



# RF Power LDMOS Transistor

## High Ruggedness N-Channel Enhancement-Mode Lateral MOSFET

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

### Narrowband Performance (7.5 Vdc, T<sub>A</sub> = 25°C, CW)

Frequency (MHz)	G <sub>ps</sub> (dB)	η <sub>D</sub> (%)	P <sub>out</sub> (W)
520 <sup>(1)</sup>	20.9	74.9	4.9

### Wideband Performance (7.5 Vdc, T<sub>A</sub> = 25°C, CW)

Frequency (MHz)	P <sub>in</sub> (W)	G <sub>ps</sub> (dB)	η <sub>D</sub> (%)	P <sub>out</sub> (W)
136–174 <sup>(2)</sup>	0.10	17.8	61.8	6.1
350–520 <sup>(3)</sup>	0.12	15.4	49.4	4.2

### Load Mismatch/Ruggedness

Frequency (MHz)	Signal Type	VSWR	P <sub>in</sub> (W)	Test Voltage	Result
435 <sup>(3)</sup>	CW	> 65:1 at all Phase Angles	0.24 (3 dB Overdrive)	9.0	No Device Degradation

1. Measured in 520 MHz narrowband test circuit.
2. Measured in 136–174 MHz VHF broadband reference circuit.
3. Measured in 350–520 MHz UHF broadband reference circuit.

### Features

- Characterized for Operation from 136 to 941 MHz
- Unmatched Input and Output Allowing Wide Frequency Range Utilization
- Integrated ESD Protection
- Integrated Stability Enhancements
- Wideband — Full Power Across the Band
- Exceptional Thermal Performance
- Extreme Ruggedness
- In Tape and Reel. T1 Suffix = 1,000 Units, 12 mm Tape Width, 7-inch Reel.

### Typical Applications

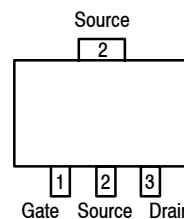
- Output Stage VHF Band Handheld Radio
- Output Stage UHF Band Handheld Radio
- Output Stage for 700–800 MHz Handheld Radio
- Driver for 10–1000 MHz Applications

**AFT05MS004NT1**

**136–941 MHz, 4 W, 7.5 V  
WIDEBAND  
RF POWER LDMOS TRANSISTOR**



SOT-89



**Figure 1. Pin Connections**

**Table 1. Maximum Ratings**

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	-0.5, +30	Vdc
Gate-Source Voltage	$V_{GS}$	-6.0, +12	Vdc
Operating Voltage	$V_{DD}$	12.5, +0	Vdc
Storage Temperature Range	$T_{stg}$	-65 to +150	°C
Case Operating Temperature Range	$T_C$	-40 to +150	°C
Operating Junction Temperature Range (1,2)	$T_J$	-40 to +150	°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	$P_D$	28 0.23	W W/°C

**Table 2. Thermal Characteristics**

Characteristic	Symbol	Value (2,3)	Unit
Thermal Resistance, Junction to Case Case Temperature 79°C, 4.0 W CW, 7.5 Vdc, $I_{DQ} = 100\text{ mA}$ , 520 MHz	$R_{\theta JC}$	4.4	°C/W

**Table 3. ESD Protection Characteristics**

Test Methodology	Class
Human Body Model (per JESD22-A114)	1C, passes 1000 V
Machine Model (per EIA/JESD22-A115)	A, passes 100 V
Charge Device Model (per JESD22-C101)	IV, passes 2000 V

**Table 4. Moisture Sensitivity Level**

Test Methodology	Rating	Package Peak Temperature	Unit
Per JESD22-A113, IPC/JEDEC J-STD-020	1	260	°C

**Table 5. Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

**Off Characteristics**

Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 30\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )	$I_{DSS}$	—	—	2	$\mu\text{Adc}$
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 7.5\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )	$I_{DSS}$	—	—	1	$\mu\text{Adc}$
Gate-Source Leakage Current ( $V_{GS} = 5\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	—	—	500	nAdc

