HOPERF

RF Power Field Effect Transistor

HPL09S001N

N-Channel Enhancement-Mode MOSFET

136–941 MHz, 1.0W, 3.7 V BROADBAND RF POWER TRANSISTOR

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.

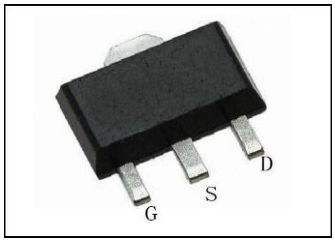
Typical Broadband EVB Performance (I_{DQ}=200mA, T_A = 25℃, CW)

VDD	Freq.	Pout		Gmax
[V]	[MHz]	[dBm]	[Watts]	[dB]
3.7	400	31.2	1.3	18.9
	440	31.1	1.3	19.1
	460	31.1	1.3	18.5
	480	31.0	1.3	18.2

Typical Narrowband EVB Performance (I_{DQ}=200mA, T_A = 25℃, CW)

VDD	Freq.	Pout		PAE
[V]	[MHz]	[dBm]	[Watts]	[%]
3.7	430	32.1	1.6	53.4
	450	32.7	1.8	57.2
	470	32.6	1.8	62.3

Capable of Handling 20:1 VSWR@6.0Vdc, 2.0Watts, CW



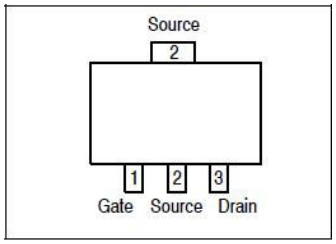


Figure 1. Pin Connections

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}	–5.0, +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	5	W

Table2. 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

Table3. Electrical Characteristics (T_A=25℃ unless otherwise noted)

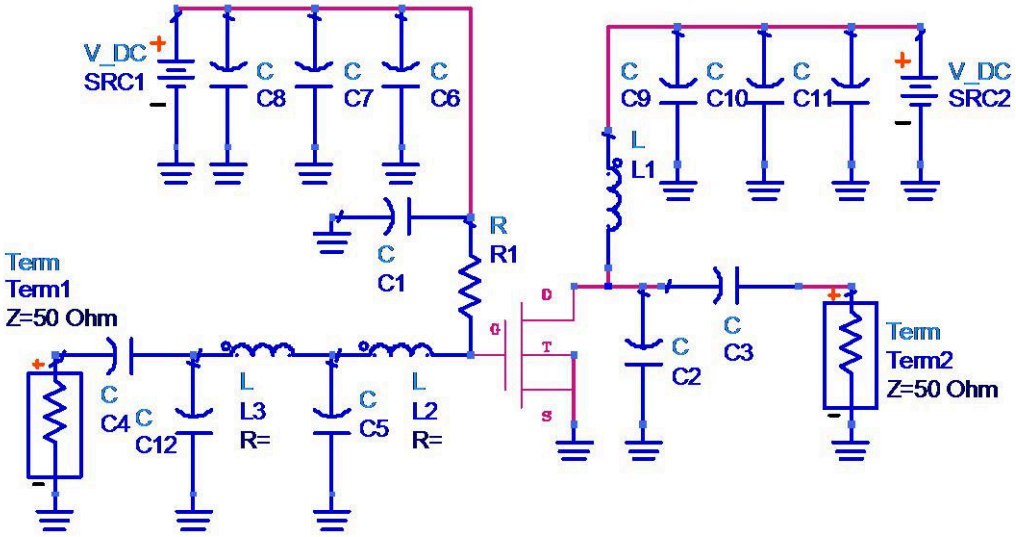
Characteristic	Symbol	Min	Typ.	Max	Unit
Off Characteristics					
Gate-Source Leakage Current (V_{GS}=5Vdc, V_{DS}=0Vdc)	I_{GSS}	-	-	1	uAdc
Zero Gate Voltage Drain Leakage Current (V_{DS}=16Vdc, V_{GS}=0Vdc)	I_{DSS}	-	-	2	μAdc
Zero Gate Voltage Drain Leakage Current (V_{DS}=3.7Vdc, V_{GS}=0Vdc)	I_{DSS}	-	-	1	μAdc
On Characteristics					
Gate Threshold Voltage (V_{DS}=3.7Vdc, I_D=1mA)	$V_{GS(th)}$	1.2	1.5	1.8	Vdc
Gate Quiescent Voltage (V_{DD}=3.7Vdc, I_D=200mA Measured in Functional Test)	$V_{GS(Q)}$	1.3	2.0	2.7	Vdc
Drain-Source On-Voltage (V_{GS}=5Vdc, I_D=200mA)	$V_{DS(ON)}$	-	0.09	-	Vdc
Dynamic Characteristics					
Reverse Transfer Capacitance (VDG=3.7V, Level=30mVac@1MHz)	Crss	-	2.4	-	pF
Output Capacitance (VDS=3.7V, Level=30mVac@1MHz)	Coss	-	9.1	-	pF
Input Capacitance (VGS=5V, Level=30mVac@1MHz)	Ciss	-	32.0	-	pF

