

HC-DS09S031NR

RF power field effect transistor

1. Product profile

1.1 General description

A 31W N-Channel LDMOS RF power transistor designed for broadcast transmitter applications with frequencies from 136 to 941MHz. The high gain, ruggedness and Broadband performance of this device make it ideal for large-signal, common-source amplifier applications in digital transmitter applications.

- **Production test performance ($T_A=25^{\circ}\text{C}$, CW class-AB)**

F (MHz)	$V_{DS}(V)$	$IDQ(mA)$	$P_L(W)$	$G_p(dB)$	$\eta_D (\%)$
860	28	100	31	15	65

- **Load Mismatch /Ruggedness**

F (MHz)	VSWR	$P_{in}(W)$	Test Voltage	Result
860	>10:1 at all Phase Angles	1.0 (3dB Overdrive)	32Vdc	No Device Degradation

1.2 Features

- Integrated ESD protection
- Unmatched Input and Output Allowing Wide Frequency Range Utilization
- Integrated Stability Enhancements
- Excellent ruggedness
- High power gain
- High efficiency
- Excellent reliability
- Easy power control
- Suitable for linear application: TETRA,SSB,LTE
- In Tape and Reel. T1 Suffix = 500 Units, 24 mm Tape Width, 13 inch Reel.

1.3 Typical Applications

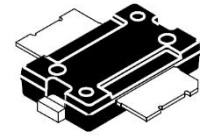
- Output Stage VHF/UHF Band Mobile Radio
- Industrial, scientific and medical applications
- Driver for 10–1000 MHz Applications

HC-DS09S031NR

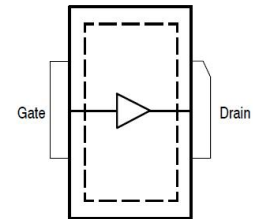
136-941MHz, 31W, 28V

LATERAL N-CHANNEL

BROADBAND

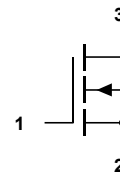


DS09S031NR



(Top View)

Note: The backside of the package is the source terminal



Pin connections

1. Gate
2. Source
3. Drain

2. Maximum ratings

Table 1. Maximum ratings

Rating	Symbol	Value	Unit
Drain–Source Voltage	V_{DS}	-0.5, +65	Vdc
Gate–Source Voltage	V_{GS}	-5, +6	Vdc
Storage Temperature Range	T_{stg}	-65 to +150	°C
Case Operating Temperature	T_C	150	°C
Operating Junction Temperature	T_J	150	°C

3. Thermal characteristics

Table 2. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 79^{\circ}\text{C}$; $PL = 31\text{W}$ (CW)	0.63	°C/W

4. ESD Protection Characteristics

Table 3. Thermal characteristics

Test Methodology	Class
Human Body Model	2B

5. Characteristics

Table 4. Static / Dynamic characteristics

$T_J = 25^{\circ}\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit
Drain–Source Breakdown Voltage ($V_{GS} = 0$, $I_D = 10\mu\text{Adc}$)	$V_{(BR)DSS}$	70	—	—	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = 28\text{ Vdc}$, $V_{GS} = 0$)	I_{DSS}	—	—	1	μAdc
Gate–Source Leakage Current ($V_{GS} = 5\text{ Vdc}$, $V_{DS} = 0$)	I_{GSS}	—	—	1	μAdc
Gate Threshold Voltage ($V_{DS} = 10\text{ Vdc}$, $I_D = 1\text{mAdc}$)	$V_{GS(th)}$	0.5	1.0	1.5	Vdc
Gate Quiescent Voltage ($V_{DS} = 28\text{ Vdc}$, $I_D = 100\text{mAdc}$)	$V_{GS(q)}$	1.0	1.5	3.0	Vdc
Drain cut-off current ($V_{DS} = 10\text{ Vdc}$, $V_{GS} = 6\text{Vdc}$)	I_{DSX}	17	22	—	Adc
Drain–Source on-state resistance ($V_{GS} = 6\text{ Vdc}$, $I_D = 3.7\text{ A}$)	$R_{DS(on)}$	—	0.24	—	Ω
Input Capacitance ($V_{DS} = 32\text{ Vdc}$, $V_{GS} = 0$, $f = 1.0\text{ MHz}$)	C_{iss}	—	170	—	pF
Output Capacitance ($V_{DS} = 32\text{ Vdc}$, $V_{GS} = 0$, $f = 1.0\text{ MHz}$)	C_{oss}	—	60	—	pF
Reverse Transfer Capacitance ($V_{DS} = 32\text{ Vdc}$, $V_{GS} = 0$, $f = 1.0\text{ MHz}$)	C_{rss}	—	10	—	pF

