DOD1H0015-1800EF

RF Power GaN Transistor

1. Product profile

1.1 General description

DOD1H0015-1800EF is a 1800 W RF GaN HEMT Transistor with first generation RF GaN technology from Dynax, which is ideal for RF energy applications at frequencies from DC to 1500 MHz.

Table 1. Typical performance [1]

Freq (MHz)	P_{sat} (dBm)	η_D@61.4dBm (%)	G_P@56.0dBm (dB)
650	61.4	83.6	22.0

[1] Typical performance in Dynax Demo with the device soldered onto the heatsink, test condition: V_{DS} = 50 V, I_{DQ} = 200 mA, test signal is 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

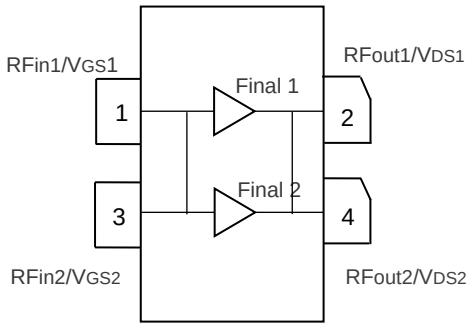

Fig 1. Pin configuration (Top view)

3. Ordering information

Table 2. Ordering information

Part number	Marking	Package type
DOD1H0015-1800EF	DOD1H0015-1800EF	1230P2BA

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}	249.6	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 = 179.5W	R_{thjc}(IR)	0.33	℃/W
Thermal Resistance at Average Power by Finite Element Analysis, Junction-to-Case $T_{base\text{-}plate}$ = 85 ℃, P_D = 179.5W	R_{thjc}(FEA)	0.44	℃/W
Final 2			
Thermal Resistance at Average Power by Infrared Measurement, Active Die Surface-to-Case $T_{base\text{-}plate}$ = 85 ℃, P_D = 179.5W	R_{thjc}(IR)	0.33	℃/W
Thermal Resistance at Average Power by Finite Element Analysis, Junction-to-Case $T_{base\text{-}plate}$ = 85 ℃, P_D = 179.5W	R_{thjc}(FEA)	0.44	℃/W

6. ESD protection characteristics

Table 5. ESD protection characteristics

Test methodology	Class
Human Body Model (per JS-001-2012)	1B (≥ 500 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 5. DC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Final 1					
Drain-Source Leakage Current (V_{GS} = -10 V, V_{DS} = 150 V)	I_{DSS}	-	-	124.8	mA
Drain-Source Breakdown Voltage (V_{GS} = -10 V, I_D = 124.8 mA)	$V_{(BR)DSS}$	150	-	-	V
Gate Threshold Voltage (V_{DS} = 50 V, I_D = 124.8 mA)	$V_{GS(th)}$	-4.0	-2.9	-1.0	V
Gate Quiescent Voltage (V_{DS} = 50 V, I_D = 200 mA)	$V_{GS(Q)}$	-	-2.8	-	V
Final 2					
Drain-Source Leakage Current (V_{GS} = -10 V, V_{DS} = 150 V)	I_{DSS}	-	-	124.8	mA
Drain-Source Breakdown Voltage (V_{GS} = -10 V, I_D = 124.8 mA)	$V_{(BR)DSS}$	150	-	-	V
Gate Threshold Voltage (V_{DS} = 50 V, I_D = 124.8 mA)	$V_{GS(th)}$	-4.0	-2.9	-1.0	V
Gate Quiescent Voltage (V_{DS} = 50 V, I_D = 200 mA)	$V_{GS(Q)}$	-	-2.8	-	V

Table 8. RF characteristics (Typical performance – 915 MHz) [1]

Parameter	Symbol	Min.	Typ.	Max.	Unit
Peak Output Power	P_{sat}	60.05	60.95	-	dBm
Drain Efficiency	η_D	72.00	80.00	-	%
Power Gain	G_P	19.90	21.50	23.10	dB

[1] Typical performance in Dynax DOD1H0015-1800EF production test fixture, test condition: VDS = 48 V, IDQ=200mA, Input signal Pulsed CW, Pulse width = 100 μs, Duty cycle = 10 %.