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

Frequency=450MHz, V_{DS}=3.7Vdc, I_{DQ}=200mA, T_A=25℃

Power Gain	G_{PS}	-	19	-	dB
Output Power	Pout	-	31	-	dBm
Drain Efficiency	η_D	-	60	-	%

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



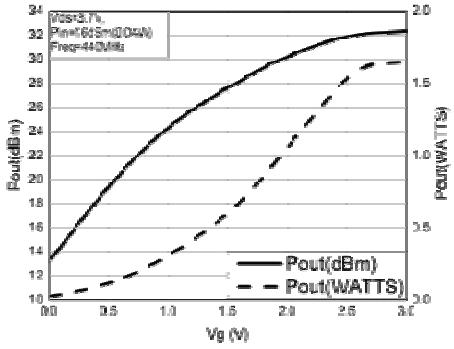
Test Circuit Component Layout

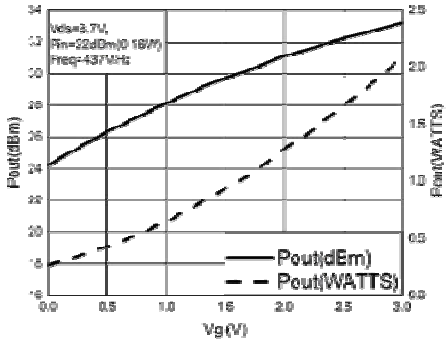
Table4. Test Circuit Component Designations and Value

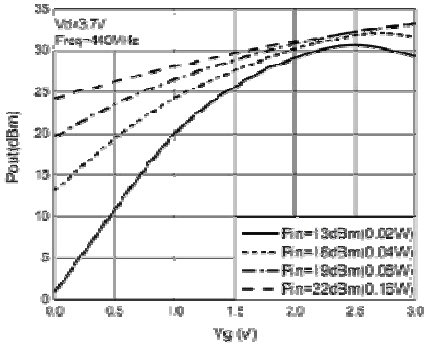
Part	Description	Part Number	Manufacturer
R1	1KOhm	—	—
L2,L3	1nH	—	—
L1	8 Turns D: 0.5 mm, φ 2.4 mm Enamel Wire	—	—
C1, C3,C4,C6,C9	100pF Chip Capacitors	GQM21P5C1H101JB01	Murata
C2, C5	10pF Chip Capacitors	GRM1885C1H201JA01	Murata
C7,C10	1000pF Chip Capacitors	GRM1885C1H102JA01	Murata
C8,C11	10uF,10VChip Capacitors	—	—
C12	18pF Chip Capacitors	—	Murata
PCB	FR-4 ,0.030",ε_r4.5	—	—

