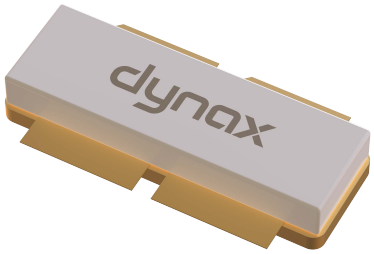
DOD1H2425-600EF

RF Power GaN Transistor



1. Product profile

1.1 General description

DOD1H2425-600EF is a 600 W RF GaN HEMT Transistor with first generation RF GaN technology from Dynax, which is ideal for industrial, scientific and medical applications at frequencies from 2400 MHz to 2500 MHz.

Table 1. Typical performance [1]

Freq (MHz)	P_{sat} (dBm)	η_D (%) @P_{sat} dBm	G_P (dB) @57.4 dBm	η_D (%) @57.4 dBm
2435	57.95	73.7	15.1	72.5
2450	57.90	73.4	15.0	72.5
2465	57.90	73.5	14.9	72.6

[1] Typical performance in Dynax Demo with the device soldered onto the heatsink, test condition: V_{DS} = 50 V, V_{GS} = -4.8 V; Input signal CW.

1.2 Features and benefits

- High Efficiency
- Internally matched for ease of use
- Low thermal resistance providing excellent thermal stability
- Excellent ruggedness
- Excellent reliability

1.3 Applications

- Industry heating
- Welding and heat sealing
- Plasma generation
- Lighting
- Scientific instrumentation
- Medical: Microwave ablation and Diathermy

1.4 Lead-free and RoHS compliant

2. Pinning information

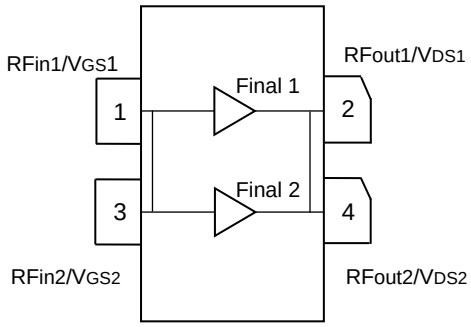


Fig 1. Pin configuration (Top view)

3. Ordering information

Table 2. Ordering information

Part number	Marking	Package type	Packaging information
DOD1H2425-600EF	DOD1H2425-600EF	1230P2BA	Tray: Suffix = 22 units
			Tape and Reel: Suffix = 100 units; 44 mm Tape width; 13-inch Reel

4. Maximum ratings

Table 3. Maximum ratings

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DSS}	150	V
Gate-Source Voltage	V_{GS}	-10 ~ +2	V
Operating Voltage	V_{DS}	0 ~ +55	V
Maximum Forward Gate Current	I_{GMAX}	106.6	mA
Storage Temperature Range	T_{STG}	- 65 ~ +150	℃
Operating Junction Temperature	T_J	225	℃
Absolute Maximum Channel Temperature [1]	T_{MAX}	275	℃

[1] 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.

5. Thermal characteristics

Table 4. Thermal characteristics

Parameter	Symbol	Value	Unit
Final 1			
Thermal Resistance at Average Power by Infrared Measurement, Active Die Surface-to-Case $T_{base\text{-}plate}$ = 85℃, P_D = 116.0 W	R_{thjc}(IR)	0.5	℃/W
Thermal Resistance at Average Power by Finite Element Analysis, Junction-to-Case $T_{base\text{-}plate}$ = 85℃, P_D = 116.0 W	R_{thjc}(FEA)	0.7	℃/W
Final 2			
Thermal Resistance at Average Power by Infrared Measurement, Active Die Surface-to-Case $T_{base\text{-}plate}$ = 85℃, P_D = 116.0 W	R_{thjc}(IR)	0.5	℃/W
Thermal Resistance at Average Power by Finite Element Analysis, Junction-to-Case $T_{base\text{-}plate}$ = 85℃, P_D = 116.0 W	R_{thjc}(FEA)	0.7	℃/W

