

DXG1CH08B-240CF

RF Power GaN Transistor



1. Product profile

1.1 General description

DXG1CH08B-240CF is a 240 W RF GaN HEMT Transistor with first generation RF GaN technology from Dynax, which is ideal for cellular base station applications at frequencies from 758 MHz to 821 MHz.

Table 1. Typical performance

Freq (MHz)	P_{sat}^1 (dBm)	P_{avg}^2 (dBm)	η_D^2 (%)	G_P^2 (dB)
758~803	53.8	47.8	37.0	16.0

¹ Test condition: Pulsed CW, Pulse width = 100 μ s, Duty cycle = 10 %.

² Typical performance in Dynax Demo with the device soldered onto the heatsink, test condition: $V_{DS} = 48$ V, $I_{DQ} = 650$ mA, Single-Carrier W-CDMA, IQ magnitude clipping, Input signal PAR = 7.5 dB @ 0.01 % probability on CCDF. ACPR measured in 3.84 MHz channel bandwidth @ ± 5 MHz offset.

1.2 Features and benefits

- > High efficiency, high gain
- > Internally matched for broadband performance
- > Designed for Digital Pre-Distortion error correction systems

1.3 Applications

- > RF power amplifier for base stations in the 758 MHz to 821 MHz frequency range

1.4 Lead-free and RoHS compliant



2. Pinning information

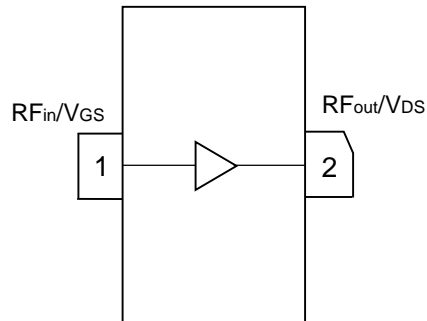


Fig 1. Pin configuration (Top view)

3. Ordering information

Table 2. Ordering information

Part number	Marking	Package type	Packaging information
DXG1CH08B-240CF	DXG1CH08B-240CF	400P1CA	Tray: Suffix = 20 units
			Tape and Reel: Suffix = 100 units; 24 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}	28.0	mA
Storage Temperature Range	T_{STG}	- 65 ~ +150	°C
Operating Junction Temperature	T_J	225	°C
Absolute Maximum Channel Temperature ¹	T_{MAX}	275	°C

¹ Functional operation above 225°C has not been characterized and is not implied. Operation at T_{MAX} (275°C) 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
Thermal Resistance at Average Power by Infrared Measurement, Active Die Surface-to-Case $T_{\text{base-plate}} = 85^{\circ}\text{C}$, $P_{\text{D}} = 77.0\text{ W}$	$R_{\text{thjc}}(\text{IR})$	1.1	$^{\circ}\text{C/W}$
Thermal Resistance at Average Power by Finite Element Analysis, Junction-to-Case $T_{\text{base-plate}} = 85^{\circ}\text{C}$, $P_{\text{D}} = 77.0\text{ W}$	$R_{\text{thjc}}(\text{FEA})$	1.4	$^{\circ}\text{C/W}$

6. ESD protection characteristics

Table 5. ESD protection characteristics

Test methodology	Class
Human Body Model (per JS-001-2012)	1A (> 250 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°C unless otherwise noted)

Table 7. DC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Leakage Current (V _{GS} = -10 V, V _{DS} = 150 V)	I _{DSS}	-	-	28.0	mA
Drain-Source Breakdown Voltage (V _{GS} = -10 V, I _D = 28.0 mA)	V _{(BR)DSS}	150	-	-	V
Gate Threshold Voltage (V _{DS} = 48 V, I _D = 28.0 mA)	V _{GS(th)}	-3.9	-3.2	-2.5	V
Gate Quiescent Voltage (V _{DS} = 48 V, I _D = 650 mA)	V _{GS(Q)}	-3.7	-3.0	-2.3	V

Table 8. RF characteristics (Typical performance – 803 MHz) ¹

Parameter	Symbol	Min.	Typ.	Max.	Unit
Peak Output Power ²	P _{sat}	53.3	54.4	-	dBm
Drain Efficiency ³	η _D	30.8	36.8	-	%
Power Gain ³	G _P	18.0	19.8	21.6	dB

¹ Typical performance in Dynax DXG1CH08B-240CF production test fixture, test condition: V_{DS} = 48 V, I_{DQ} = 200 mA.