TYPICAL CHARACTERISTICS

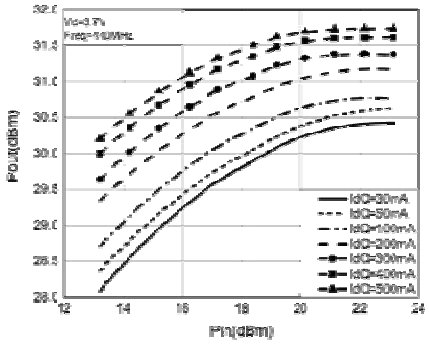
1、440MHz @Vds, Pout VS Vg

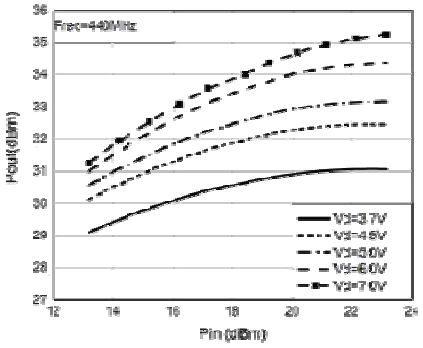




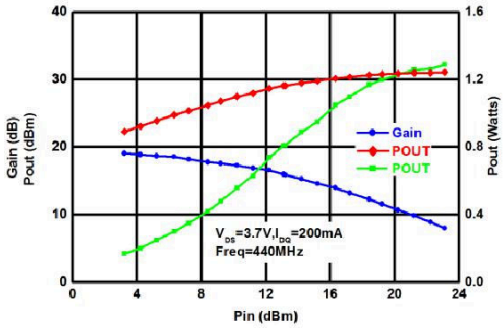


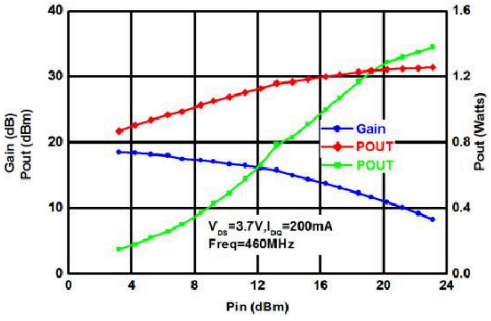
2、440MHz @Vgs, Pout Gain VS Pin

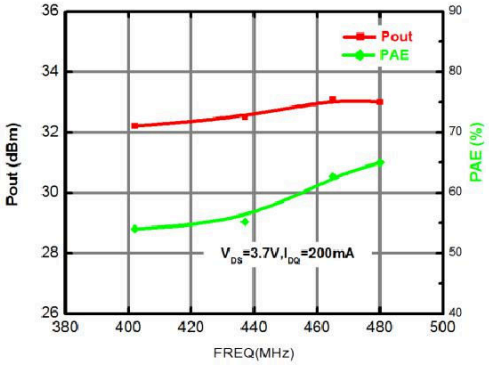




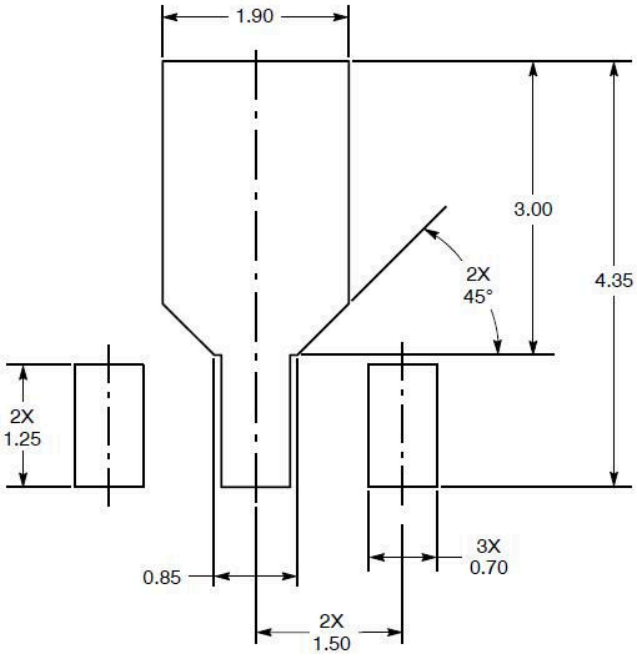