6. ESD protection characteristics

Table 5. ESD protection characteristics

Test methodology	Class
Human Body Model (per JS-001-2012)	1C (≥ 1000 V)
Charged Device Model (per JESD22-C101F)	C3 (≥ 1000 V)

7. Moisture sensitivity level

Table 6. Moisture sensitivity level

Test methodology	Class
Moisture Sensitivity Level (per J-STD-020)	Level 1

8. Electrical characteristics (TA = 25℃ unless otherwise noted)

Table 7. DC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Final 1					
Drain-Source Leakage Current (V_{GS} = -10 V, V_{DS} = 150 V)	I_{DSS}	-	-	53.3	mA
Drain-Source Breakdown Voltage (V_{GS} = -10 V, I_D = 53.3 mA)	$V_{(BR)DSS}$	150	-	-	V
Gate Threshold Voltage (V_{DS} = 50 V, I_D = 53.3 mA)	$V_{GS(th)}$	-4.0	-2.9	-1.0	V
Gate Quiescent Voltage (V_{DS} = 50 V, I_D = 800 mA)	$V_{GS(Q)}$	-	-2.7	-	V
Final 2					
Drain-Source Leakage Current (V_{GS} = -10 V, V_{DS} = 150 V)	I_{DSS}	-	-	53.3	mA
Drain-Source Breakdown Voltage (V_{GS} = -10 V, I_D = 53.3 mA)	$V_{(BR)DSS}$	150	-	-	V
Gate Threshold Voltage (V_{DS} = 50 V, I_D = 53.3 mA)	$V_{GS(th)}$	-4.0	-2.9	-1.0	V
Gate Quiescent Voltage (V_{DS} = 50 V, I_D = 800 mA)	$V_{GS(Q)}$	-	-2.7	-	V

Table 8. RF characteristics (Typical performance – 2450 MHz) [1]

Parameter	Symbol	Min.	Typ.	Max.	Unit
Peak Output Power	P_{sat}	56.05	56.95	-	dBm
Drain Efficiency [2]	η_D	62.40	70.40	-	%
Power Gain [2]	G_P	13.10	14.70	16.30	dB

[1] Typical performance in Dynax DOD1H2425-600EF production test fixture, test condition: V_{DS} = 50 V, V_{GS} = V_{th} - $V_{g\text{-}offset}$, $V_{g\text{-}offset}$ = 1.7 V, Input signal Pulsed CW, Pulse width = 100 µs, Duty cycle = 10 %.

2 Measured at P_{out} = P_{target}.

Table 9. Load mismatch

Parameter	Result
VSWR 10:1 at V_{DS} = 50 V, 600 W Pulsed CW output power, Pulse width = 100 µs, Duty cycle = 10%.	No device damage

