

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, 0.2W, 3.7 V
BROADBAND RF
POWER TRANSISTOR

Typical Broadband EVB Performance ($I_{DQ}=50\text{mA}$, $T_A = 25^\circ\text{C}$, CW)

V_{DD}	Freq.	Gain	Pout		η_D
[V]	[MHz]	[dB]	[dBm]	[mW]	[%]
3.7	400	19.4	23.0	200	65.5
	440	19.5	23.2	206	65.8
	480	19.7	23.1	205	65.9
	520	18.9	22.9	194	63.3

Capable of Handling 20:1 VSWR @ 6.0 Vdc, 0.3 Watts, CW

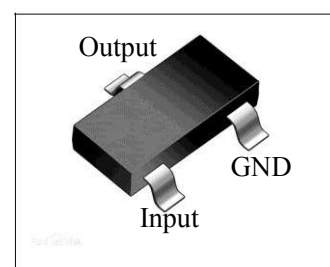


Figure 1. Pin Connections

Features

- Characterized for Operation from 136 to 941 MHz
- Unmatched Input and Output Allowing Broad Frequency Range Utilization
- Integrated Stability Enhancements
- 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

HPL09S0P2T1

RF Power Field Effect Transistor

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	°C
Case Operating Temperature	T_C	-40 to +150	°C
Operating Junction Temperature	T_J	-40 to +150	°C
Power Dissipation (@ $T_C=25^{\circ}C$)	PD	0.3	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 ($T_A=25^{\circ}C$ unless otherwise noted)

Characteristic	Symbol	Min	Typ.	Max	Unit
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Off Characteristics

Gate-Source Leakage Current ($V_{GS}=5V_{dc}$, $V_{DS}=0V_{dc}$)	I_{GSS}	-	-	500	nAdc
Zero Gate Voltage Drain Leakage Current ($V_{DS}=16V_{dc}$, $V_{GS}=0V_{dc}$)	I_{DSS}	-	-	100	nAdc
Zero Gate Voltage Drain Leakage Current ($V_{DS}=3.7V_{dc}$, $V_{GS}=0V_{dc}$)	I_{DSS}	-	-	100	nAdc

On Characteristics

Gate Threshold Voltage ($V_{DS}=3.7V_{dc}$, $I_D=1mA$)	$V_{GS(th)}$	1.6	1.8	2.0	Vdc
Gate Quiescent Voltage ($V_{DD}=3.7V_{dc}$, $I_D=50mA$ Measured in Functional Test)	$V_{GS(Q)}$	2.3	2.6	2.9	Vdc
Drain-Source On-Voltage ($V_{GS}=5V_{dc}$, $I_D=100mA$)	$V_{DS(ON)}$	-	0.28	-	Vdc

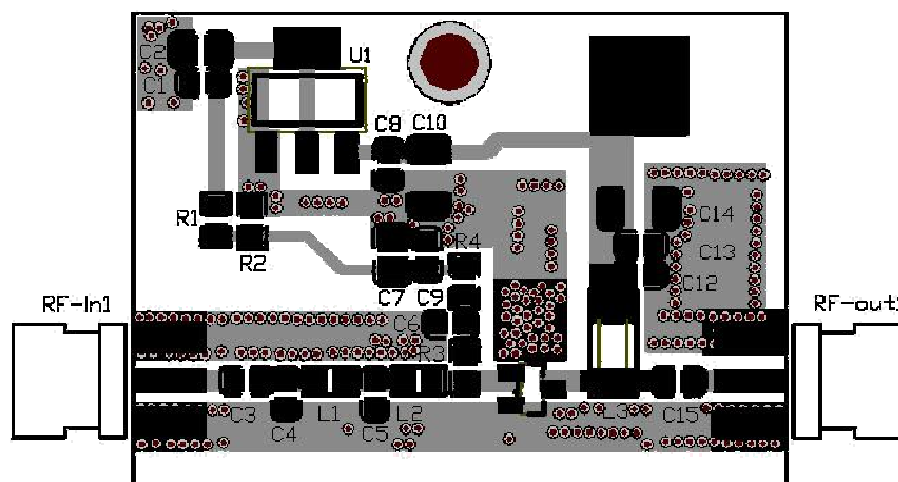
Dynamic Characteristics

Reverse Transfer Capacitance ($V_{DG}=3.7V$, Level=30mVac@1MHz)	C_{rss}	-	0.25	-	pF
Output Capacitance ($V_{DS}=3.7V$, Level=30mVac@1MHz)	C_{oss}	-	1.8	-	pF
Input Capacitance ($V_{GS}=5V$, Level=30mVac@1MHz)	C_{iss}	-	8.0	-	pF