**On Characteristics**

Gate Threshold Voltage ( $V_{DS} = 10\text{ Vdc}$ , $I_D = 67\ \mu\text{Adc}$ )	$V_{GS(th)}$	1.7	2.2	2.5	Vdc
Drain-Source On-Voltage ( $V_{GS} = 10\text{ Vdc}$ , $I_D = 700\text{ mAdc}$ )	$V_{DS(on)}$	—	.22	—	Vdc
Forward Transconductance ( $V_{DS} = 7.5\text{ Vdc}$ , $I_D = 4.0\text{ Adc}$ )	$g_{fs}$	—	4.0	—	S

**Dynamic Characteristics**

Reverse Transfer Capacitance ( $V_{DS} = 7.5\text{ Vdc} \pm 30\text{ mV(rms)ac}$ @ 1 MHz, $V_{GS} = 0\text{ Vdc}$ )	$C_{rss}$	—	1.63	—	pF
Output Capacitance ( $V_{DS} = 7.5\text{ Vdc} \pm 30\text{ mV(rms)ac}$ @ 1 MHz, $V_{GS} = 0\text{ Vdc}$ )	$C_{oss}$	—	34.8	—	pF
Input Capacitance ( $V_{DS} = 7.5\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc} \pm 30\text{ mV(rms)ac}$ @ 1 MHz)	$C_{iss}$	—	57.6	—	pF

1. Continuous use at maximum temperature will affect MTTF.
2. MTTF calculator available at <http://www.freescale.com/rf>. Select Software & Tools/Development Tools/Calculators to access MTTF calculators by product.
3. Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers*. Go to <http://www.freescale.com/rf>. Select Documentation/Application Notes - AN1955.

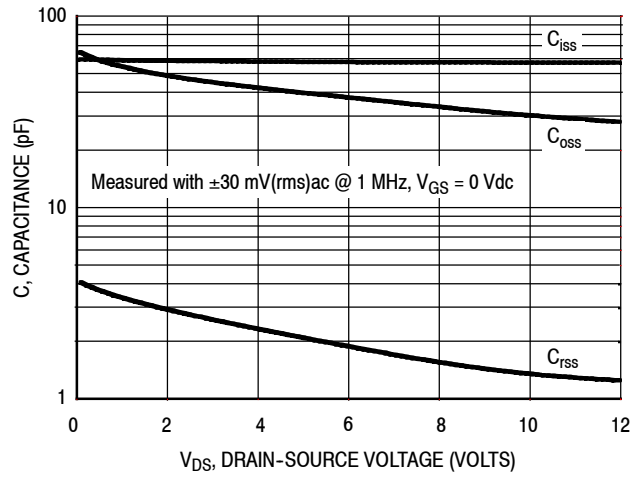
(continued)

**AFT05MS004NT1**

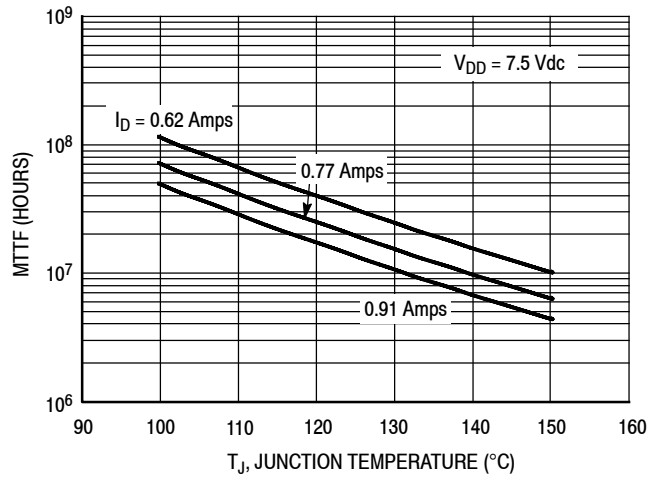
**Table 5. Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) **(continued)**

Characteristic	Symbol	Min	Typ	Max	Unit
<b>Functional Tests</b> (In Freescale Narrowband Test Fixture, 50 ohm system) $V_{DD} = 7.5\text{ Vdc}$ , $I_{DQ} = 100\text{ mA}$ , $P_{in} = 16\text{ dBm}$ , $f = 520\text{ MHz}$					
Common-Source Amplifier Output Power	$P_{out}$	—	4.9	—	W
Drain Efficiency	$\eta_D$	—	74.9	—	%