² Test condition: Pulsed CW, Pulse width = 100 μs, Duty cycle = 10 %.

³ Test condition: P_{avg} = P_{sat} - 6 dB, Single-Carrier W-CDMA, IQ magnitude clipping, Input signal PAR = 7.5 dB @ 0.01 % probability on CCDF.

Table 9. Load mismatch

Parameter	Result
VSWR 10:1 at V _{DS} = 48 V, 240 W Pulsed CW output power, Pulse width = 100 μs, Duty cycle = 10%.	No device damage

9. Test information

9.1 Typical application circuit

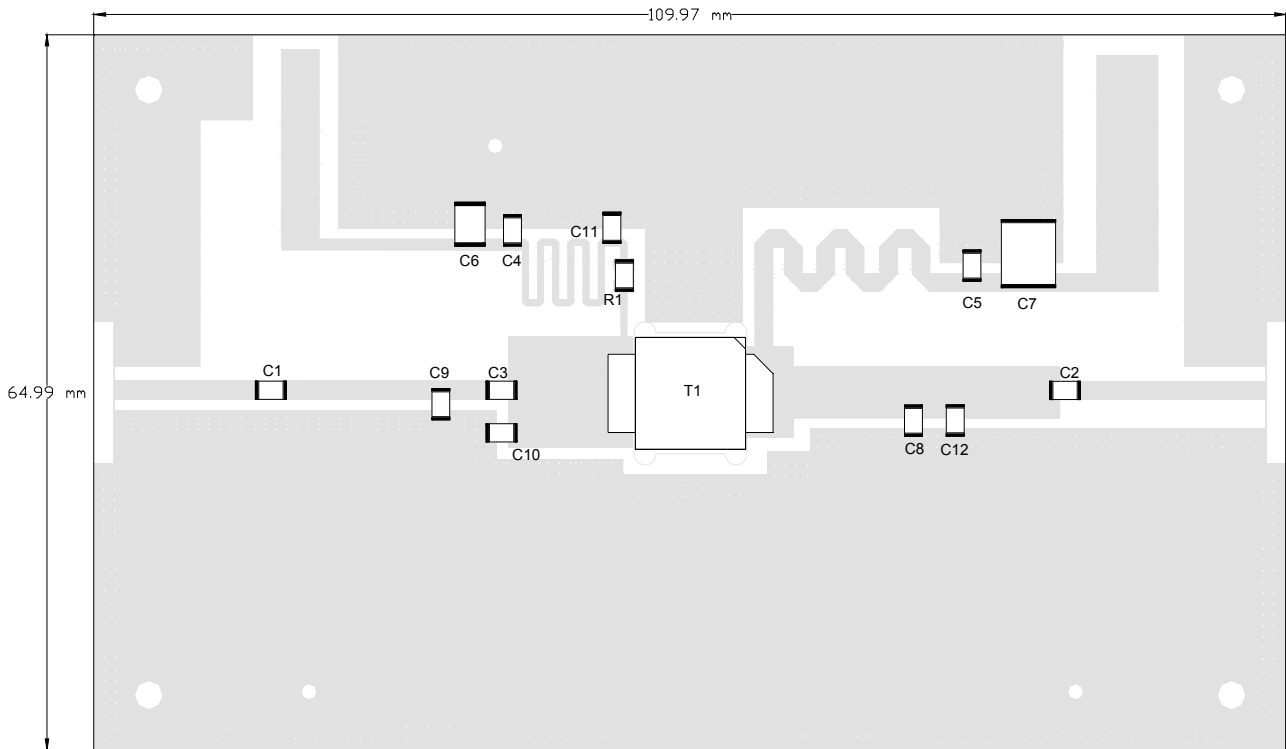


Fig 2. Component layout

Table 10. List of components

S/N	Type	Designator	Description	Value	Vendor
1	Cap	C1	ATC600F100JT250XT	10 pF	ATC
2	Cap	C4,C5	ATC600F680JT250XT	68 pF	ATC
3	Cap	C2,C3	ATC600F330JT250XT	33 pF	ATC
4	Cap	C8	ATC600F2R7JT250XT	2.7 pF	ATC
5	Cap	C10,C11,C12	ATC600F8R2JT250XT	8.2 pF	ATC
6	Cap	C9	ATC100B4R7JT500XT	4.7 pF	ATC
7	Cap	C6	GRM31CZ72A225KE	2.2 uF	Murata
8	Cap	C7	C5750X7S2A106KY000N	10 uF	TDK
9	Res	R1	RC0805FR_0710RL	10 Ω	Yageo
10	Transistor	T1	DXG1CH08B-240CF	/	Dynax

