DunSemi

RF Power Field Effect Transistor

DSL09S0P1T2

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Rev. 1, 7/2018

N-Channel Enhancement-Mode MOSFET

Designed for handheld two–way radio applications with frequencies from 136 to 941 MHz. The high gain, ruggedness and Broadband performance of this device make it ideal for large–signal, common–source amplifier applications in handheld radio equipment.

136–941 MHz, 0.15W, 3.7 V
BROADBAND RF POWER TRANSISTOR

Typical Broadband EVB Performance (I_{DQ}=90mA, T_A = 25℃, CW)

V_{DS}	Freq.	Gmax	Pout		PAE
[V]	[MHz]	[dB]	[dBm]	[mW]	[%]
3.7	400	17.5	22.0	160	53.4
	440	16.0	23.2	210	67.4
	480	15.4	23.2	210	64.4
	520	13.8	23.0	200	61.3

- Capable of Handling 20:1 VSWR @ 6.0 Vdc, 0.2 Watts, CW

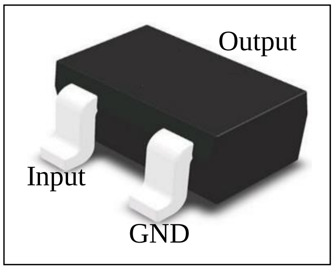


Figure 1. Pin Connections

Features

- Characterized for Operation from 136 to 941 MHz
- Unmatched Input and Output Allowing Broad Frequency Range Utilization
- Integrated ESD Protection
- Broadband – Full Power Across the Band
- Exceptional Thermal Performance
- Extreme Ruggedness

Typical Applications

- Output Stage VHF Band Handheld Radio
- Output Stage UHF Band Handheld Radio
- Output Stage for 700–800 MHz Handheld Radio
- Driver for 10–1000 MHz Applications

Table1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	–0.5, +20	Vdc
Gate-Source Voltage	V_{GS}	–0.5, +8	Vdc
Operating Voltage	V_{DD}	0, +6	Vdc
Storage Temperature Range	T_{stg}	–65 to +150	℃
Case Operating Temperature	T_C	–40 to +150	℃
Operating Junction Temperature	T_J	–40 to +150	℃
Power Dissipation @TC=25℃	PD	0.25	Watts

Table 2. ESD Protection Characteristic

Test Methodology	Class
Human Body Model (per JESD22--A114)	2, passes 2500 V
Machine Model (per EIA/JESD22--A115)	A, passes 100 V
Charge Device Model (per JESD22--C101)	IV, passes 2000 V

Table 3. Electrical Characteristics (T_A=25℃ unless otherwise noted)

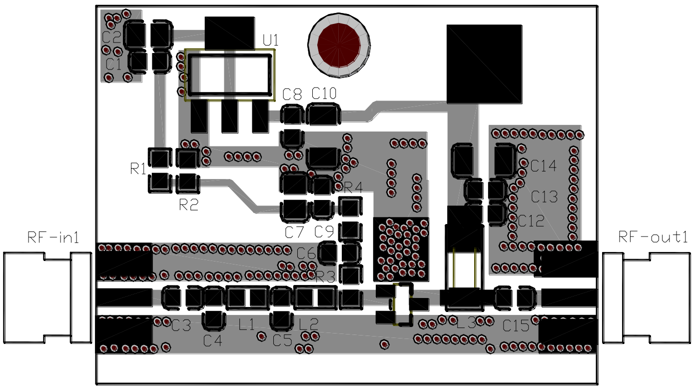
Characteristic	Symbol	Min	Typ.	Max	Unit
Off Characteristics					
Gate-Source Leakage Current (V_{GS}=5Vdc, V_{DS}=0Vdc)	I_{GSS}	-	-	500	nAdc
Zero Gate Voltage Drain Leakage Current (V_{DS}=16Vdc, V_{GS}=0Vdc)	I_{DSS}	-	-	100	nAdc
Zero Gate Voltage Drain Leakage Current (V_{DS}=3.7Vdc, V_{GS}=0Vdc)	I_{DSS}	-	-	100	nAdc
On Characteristics					
Gate Threshold Voltage (V_{DS}=3.7Vdc, I_D=1mA)	$V_{GS(th)}$	1.6	1.8	2.0	Vdc
Gate Quiescent Voltage (V_{DD}=3.7Vdc, I_D=90mA Measured in Functional Test)	$V_{GS(Q)}$	2.2	2.6	2.8	Vdc
Drain-Source On-Voltage (V_{GS}=5Vdc, I_D=100mA)	$V_{DS(ON)}$	-	0.28	-	Vdc
Dynamic Characteristics					
Reverse Transfer Capacitance (V_{DG}=3.7V, Level=30mVac@1MHz)	Crss	-	0.25	-	pF
Output Capacitance (V_{DS}=3.7V, Level=30mVac@1MHz)	Coss	-	1.8	-	pF
Input Capacitance (V_{GS}=5V, Level=30mVac@1MHz)	Ciss	-	8.0	-	pF