### TYPICAL CHARACTERISTICS



**Figure 2. Capacitance versus Drain-Source Voltage**

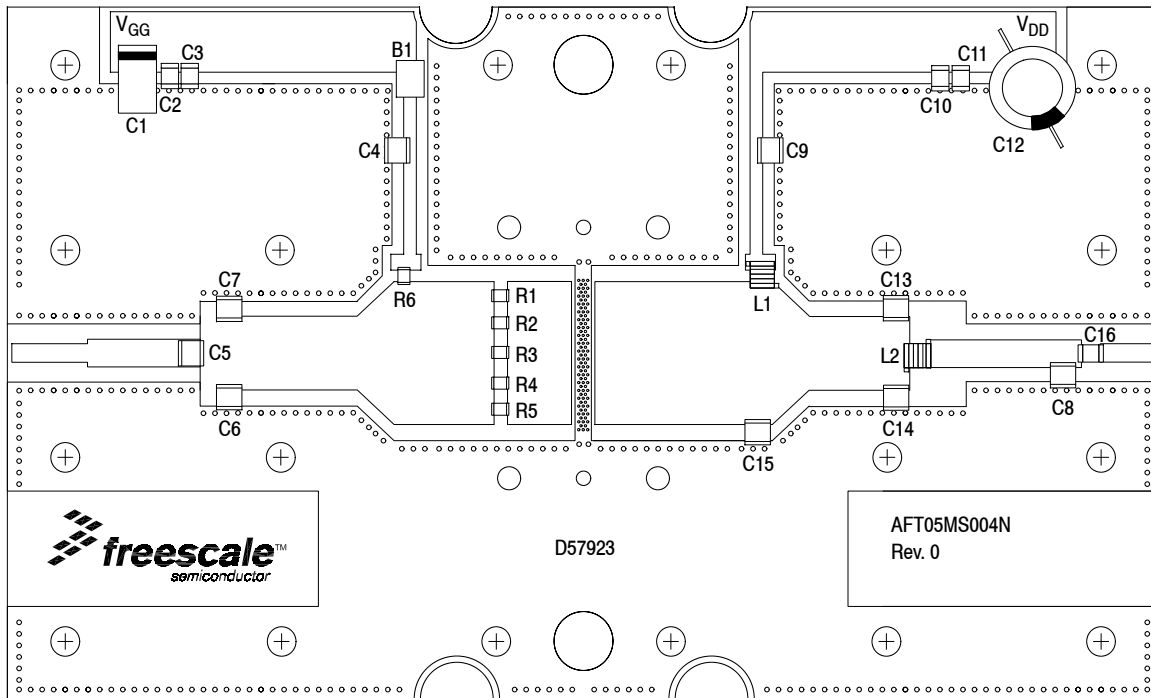


**Note:** MTTF value represents the total cumulative operating time under indicated test conditions.

MTTF calculator available at <http://www.freescale.com/rf>. Select Software & Tools/Development Tools/Calculators to access MTTF calculators by product.