9. Test information

9.1 Typical application circuit

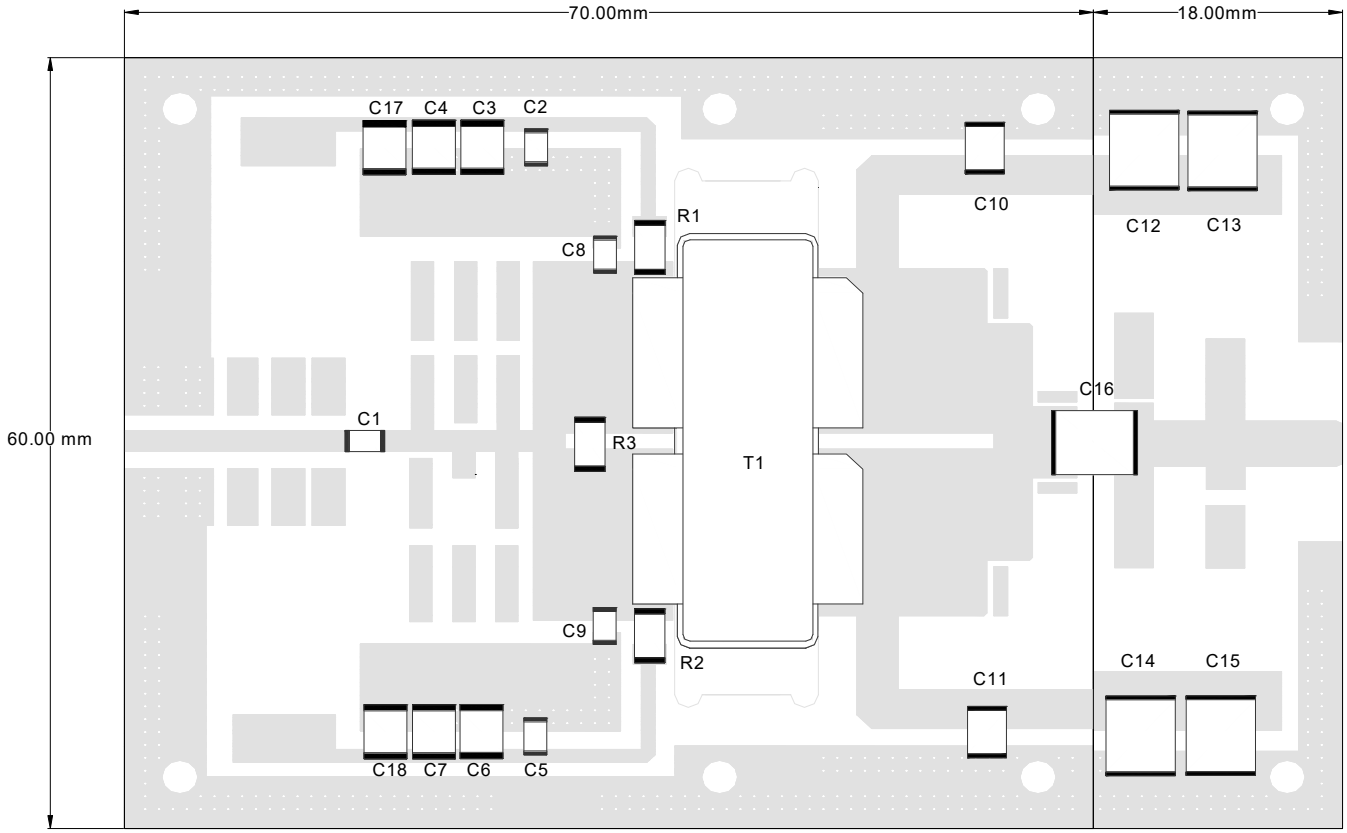


Fig 2. Component layout

Table 10. List of components

S/N	Type	Designator	Description	Value	Vendor
1	Cap	C1,C2,C5	ATC600F100JT250XT	10 pF	ATC
2	Cap	C8,C9	ATC600F0R9JT250XT	0.9 PF	ATC
3	Cap	C3,C4,C6,C7,C17,C18	GRM31CZ72A475KE	4.7 uF	Murata
4	Cap	C10,C11	ATC100B100JTDC7	10 pF	ATC
5	Cap	C12,C13,C14,C15	C5750X7S2A106KT	10 uF	TDK
6	Cap	C16	MIN02-002CC120	12 pF	CDE
7	Res	R1,R2,R3	RC1206FR_0710RL	10 Ω	Yageo
8	Transistor	T1	DOD1H2425-600EF	/	Dynax
9	PCB	/	Rogers TC 350	30 mil & 60 mil	Rogers