3、Freq@Vds, POUT, Pout Gain VS Pin



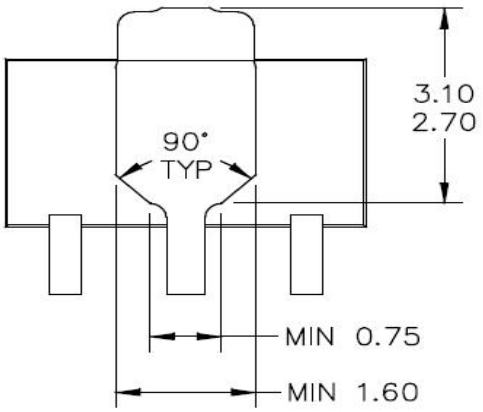




PACKAGE
Unit : mm

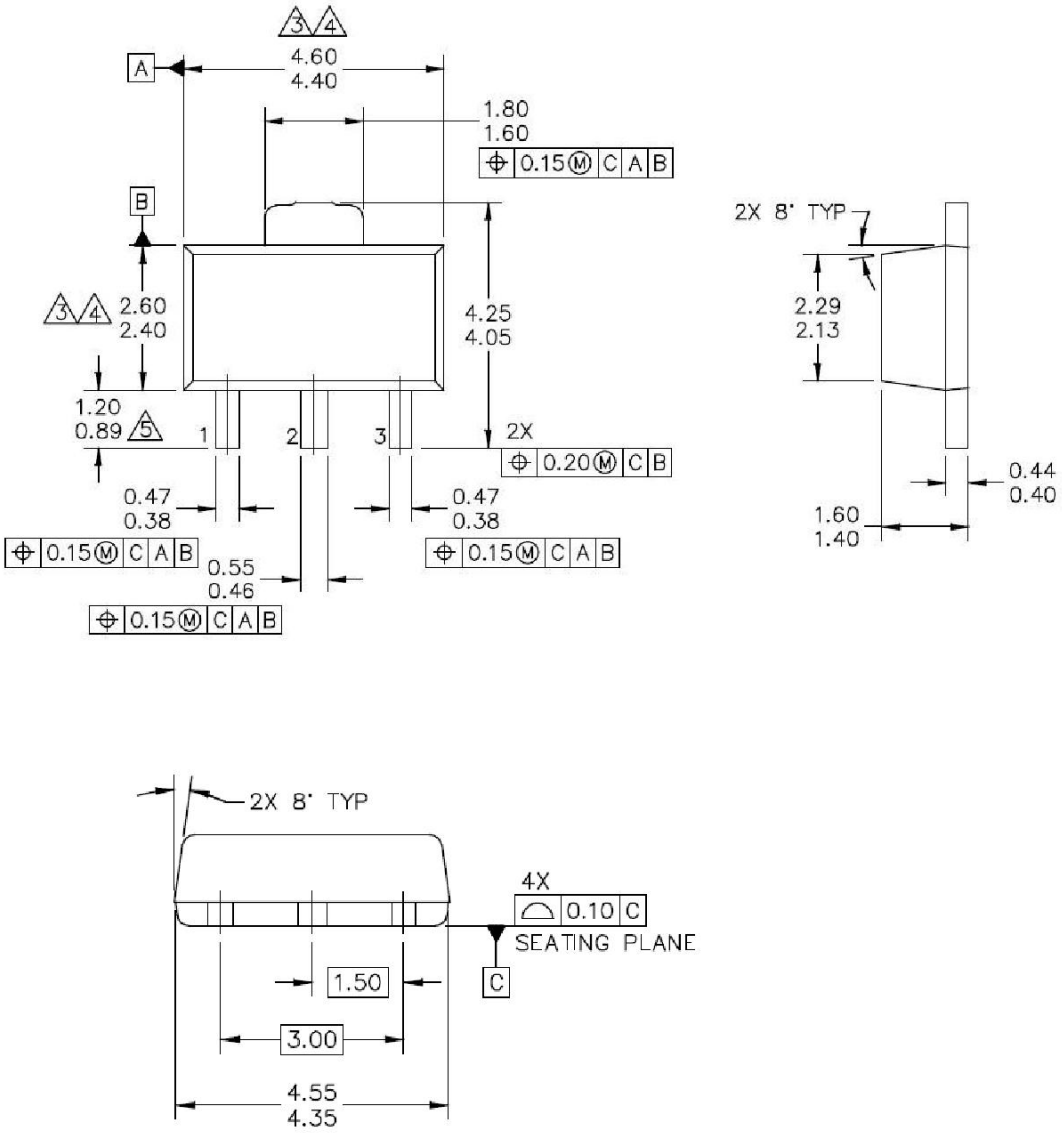


PCB Pad Layout for SOT– 89



Bottom View

PACKAGE DIMENSIONS



REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
1.0	May 2018	Initial Release of Data Sheet