**Figure 3. MTTF versus Junction Temperature — CW**

## 520 MHz NARROWBAND PRODUCTION TEST FIXTURE



**Figure 4. AFT05MS004NT1 Narrowband Test Circuit Component Layout — 520 MHz**

**Table 6. AFT05MS004NT1 Narrowband Test Circuit Component Designations and Values — 520 MHz**

Part	Description	Part Number	Manufacturer
B1	RF Bead, Short	2743019447	Fair-Rite
C1	22 $\mu$ F, 35 V Tantalum Capacitor	T491X226K035AT	Kemet
C2, C11	0.1 $\mu$ F Chip Capacitors	CDR33BX104AKWS	AVX
C3, C10	0.01 $\mu$ F Chip Capacitors	C0805C103K5RAC	Kemet
C4, C9	180 pF Chip Capacitors	ATC100B181JT300XT	ATC
C5	11 pF Chip Capacitor	ATC100B110JT500XT	ATC
C6, C7	13 pF Chip Capacitors	ATC100B130JT500XT	ATC
C8, C15	2.2 pF Chip Capacitors	ATC100B2R2JT500XT	ATC
C12	330 $\mu$ F, 35 V Electrolytic Capacitor	MCGPR35V337M10X16-RH	Multicomp
C13, C14	16 pF Chip Capacitors	ATC100B160JT500XT	ATC
C16	9.1 pF Chip Capacitor	ATC100B9R1CT500XT	ATC
L1	8.0 nH, 3 Turn Inductor	A03TKLC	Coilcraft
L2	5 nH, 2 Turn Inductor	A02TKLC	Coilcraft
R1, R2, R3, R4, R5	1.5 $\Omega$ , 1/4 W Chip Resistors	RC1206FR-071R5L	Yageo
R6	27 $\Omega$ , 1/4 W Chip Resistor	CRCW120627R0FKEA	Vishay
PCB	Rogers RO4350, 0.030", $\epsilon_r = 3.66$	D57923	MTL

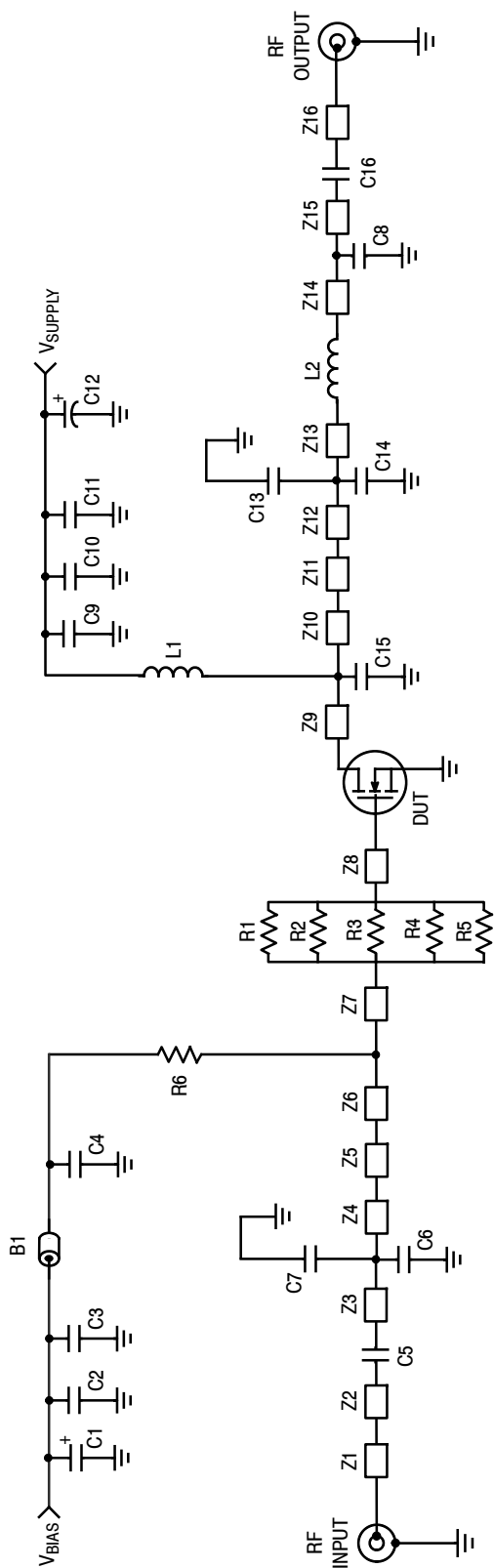


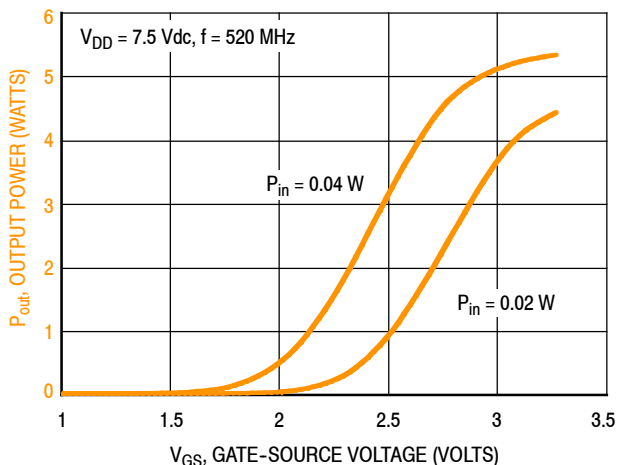
Figure 5. AFT05MS004NT1 Narrowband Test Circuit Schematic — 520 MHz