9.2 Graphic data

9.2.1 Pulse CW

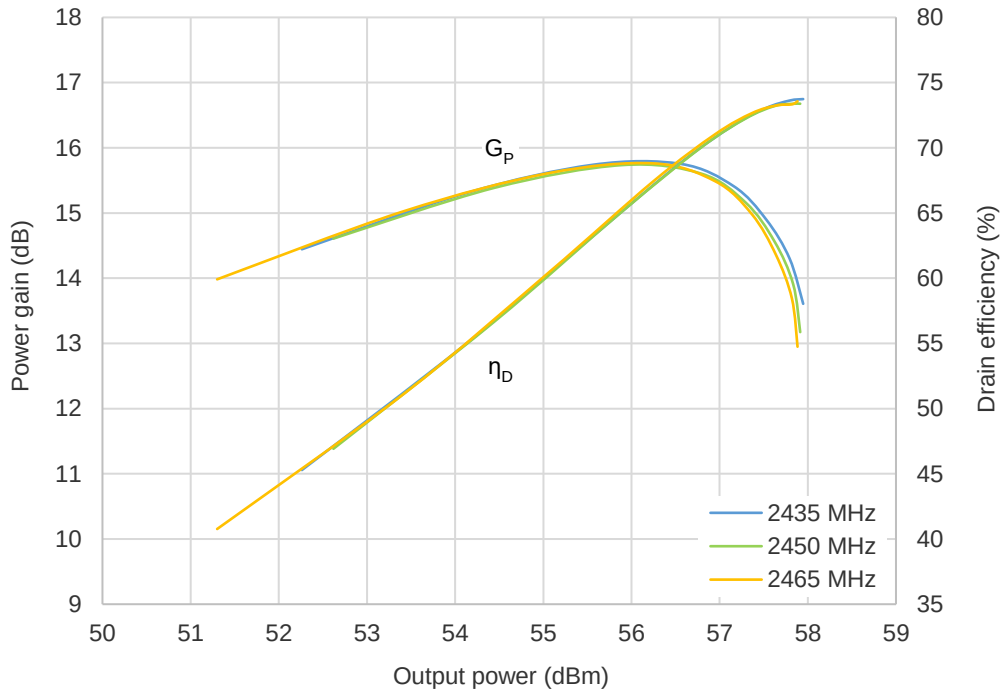


Fig 3. Power gain, Drain efficiency vs. Pulse output power

10. Impedance information

Table 11. Typical impedance of final1 [1]

Maximum Output Power						
Freq (MHz)	Z_S (Ω)	Z_L (Ω)	G_P (dB)	P_{sat} (dBm)	P_{sat} (W)	η_D (%)
2400	4.1 - j5.7	1.9 - j5.3	20.8	56.3	426.6	65.6
2500	4.6 - j3.9	1.7 - j6.6	20.8	56.3	426.1	64.2
Maximum Drain Efficiency						
Freq (MHz)	Z_S (Ω)	Z_L (Ω)	G_P (dB)	P_{sat} (dBm)	P_{sat} (W)	η_D (%)
2400	4.1 - j5.7	3.0 - j3.3	22.2	53.8	239.9	77.3
2500	4.6 - j3.9	2.4 - j3.9	23.0	53.6	229.1	77.8

Table 12. Typical impedance of final2 [1]

Maximum Output Power						
Freq (MHz)	Z_S (Ω)	Z_L (Ω)	G_P (dB)	P_{sat} (dBm)	P_{sat} (W)	η_D (%)
2400	4.1 - j5.7	1.9 - j5.3	20.8	56.3	426.6	65.6
2500	4.6 - j3.9	1.7 - j6.6	20.8	56.3	426.1	64.2
Maximum Drain Efficiency						
Freq (MHz)	Z_S (Ω)	Z_L (Ω)	G_P (dB)	P_{sat} (dBm)	P_{sat} (W)	η_D (%)
2400	4.1 - j5.7	3.0 - j3.3	22.2	53.8	239.9	77.3
2500	4.6 - j3.9	2.4 - j3.9	23.0	53.6	229.1	77.8

[1] V_{DS} = 48 V, I_{DQA} = 800 mA, Pulsed CW, Pulse Width = 100 µs, Duty Cycle = 10 %.

