It features fully input matching.



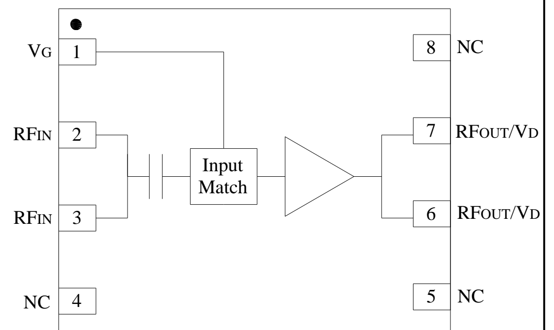
Package Type: DFN 6×5mm

Applications

- Wideband or Narrowband Amplifiers
- Test Instrumentations

Typical RF Performance [1]

- Frequency: 20 – 1000 MHz
- Saturation Output Power: 12.5 W
- Saturation Drain Efficiency: 66% @650MHz
- Small Signal Gain: 18 dB @650MHz



(Top View)
Figure 1. Pin Connection

Note:

[1] Typical Performance in Dynax DF1G0010-16N Class AB Demo with the device soldered onto the heatsink, test condition: V_{DD} = 28 V, I_{DQ} = 90 mA, Input signal Pulsed CW, Pulse Width = 100 µs, Duty Cycle = 10 %.

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Table 1. Maximum Ratings

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DSS}	150	V
Gate-Source Voltage	V_{GS}	-10 ~ +2	V
Operating Voltage	V_{DD}	0 ~ +55	V
Maximum Forward Gate Current	I_{GMAX}	3.2	mA
Storage Temperature Range	T_{STG}	-65 ~ +150	℃
Operating Junction Temperature	T_J	225	℃
Absolute Maximum Channel Temperature [2]	T_{MAX}	275	℃

[2] Functional operation above 225℃ has not been characterized and is not implied. Operation at T_{MAX} (275℃) reduces median time to failure by an order of magnitude; Operation beyond T_{MAX} could cause permanent damage.

Table 2. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance at Average Power by Infrared Measurement, Active Die Surface-to-Case $T_{base\text{-}plate}$ = 85℃, P_D = TBD	$R_{thjc(IR)}$	TBD	℃/W
Thermal Resistance at Average Power by Finite Element Analysis, Junction-to-Case $T_{base\text{-}plate}$ = 85℃, P_D = TBD	$R_{thjc(FEA)}$	TBD	℃/W

Table 3. Ordering Information

Device	Package Type	Marking
DF1G0010-16N	DFN 6×5mm	DU16A

Table 4. Bias Sequences

Bias-up Sequence	Bias-down Sequence
Set V_{GS} to -5 V	Turn off RF power
Turn on V_{DS} to 28 V	Reduce V_{DS} down to 0 V
Increase V_{GS} until I_{DS} current is attained	Turn off V_{GS}
Apply RF input power	

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Table 5. Electrical Characteristics (T_A = 25 ℃ unless otherwise noted)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
DC Characteristics (measured on wafer prior to packaging)					
Drain-Source Leakage Current (V_{GS} = -10 V, V_{DS} = 150 V)	I_{DSS}	-	-	3.2	mA
Drain-Source Breakdown Voltage (V_{GS} = -10 V, I_D = 3.2 mA)	$V_{(BR)DSS}$	150	-	-	V
Gate Threshold Voltage (V_{DS} = 28 V, I_D = 3.2 mA)	$V_{GS(th)}$	-4.0	-3.2	-1.0	V
Gate Quiescent Voltage (V_{DD} = 28 V, I_D = 90 mA)	$V_{GS(Q)}$	-	-3.0	-	V
RF Characteristics					
Typical Performance [3]					
Saturation Output Power	P_{sat}	-	12.5	-	W
Saturation Drain Efficiency	η_D	-	66	-	%
Power Gain	G_P	-	18	-	dB
Gain Flatness	G_F	-	3	-	dB

[3] Typical Performance in Dynax DF1G0010-16N Class AB Demo with the device soldered onto the heatsink, test condition: V_{DD} = 28 V, I_{DQ} = 90 mA, f = 20 – 1000 MHz, Input signal Pulsed CW, Pulse Width = 100 μs, Duty Cycle = 10 %.

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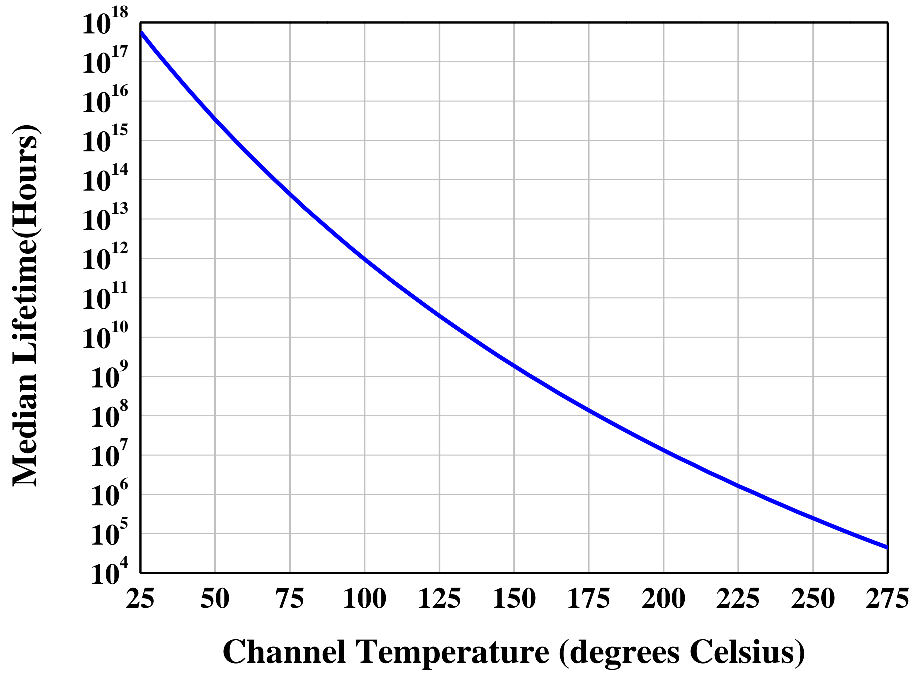