Table 5. RF functional characteristics

Mode of operation: CW; $f = 860\text{ MHz}$; RF performance at $V_{DS} = 28\text{ V}$; $I_{DQ} = 100\text{ mA}$; $T_{case} = 25^{\circ}\text{C}$;

Symbol	Characteristic	Condition	Min	Typ	Max	Unit
G_P	Power Gain	$P_L = 31\text{ W}$ $V_{DS} = 28\text{ V}$ $I_{DQ} = 100\text{mA}$ $f = 860\text{ MHz}$	15	16	—	dB
η_D	Drain Efficiency		60	65	—	%

6. Test information

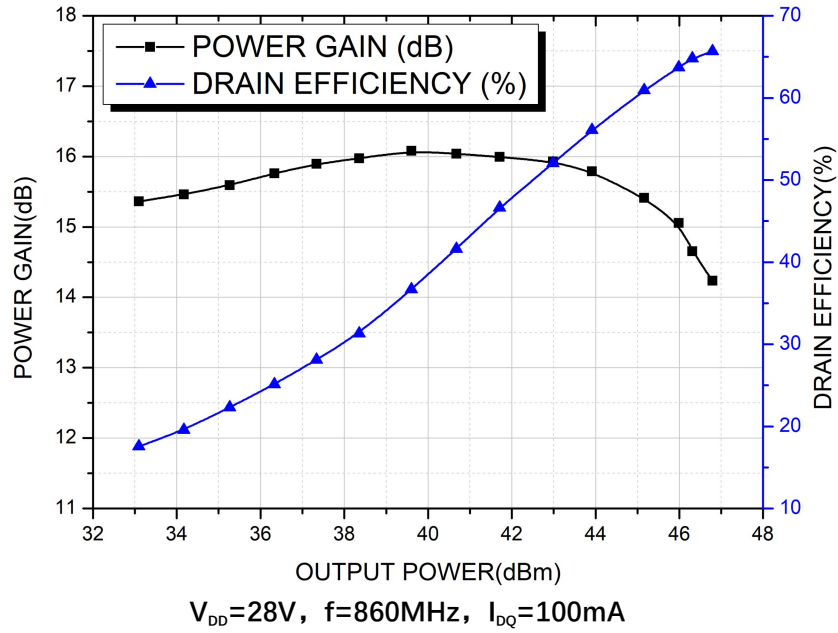
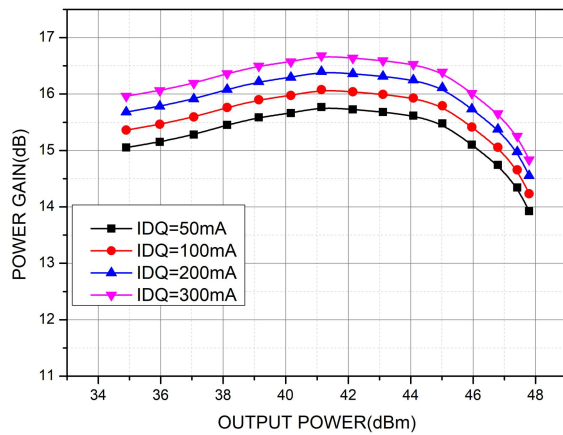
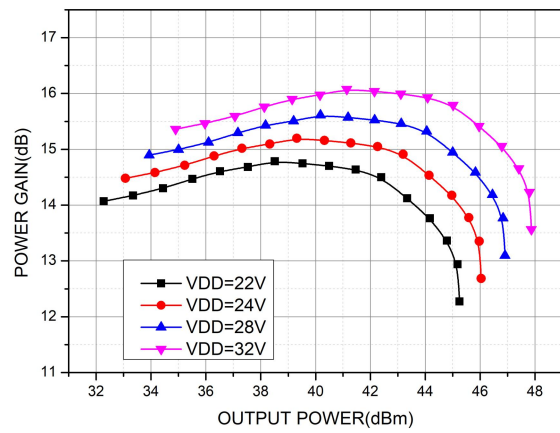