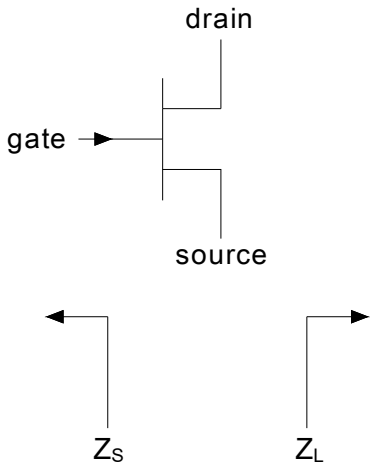


Fig 4. Definition of transistor impedance

11. Median lifetime

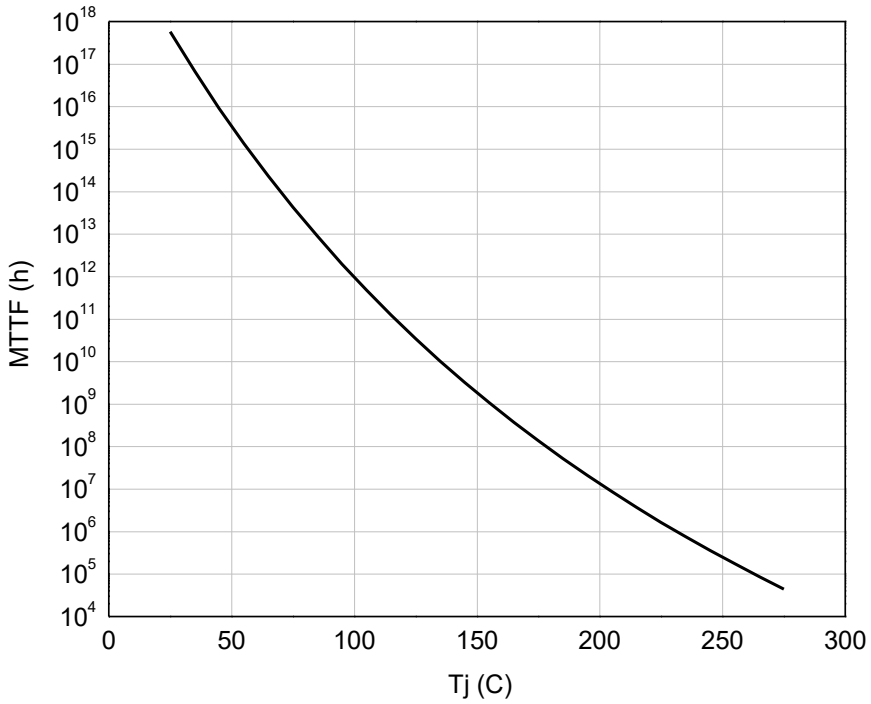


Fig 5. Median lifetime vs. channel temperature

12. Package outline

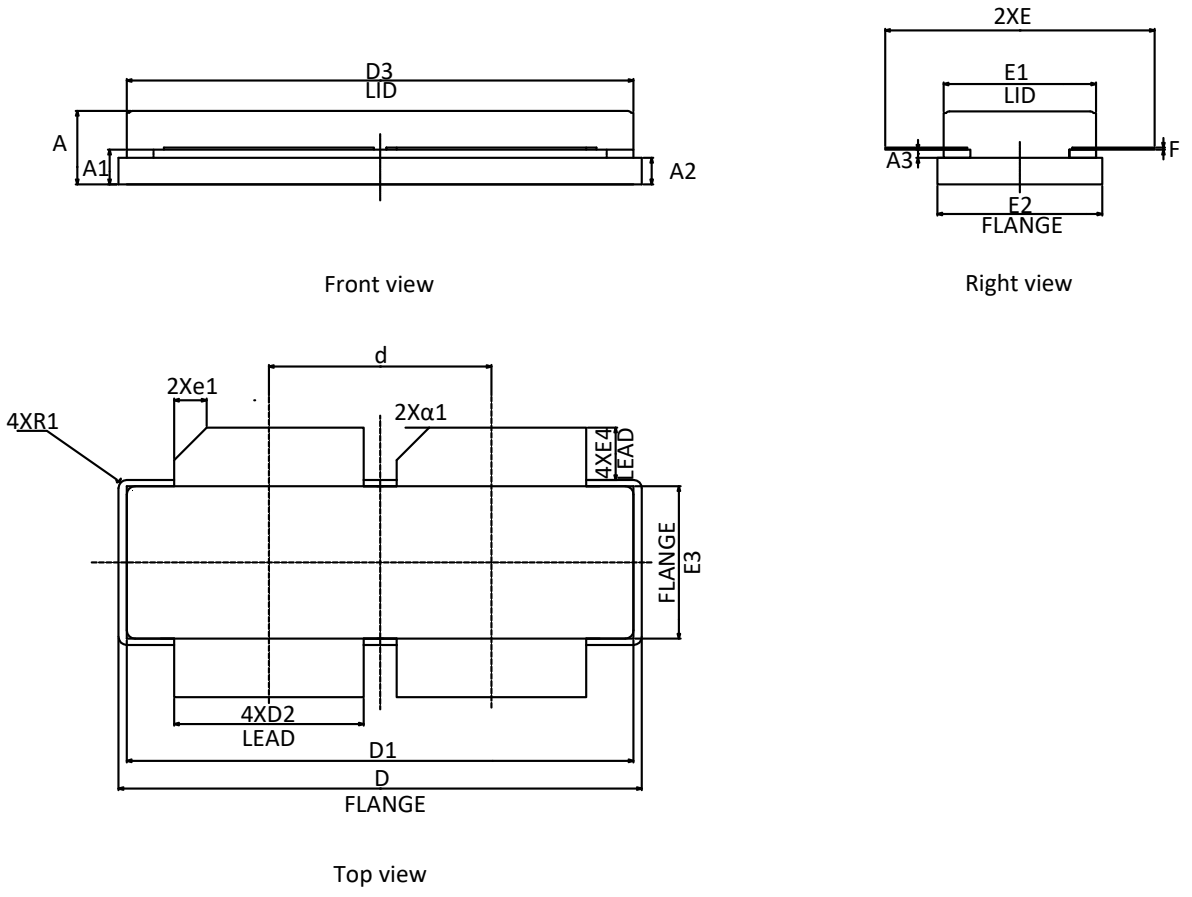


Fig 6. Package outline —— 1230P2BA

Table 13. Package dimensions

DIM	INCH			MILLIMETER		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.165	0.178	0.191	4.18	4.52	4.85
A1	0.079	0.084	0.089	2.00	2.13	2.26
A2	0.059	0.064	0.069	1.50	1.63	1.76
A3	0.015	0.020	0.025	0.38	0.51	0.64
D	1.265	1.270	1.275	32.13	32.26	32.39
D1	1.217	1.228	1.240	30.90	31.20	31.50
D2	0.455	0.460	0.465	11.55	11.68	11.81
D3	1.218	1.230	1.242	30.94	31.24	31.55
d	0.535	0.540	0.545	13.59	13.72	13.85
E	0.635	0.654	0.674	16.12	16.62	17.12
E1	0.366	0.370	0.374	9.30	9.40	9.50
E2	0.395	0.400	0.405	10.03	10.16	10.29
E3	0.365	0.370	0.375	9.27	9.40	9.53

(Continued)

DIM	INCH			MILLIMETER		
	MIN	Nom	MAX	MIN	Nom	MAX
E4	0.117	0.127	0.137	2.98	3.23	3.48
F	0.004	0.006	0.007	0.10	0.15	0.18
R1	0.028	0.031	0.035	0.70	0.80	0.90
e1	0.075	0.079	0.083	1.90	2.00	2.10
α1	45° REF					

13. Abbreviations

Table 14. Abbreviations

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

14. Legal information

14.1 Datasheet status

Document status	Product status	Definition
Objective [short] datasheet	Engineering sample	This document contains data from the objective specification for product development.
Preliminary [short] datasheet	Engineering sample	This document contains data from the preliminary specification.
Production [short] datasheet	Mass product	This document contains the product specification.

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