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

Frequency=440MHz, $V_{DD}=3.7V_{dc}$, $I_{DQ}=50mA$, $P_{in}=4dBm$, $T_A=25^{\circ}C$

Output Power	P_{out}	-	155	-	mW
Power Gain	G_{PS}	-	18	-	dB
Drain Efficiency	η_D	-	57	-	%

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

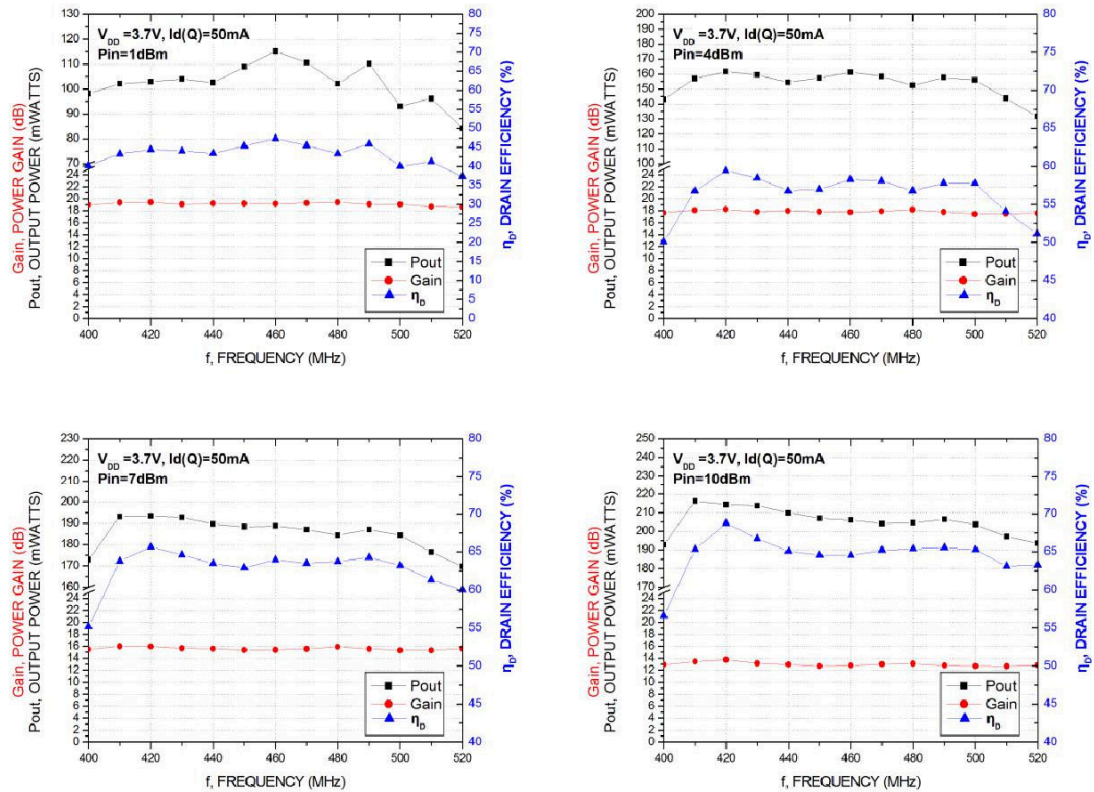
Test Circuit Component Layout

Table 4. Test Circuit Component Designations and Value

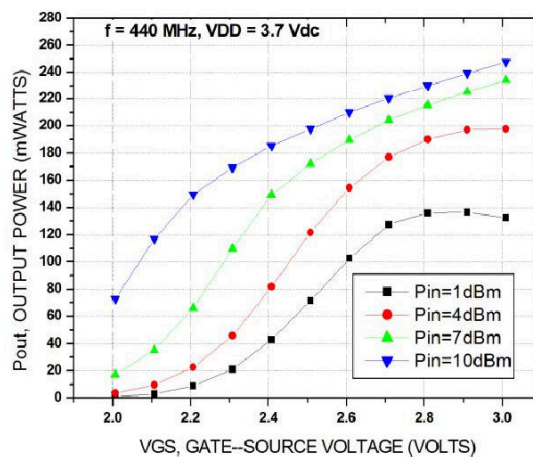
Part	Description	Part Number	Manufacturer
R3	470Ohm	—	—
R4	6.8KOhm	—	—
L1, L2	4.7nH	—	—
L3	8 Turns D: 0.5 mm, φ 2.4 mm Enamel Wire	—	—