10. Impedance information

Table 11. Typical impedance ¹

Maximum Output Power						
Freq (MHz)	Z_S (Ω)	Z_L (Ω)	G_P (dB)	P_{sat} (dBm)	P_{sat} (W)	η_D (%)
758	2.6 - j5.3	3.4 + j0.6	24.4	55.1	323	73.6
790	2.8 - j5.7	3.4 + j0.9	24.1	55.1	323	73.5
821	3.2 - j6.5	3.3 + j0.8	23.7	55.0	316	73.8
Maximum Drain Efficiency						
Freq (MHz)	Z_S (Ω)	Z_L (Ω)	G_P (dB)	P_{sat} (dBm)	P_{sat} (W)	η_D (%)
758	2.6 - j5.3	5.7 + j4.8	26.6	52.0	158	84.4
790	2.8 - j5.7	5.6 + j5.0	26.4	52.1	162	84.2
821	3.2 - j6.5	5.6 + j4.9	25.9	52.0	158	84.8

¹ $V_{DS} = 48$ V, $I_{DQA} = 650$ mA, Pulsed CW, Pulse width = 100 μ s, Duty cycle = 10 %.

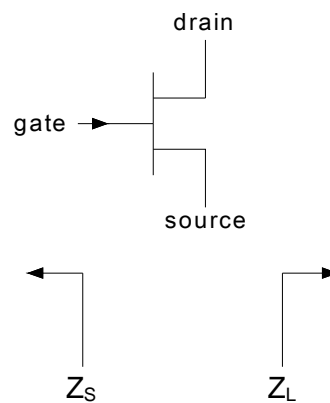


Fig 3. Definition of transistor impedance