Typical Performances (In DuSemi Narrowband Test DEMO，50 Ohm system)

Frequency=440MHz, V_{DD}=3.7Vdc, $I_{D(Q)}$=90mA, Pin=7dBm, T_A=25℃

Output Power	P_{out}	-	151	-	mW
Power Gain	G_{PS}	-	15	-	dB
Drain Efficiency	η_D	-	50	-	%

Broad Band Evaluation Circuit (@VDD = 3.7V, f = 440 MHz)



Test Circuit Component Layout

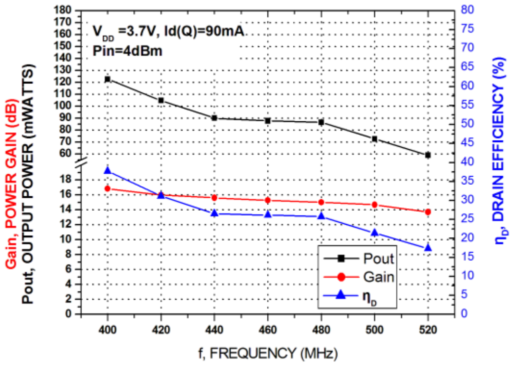
Table 5. Test Circuit Component Designations and Value

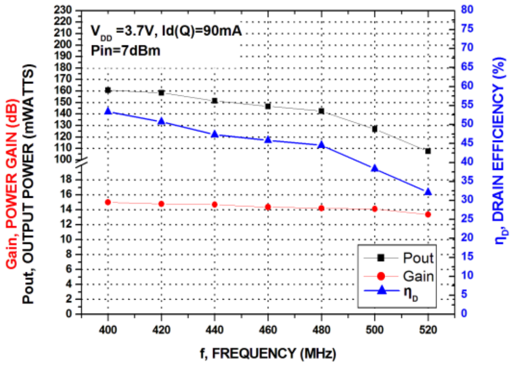
Part	Description	Part Number	Manufacturer
R3	470Ohm	—	—
R4	6.8KOhm	—	—
L1, L2	4.7nH	—	—
L3	8 Turns D: 0.5 mm, φ 2.4 mm Enamel Wire	—	—
C3,C15,	100pF Chip Capacitors	GQM21P5C1H101JB01	Murata
C4	18pF Chip Capacitors	GRM1885C1H201JA01	Murata
C12, C9	1000pF Chip Capacitors	GRM1885C1H102JA01	Murata
C10, C14,C7	10uF,25VChip Capacitors	—	—
C5	24pF Chip Capacitors	—	Murata
R1,R2,C1,C2,C8,C6	NC	—	—
U1	LM1117		
PCB	FR-4 ,1.6mm, ε_r4.5	—	

TYPICAL CHARACTERISTICS

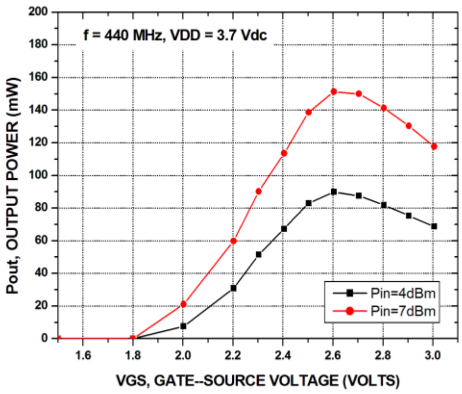
1. Power Gain, Drain Efficiency and Output Power versus Frequency at a Constant Pin

V_{DD}	$I_{D(Q)}$	Pin	Freq	Pout		Gain	η_D
[V]	[mA]	[dBm]	[MHz]	[dBm]	[mW]	[dB]	[%]
3.7	90	7	400	22.1	161	15.0	53.4
			440	21.8	151	14.7	47.4
			480	21.5	142	14.2	44.6
			520	20.3	107	13.4	32.1