C3,C15,	100pF Chip Capacitors	GQM21P5C1H101JB01	Murata
C4	18pF Chip Capacitors	GRM1885C1H201JA01	Murata
C12, C9	1000pF Chip Capacitors	GRM1885C1H102JA01	Murata
C10, C14,C7	10uF,25VChip Capacitors	—	—
C5	24pF Chip Capacitors	—	Murata
R1,R2,C1,C2,C8,C6	NC	—	—
U1	LM1117	—	—
PCB	FR-4 ,1.6mm, ϵ_r 4.5	—	—

TYPICAL CHARACTERISTICS

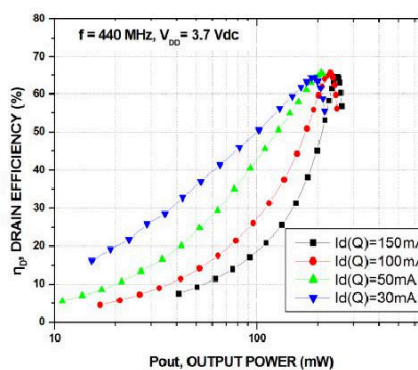
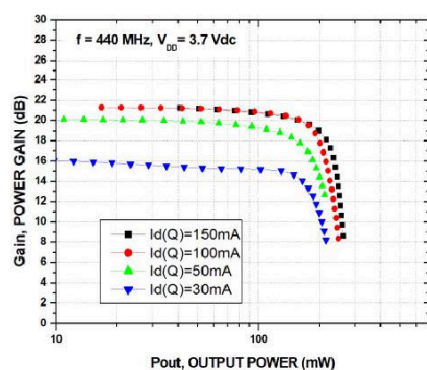
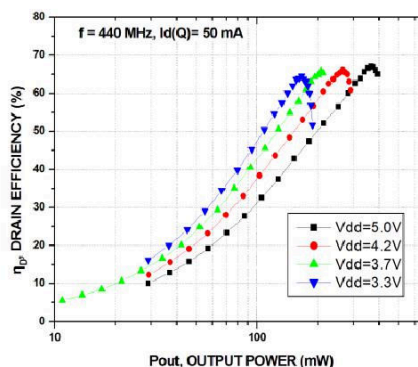
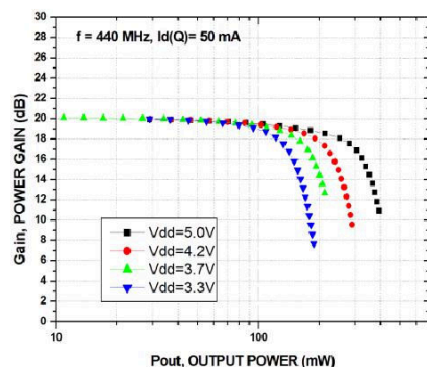
1. Power Gain, Drain Efficiency and Output Power versus Frequency at a Constant Pin