Fig 1. Power gain and drain efficiency as function of load power; typical values



$f=860MHz, V_{DD}=28V$

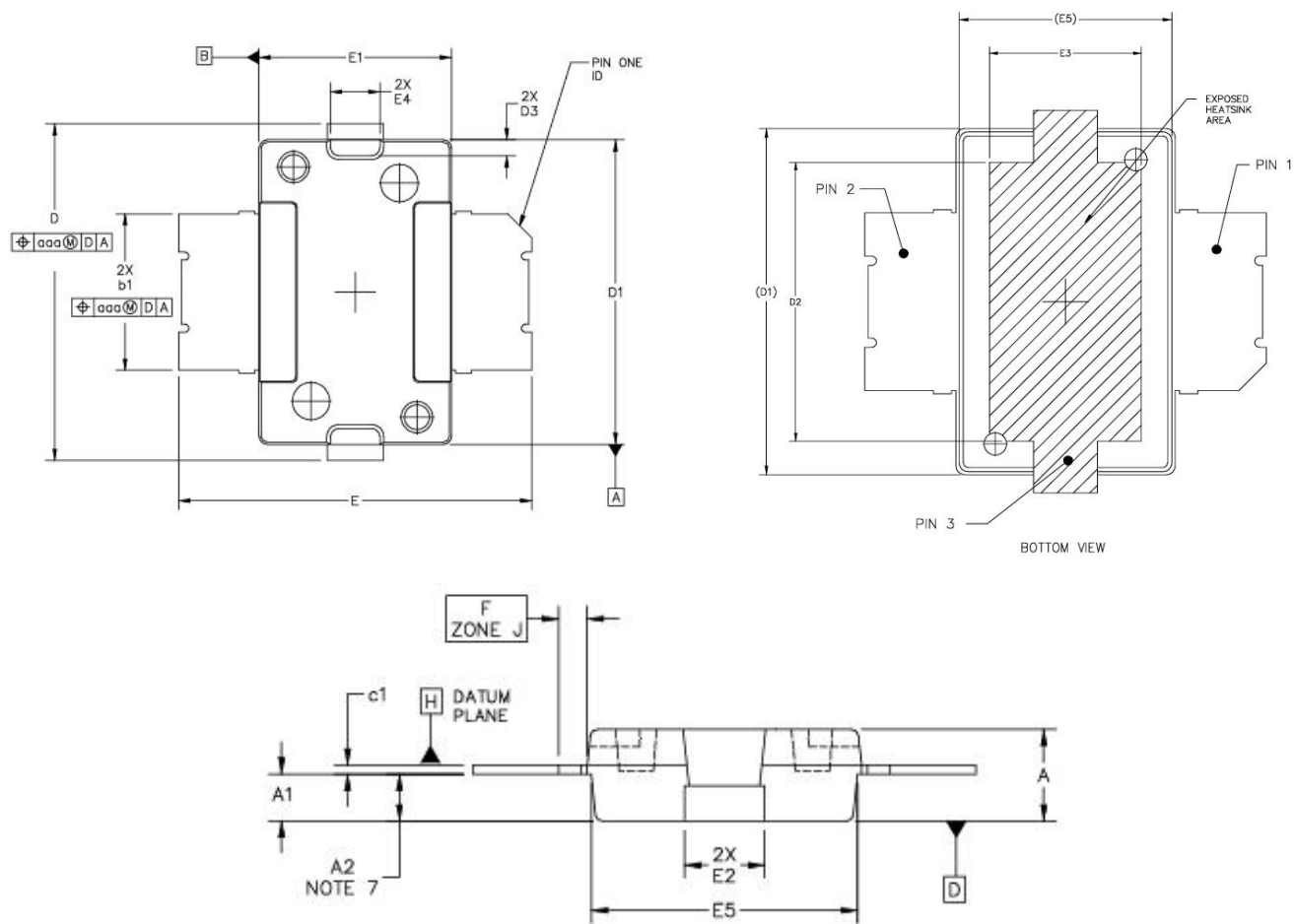


$f=860MHz, I_{DQ}=100mA$

Fig 2. Power Gain versus Output Power

7. Package outline

TO270-2



STYLE 1:
PIN 1 - DRAIN
PIN 2 - GATE
PIN 3 - SOURCE

DIM	INCH		MILLIMETER		DIM	INCH		MILLIMETER	
	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
A	.078	.082	1.98	2.08	F	.025 BSC		0.64 BSC	
A1	.039	.043	0.99	1.09	b1	.193	.199	4.90	5.06
A2	.040	.042	1.02	1.07	c1	.007	.011	0.18	0.28
D	.416	.424	10.57	10.77	aaa	.004		0.10	
D1	.378	.382	9.60	9.70					
D2	.290	----	7.37	----					
D3	.016	.024	0.41	0.61					
E	.436	.444	11.07	11.28					
E1	.238	.242	6.04	6.15					
E2	.066	.074	1.68	1.88					
E3	.150	----	3.81	----					
E4	.058	.066	1.47	1.68					
E5	.231	.235	5.87	5.97					