Table 7. AFT05MS004NT1 Narrowband Test Circuit Microstrips — 520 MHz

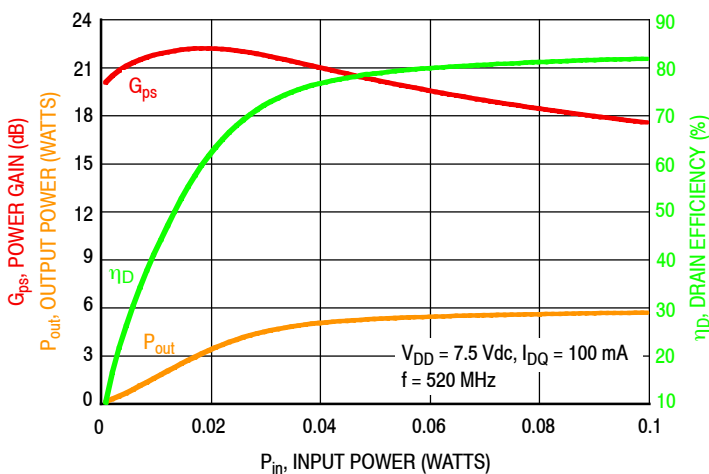
Microstrip	Description
Z1	0.328" x 0.080" Microstrip
Z2	0.490" x 0.120" Microstrip
Z3	0.055" x 0.320" Microstrip
Z4	0.555" x 0.320" Microstrip
Z5	0.160" x 0.320" x 0.620" Taper Microstrip
Z6	0.045" x 0.620" Microstrip
Z7	0.387" x 0.620" Microstrip
Z8	0.273" x 0.620" Microstrip

Microstrip	Description
Z9	0.708" x 0.620" Microstrip
Z10	0.062" x 0.620" Microstrip
Z11	0.162" x 0.620" x 0.320" Taper Microstrip
Z12	0.377" x 0.320" Microstrip
Z13	0.055" x 0.320" Microstrip
Z14	0.587" x 0.120" Microstrip
Z15	0.078" x 0.120" Microstrip
Z16	0.238" x 0.080" Microstrip

## TYPICAL CHARACTERISTICS — 520 MHz NARROWBAND REFERENCE CIRCUIT



**Figure 6. Output Power versus Gate-Source Voltage**



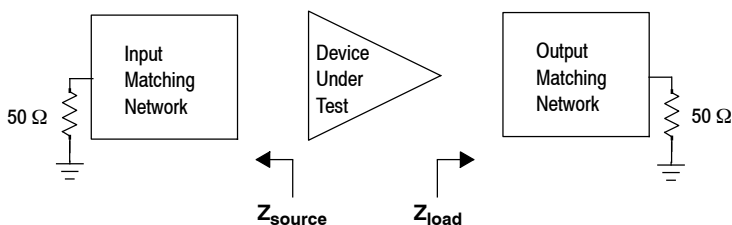
**Figure 7. Power Gain, Drain Efficiency and Output Power versus Input Power**

$V_{DD} = 7.5 \text{ Vdc}, I_{DQ} = 100 \text{ mA}, P_{out} = 4 \text{ W}$

f MHz	$Z_{source}$ Ω	$Z_{load}$ Ω
520	$1.35 + j2.15$	$2.10 + j1.70$

$Z_{source}$  = Test circuit impedance as measured from gate to ground.

$Z_{load}$  = Test circuit impedance as measured from drain to ground.