9. Test information

9.1 Typical application circuit

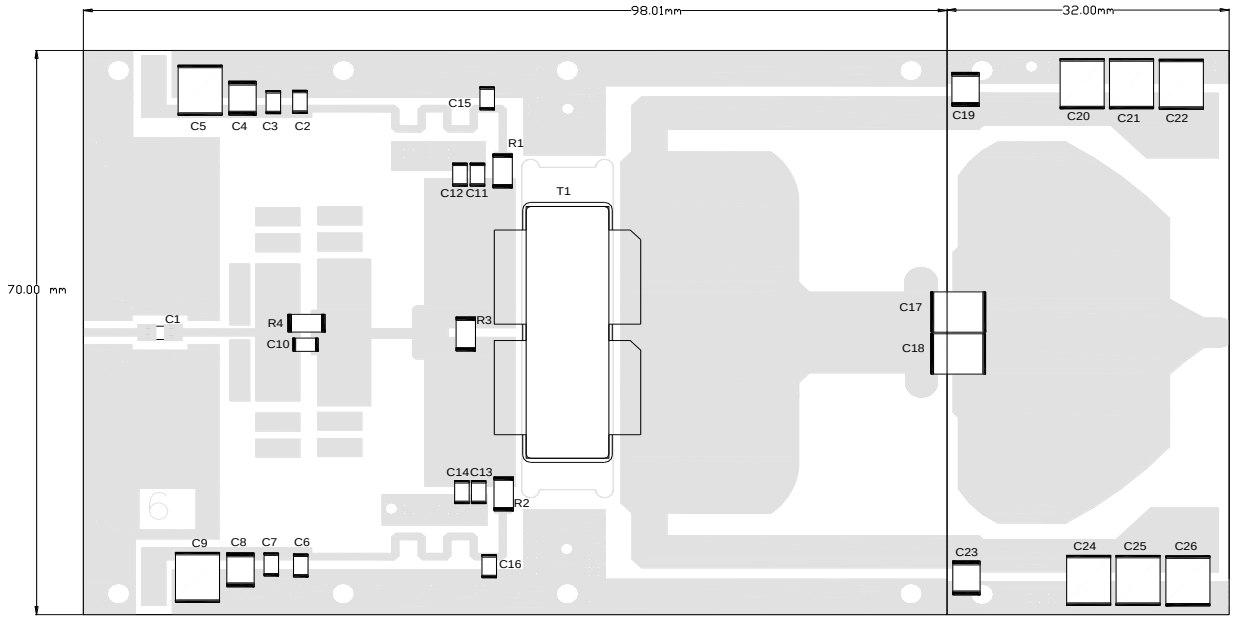

Fig 2. Component layout

Table 10. List of components

S/N	Type	Designator	Description	Value	Vendor
1	Cap	C1,C11,C13	ATC600F120JT250XT	12 pF	ATC
2	Cap	C2,C6	ATC600F101JT250XT	100 pF	ATC
3	Cap	C10	ATC600F390JT250XT	39 pF	ATC
4	Cap	C12,C14	ATC600F9R1JT250XT	9.1 pF	ATC
5	Cap	C15,C16	ATC600F6R8JT250XT	6.8 pF	ATC
6	Cap	C19,C23	ATC800B101JT250XT	100 pF	ATC
7	Cap	C5,C9,C20,C21,C22,C24,C25,C26	C5750X7S2A106KT	10 uF	TDK
8	Cap	C4,C8	GRM32ER72A225KA35L	2.2 uF	Murata
9	Cap	C3,C7	CGA4J2X7R2A333KT0Y0U	33 nF	TDK
10	Cap	C17,C18	MIN02-002EC101	100 pF	CDE
11	Res	R1,R2,R3	RC1206FR_0710RL	10 Ω	Yageo
12	Res	R4	RC1206FR_0718RL	18 Ω	Yageo
13	Transistor	T1	DOD1H0015-1800EF	/	Dynax
14	PCB	/	Rogers 4360	25 mil	Rogers
15	PCB	/	Rogers TC 350 Plus	60 mil	Rogers