11. Median lifetime

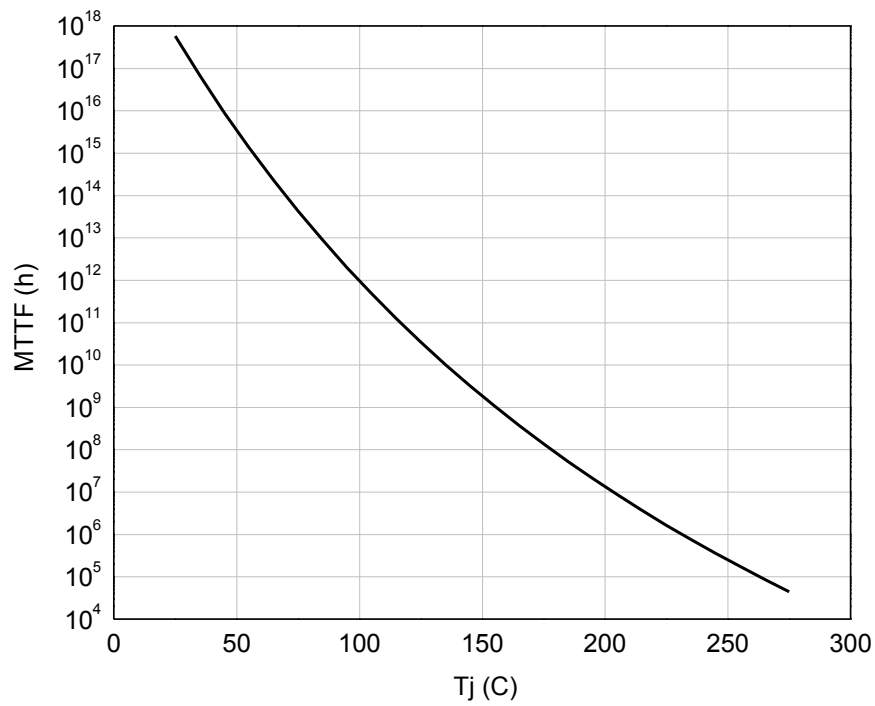
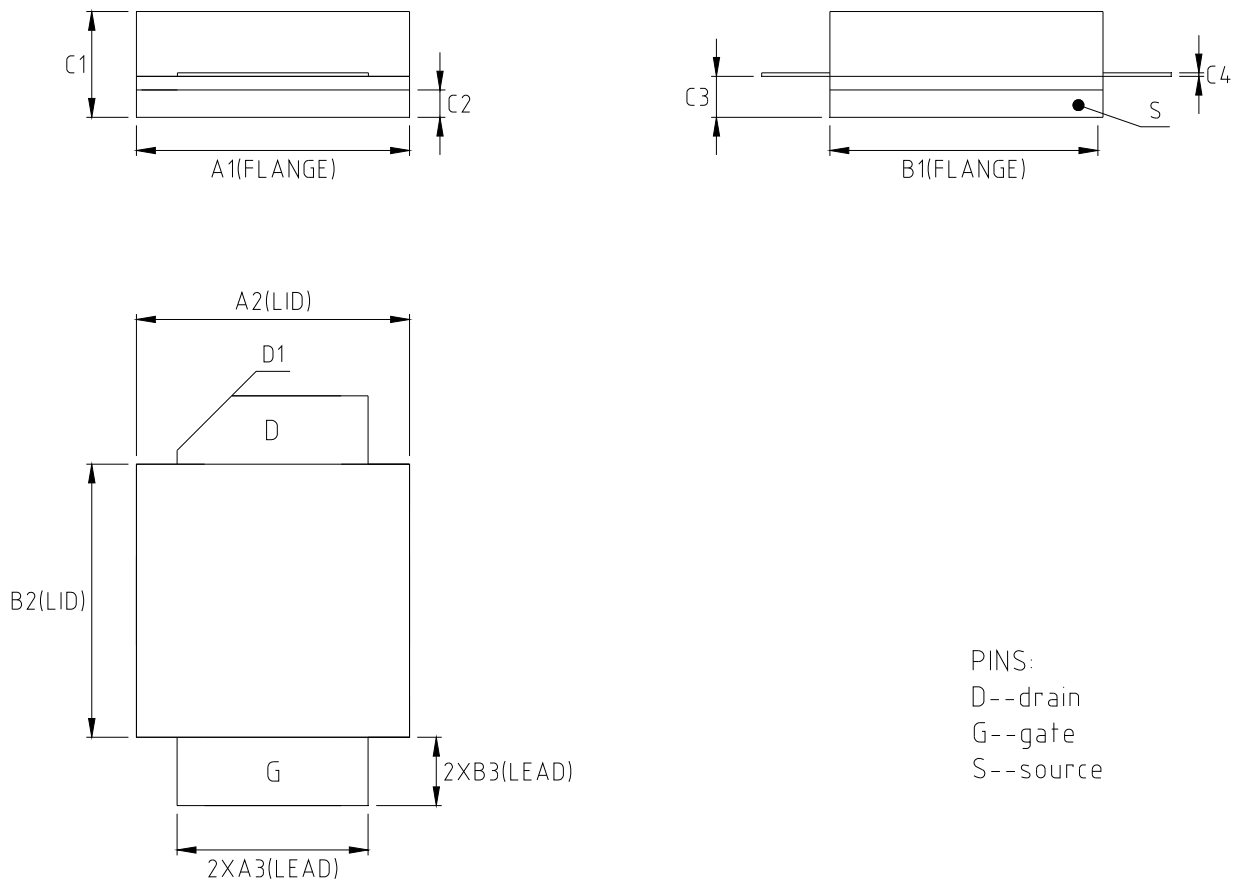


Fig 4. Median lifetime vs. channel temperature

12. Package outline



DIM	INCH		MILLIMETER	
	MIN	MAX	MIN	MAX
A1	0.395	0.405	10.03	10.29
A2	0.395	0.405	10.03	10.29
A3	0.275	0.285	6.99	7.24
B1	0.395	0.405	10.03	10.29
B2	0.395	0.405	10.03	10.29
B3	0.080	0.120	2.03	3.05
C1	0.148	0.178	3.76	4.52
C2	0.035	0.045	0.89	1.14
C3	0.057	0.067	1.45	1.70
C4	0.003	0.006	0.08	0.15
D1	0.080 45° REF		2.03 45° REF	

Fig 5. Package outline — 400P1CA

13. Abbreviations

Table 12. 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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