**Figure 8. Narrowband Series Equivalent Source and Load Impedance — 520 MHz**

## 136–174 MHz VHF BROADBAND REFERENCE CIRCUIT

**Table 8. 136–174 MHz VHF Broadband Performance** (In Freescale Reference Circuit, 50 ohm system)

$V_{DD} = 7.5$  Volts,  $I_{DQ} = 100$  mA,  $T_A = 25^\circ\text{C}$ , CW

Frequency (MHz)	$P_{in}$ (W)	$G_{ps}$ (dB)	$\eta_D$ (%)	$P_{out}$ (W)
135	0.10	17.8	62.3	6.0
155	0.06	20.2	69.1	6.0
175	0.10	17.9	61.8	6.0

**Table 9. Load Mismatch/Ruggedness** (In Freescale Reference Circuit)

Frequency (MHz)	Signal Type	VSWR	$P_{in}$ (W)	Test Voltage, $V_{DD}$	Result
155	CW	> 65:1 at all Phase Angles	0.2 (3 dB Overdrive)	9.0	No Device Degradation



### 136–174 MHz VHF BROADBAND REFERENCE CIRCUIT

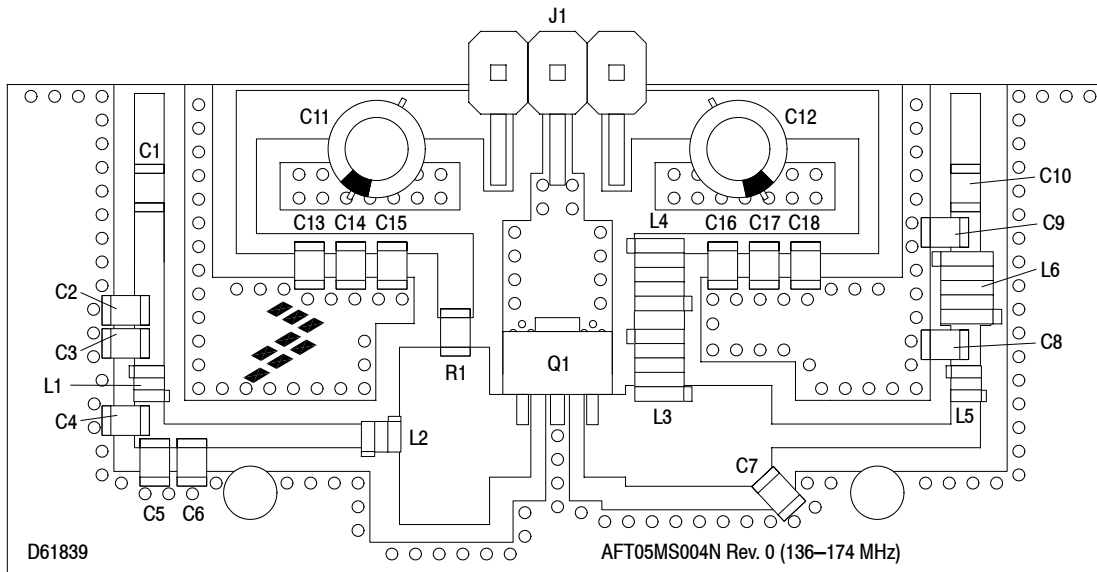


Figure 9. AFT05MS004NT1 VHF Broadband Reference Circuit Component Layout — 136–174 MHz

Table 10. AFT05MS004NT1 VHF Broadband Reference Circuit Component Designations and Values — 136–174 MHz

Part	Description	Part Number	Manufacturer
C1, C10, C14, C17	1 nF Chip Capacitors	2012X7R2E102M	TDK
C2	39 pF Chip Capacitor	ATC600F390JT250XT	ATC
C3, C8	56 pF Chip Capacitors	ATC600F560JT250XT	ATC
C4, C5	68 pF Chip Capacitors	ATC600F680JT250XT	ATC
C6, C15, C16	100 pF Chip Capacitors	ATC600F101JT250XT	ATC
C7	150 pF Chip Capacitor	ATC600F151JT250XT	ATC
C9	8.2 pF Chip Capacitor	ATC600F8R2BT250XT	ATC
C11, C12	10 $\mu$ F, 50 V Electrolytic Capacitors	UVR1H100MDD	Nichicon
C13, C18	1 $\mu$ F Chip Capacitors	GRM21BR71H105KA12L	Murata
J1	Breakaway Header, Right-Angle 3 Pins	22-28-8360	Molex
L1	13.7 nH Inductor	0807SQ14N	Coilcraft
L2	12.3 nH Inductor	0806SQ12N	Coilcraft
L3, L4	25.0 nH Inductors	0908SQ25N	Coilcraft
L5	15.7 nH Inductor	0806SQ16N	Coilcraft
L6	27.3 nH Inductor	0908SQ27N	Coilcraft
Q1	RF Power LDMOS Transistor	AFT05MS004NT1	Freescale
R1	33 $\Omega$ , 1/10 W Chip Resistor	CRCW080533R0JNEA	Vishay
PCB	0.020", $\epsilon_r = 4.8$ , FR4 (S-1000)	D61839	MTL