9.2 Graphic data

9.2.1 CW

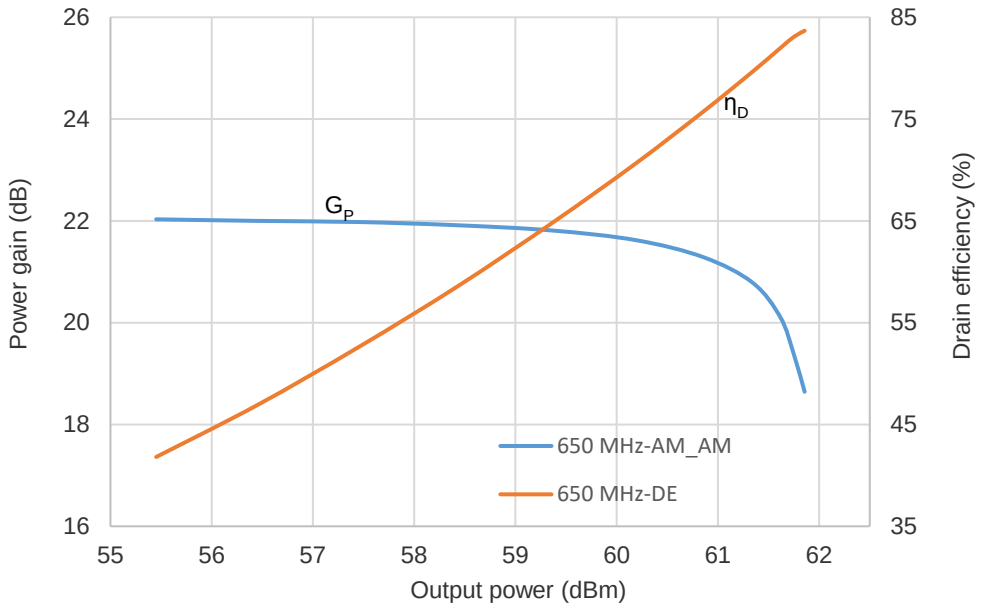

Fig 3. Power gain, Drain efficiency vs. CW output power

10. Median lifetime

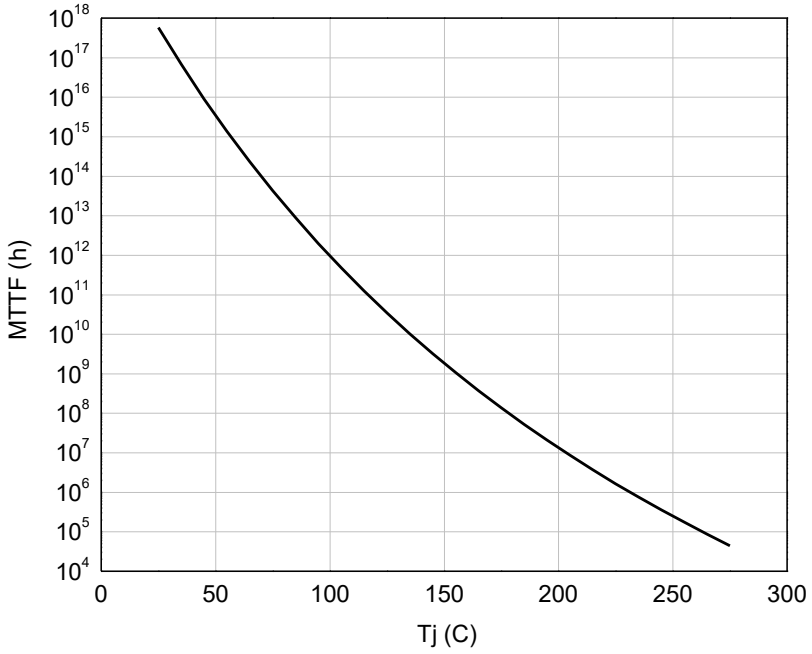

Fig 3. Median lifetime vs. channel temperature

11. Package outline

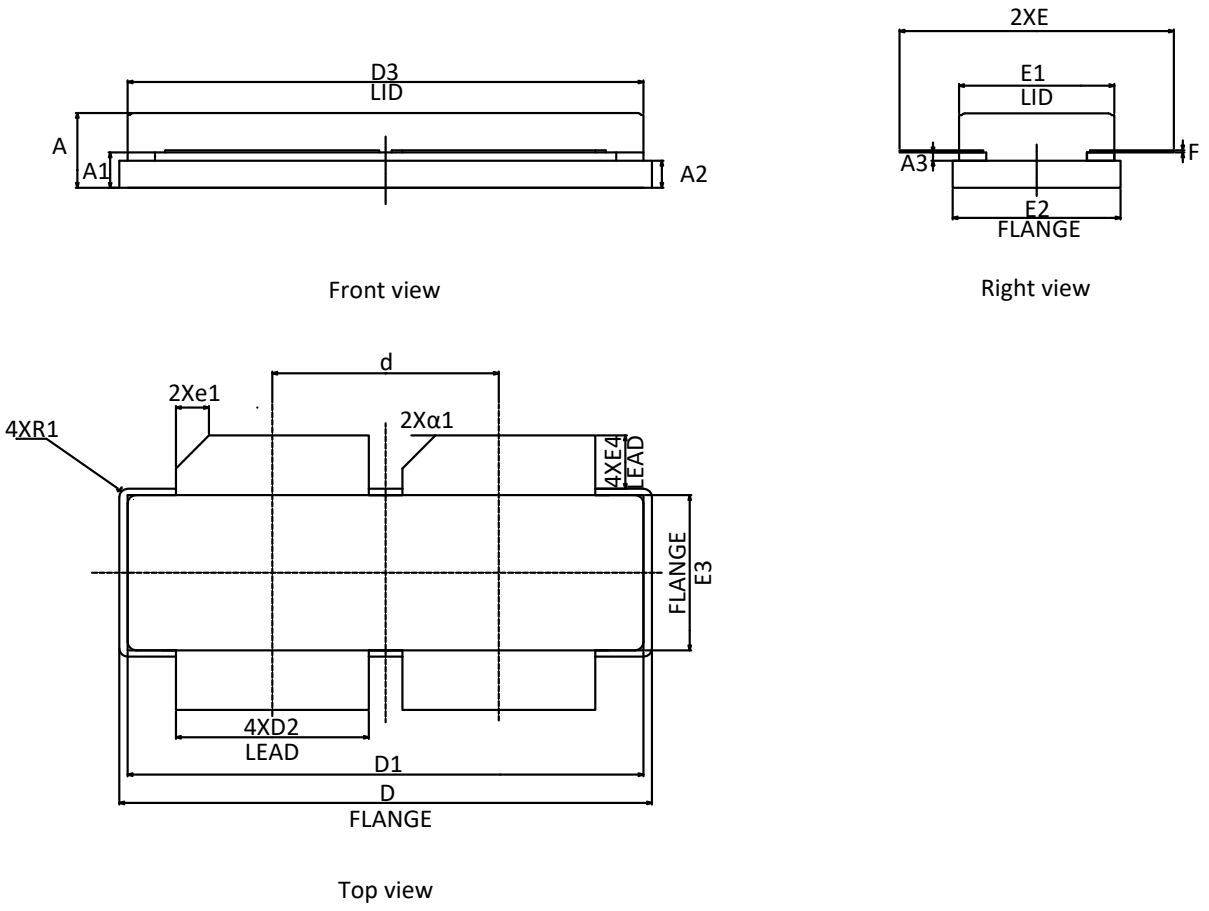

Fig 4. Package outline —— 1230P2BA

Table 8. 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

(Continued)

DIM	INCH			MILLIMETER		
	MIN	Nom	MAX	MIN	Nom	MAX
E3	0.365	0.370	0.375	9.27	9.40	9.53
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					

12. Abbreviations

Table 9. Abbreviations

Acronym	Description
CW	Continuous Waveform
GaN	Gallium Nitride
HEMT	High Electron Mobility Transistor
MTTF	Median Time To Failure

13. Legal information

11.1 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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