Figure 2. Median Lifetime vs. Channel Temperature

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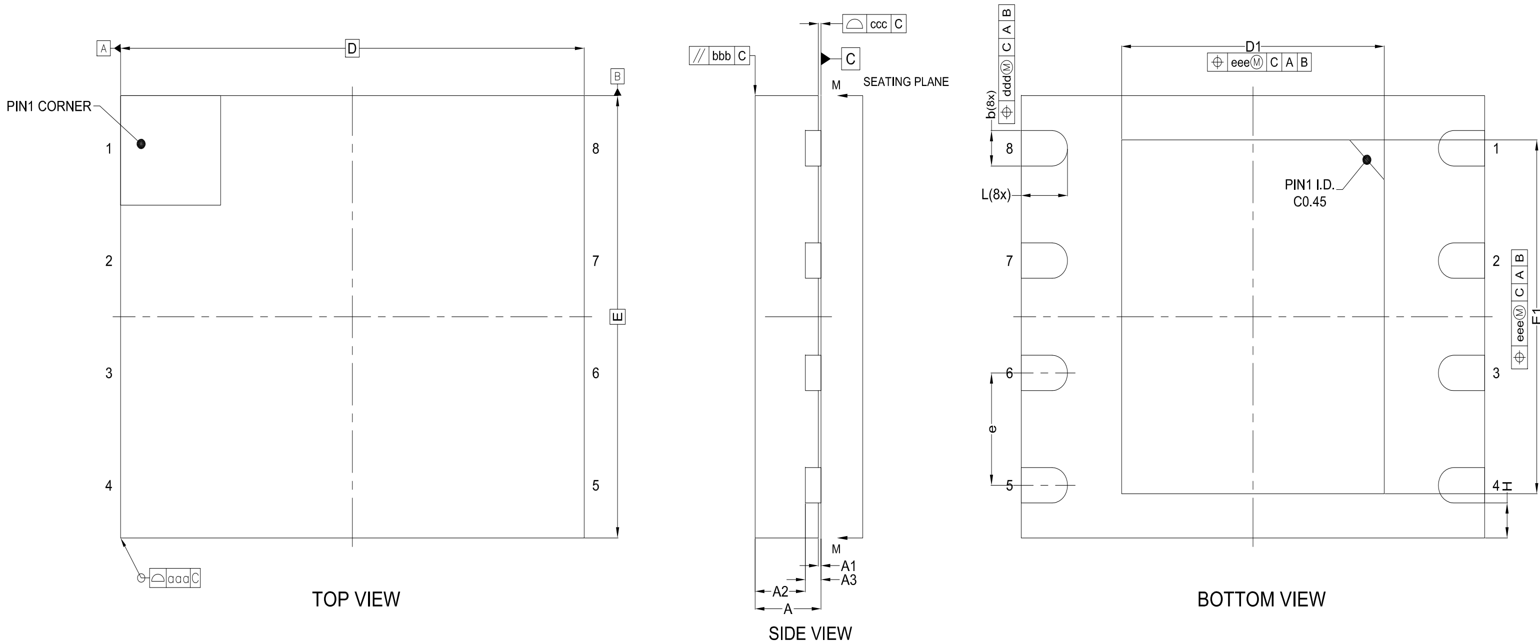
Package Dimensions

Package Type: DFN 6×5mm



DESCRIPTION		SYMBOL	MILLIMETER		
			MIN	NOM	MAX
TOTAL THICKNESS		A	0.80	0.85	0.90
STAND OFF		A1	0.00	---	0.05
MOLD THICKNESS		A2	0.60	0.65	0.70
L/F THICKNESS		A3	0.203 REF		
BODY SIZE	X	D	5.90	6.00	6.10
	Y	E	4.90	5.00	5.10
LEAD PITCH		e	1.27 BSC		
LEAD WIDTH		b	0.35	0.40	0.45
LEAD LENGTH		L	0.55	0.60	0.65
EP SIZE	X	D1	3.35	3.40	3.45
	Y	E1	3.95	4.00	4.05
LEAD EDGD TO PKG EDGE		H	0.395 BSC		
TOLERANCE OF FORM AND POSITION					
GEOMETRIC TOLERANCE		aaa	0.10		
MOLD FLATNESS		bbb	0.10		
LEAD COPLANARITY		ccc	0.08		
LEAD POSITION OFFSET		ddd	0.10		
EXPOSED PAD OFFSET		eee	0.10		

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Product Documentation and Software

Refer to the following resources to aid your design process.

Application Notes

- AN_02: User Guide for GaN HEMT Transistor

Document Revision History

The following table summarizes revisions to this document.

Status	Revision	Date	Description
Objective datasheet	V01	08/23/2021	Initial version.
Objective datasheet	V02	11/04/2021	Update typical RF performance and POD drawing.

Abbreviations

Acronym	Description
CW	Continuous Waveform
GaN	Gallium Nitride
HEMT	High Electron Mobility Transistor
MTTF	Median Time To Failure
VSWR	Voltage Standing-Wave Ratio

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