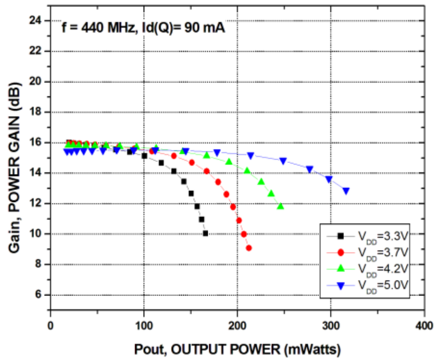


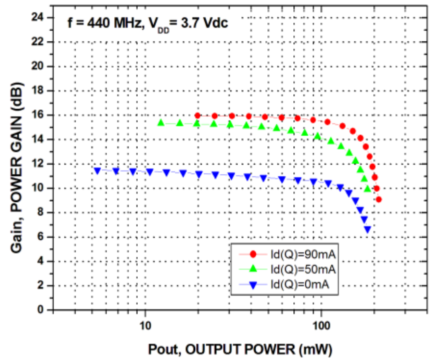


2. Output Power versus Gate-Source Voltage @440MHz



3. Power Gain versus Output Power@440MHz





4. Power Gain, Drain Efficiency and Output Power versus Input Power

V_{DS}	$I_{D(Q)}$	Freq.	Gain	Pout		η_D
[V]	[mA]	[MHz]	[dB]	[dBm]	[mW]	[%]
3.7	90	400	17.5	22.0	160	53.4
		440	16.0	23.2	210	67.4
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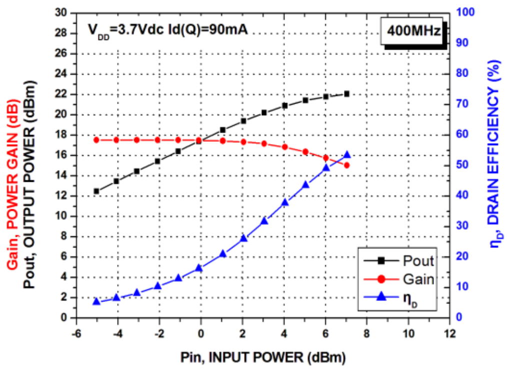
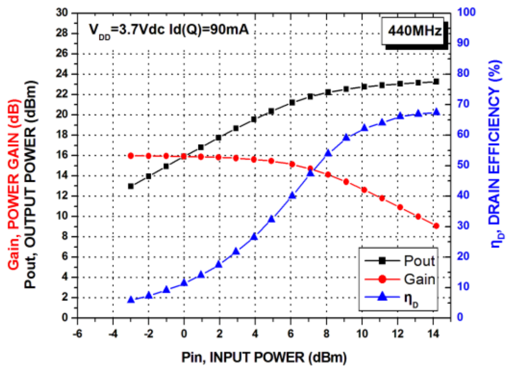
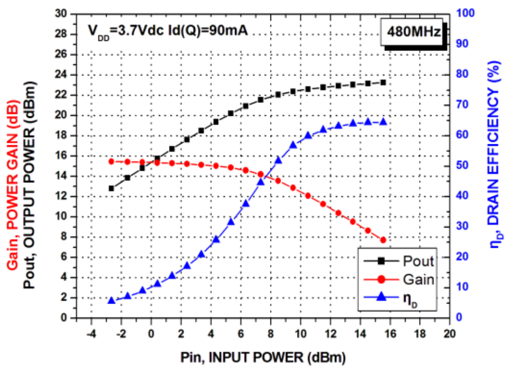
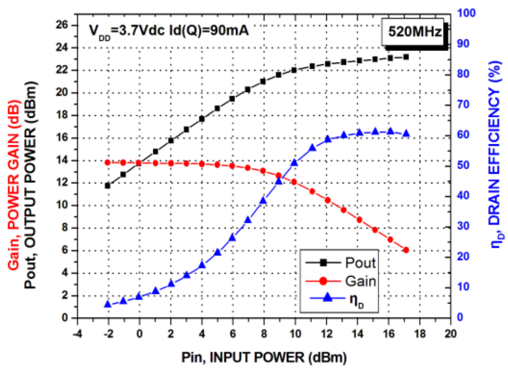
		520	13.8	23.0	200	61.3

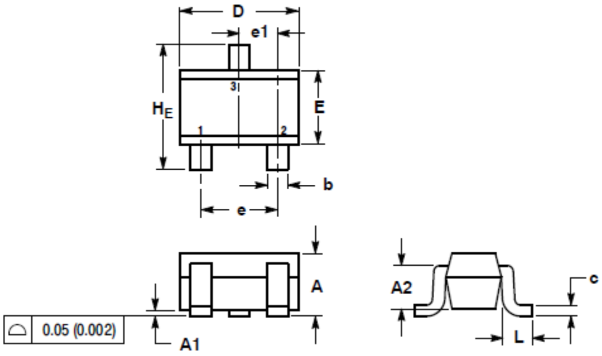








PACKAGE



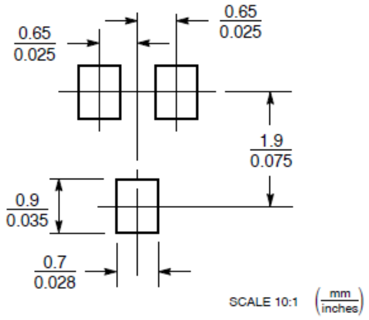
NOTES:

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70 REF			0.028 REF		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.10	2.20	0.071	0.083	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC			0.026 BSC		
L	0.20	0.38	0.56	0.008	0.015	0.022
H_E	2.00	2.10	2.40	0.079	0.083	0.095

STYLE 3:

PIN 1.gate
2.source
3.drain

SOLDERING FOOTPRINT*



REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
1	July 2018	Initial Release of Data Sheet