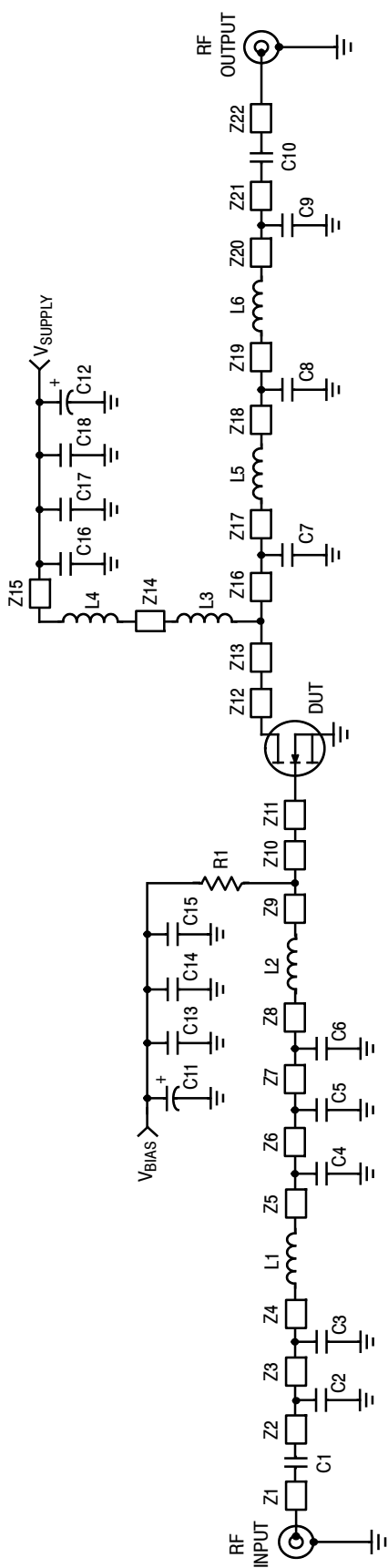


Figure 10. AFT05MS004NT1 VHF Broadband Reference Circuit Schematic — 136–174 MHz

Table 11. AFT05MS004NT1 VHF Broadband Reference Circuit Microstrips — 136–174 MHz

Microstrip	Description	Microstrip	Description
Z1	0.120" x 0.050" Microstrip	Z9	0.070" x 0.300" Microstrip
Z2	0.142" x 0.050" Microstrip	Z10	0.032" x 0.300" Microstrip
Z3	0.010" x 0.050" Microstrip	Z11	0.070" x 0.140" Microstrip
Z4	0.012" x 0.050" Microstrip	Z12	0.070" x 0.140" Microstrip
Z5	0.010" x 0.050" Microstrip	Z13	0.015" x 0.170" Microstrip
Z6*	0.010" x 0.050" Microstrip	Z14	0.030" x 0.084" Microstrip
Z7	0.012" x 0.040" Microstrip	Z15	0.040" x 0.040" Microstrip
Z8	0.265" x 0.040" Microstrip		
		Z16	0.015" x 0.170" Microstrip
		Z17*	0.357" x 0.050" Microstrip
		Z18	0.010" x 0.050" Microstrip
		Z19	0.010" x 0.050" Microstrip
		Z20	0.010" x 0.050" Microstrip
		Z21	0.010" x 0.050" Microstrip
		Z22	0.120" x 0.050" Microstrip