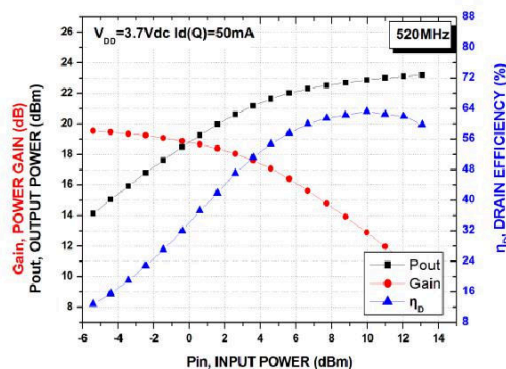
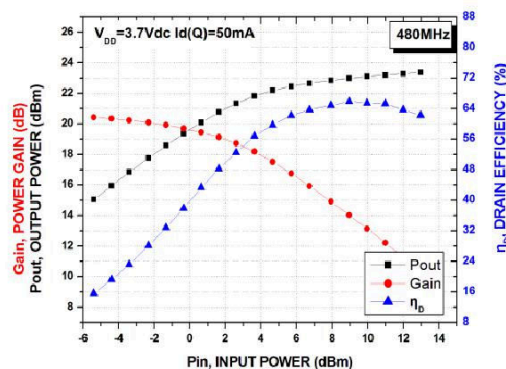
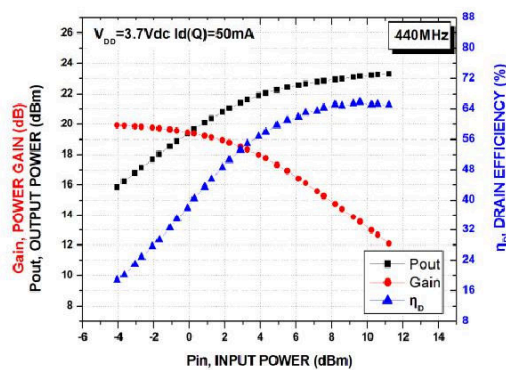
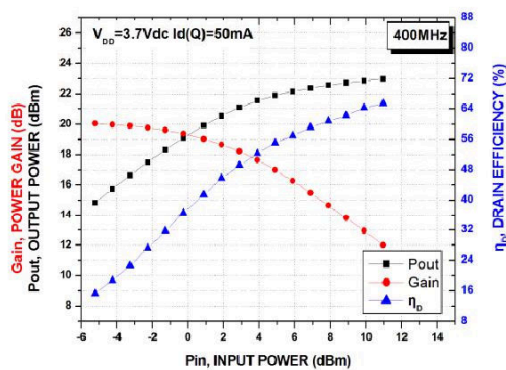
2. Output Power versus Gate-Source Voltage @440MHz



3. Power Gain and Drain Efficiency versus Output Power@440MHz



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

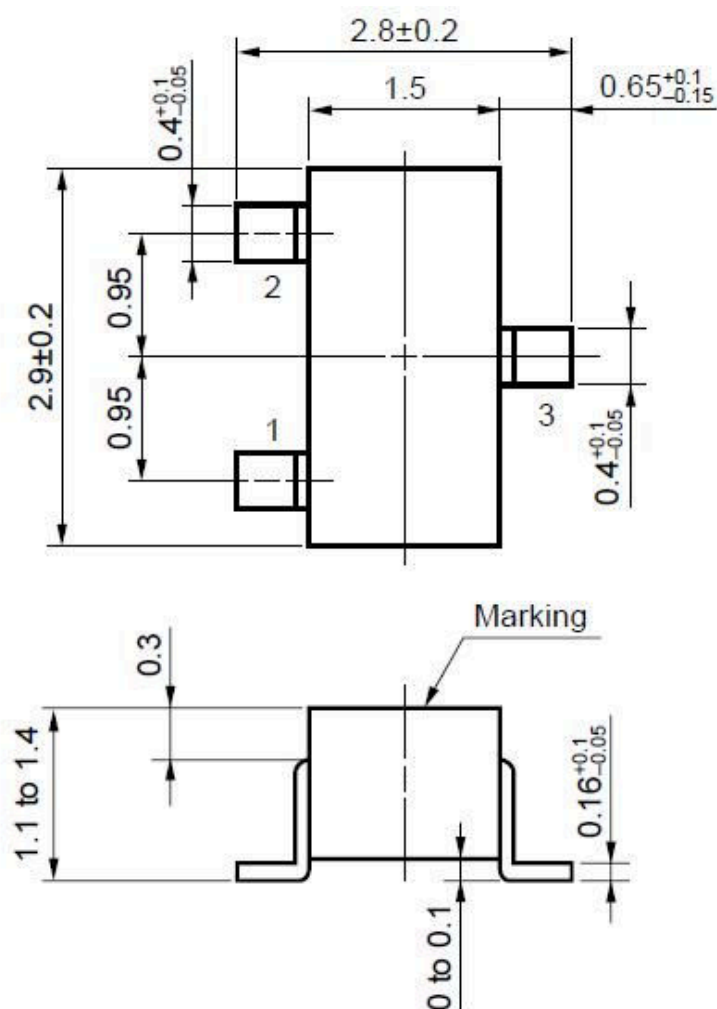


HPL09S0P2T1

RF Power Field Effect Transistor

PACKAGE

Unit : mm



REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
1.0	March 2018	Initial Release of Data Sheet