\* Line length includes microstrip bends

## TYPICAL CHARACTERISTICS — 136–174 MHz VHF BROADBAND REFERENCE CIRCUIT

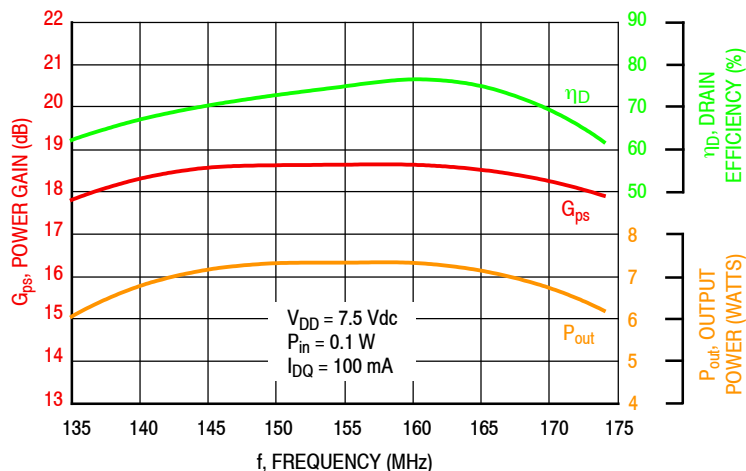


Figure 11. Power Gain, Drain Efficiency and Output Power versus Frequency at a Constant  $P_{in}$

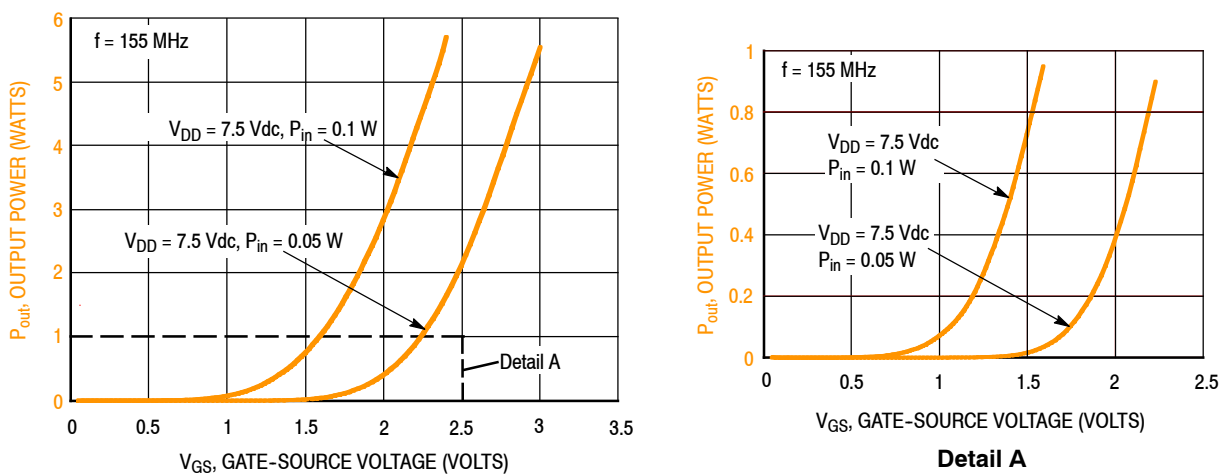


Figure 12. Output Power versus Gate-Source Voltage

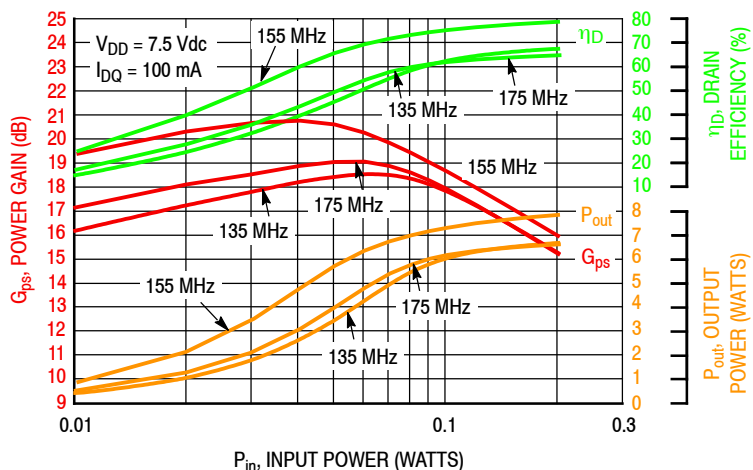
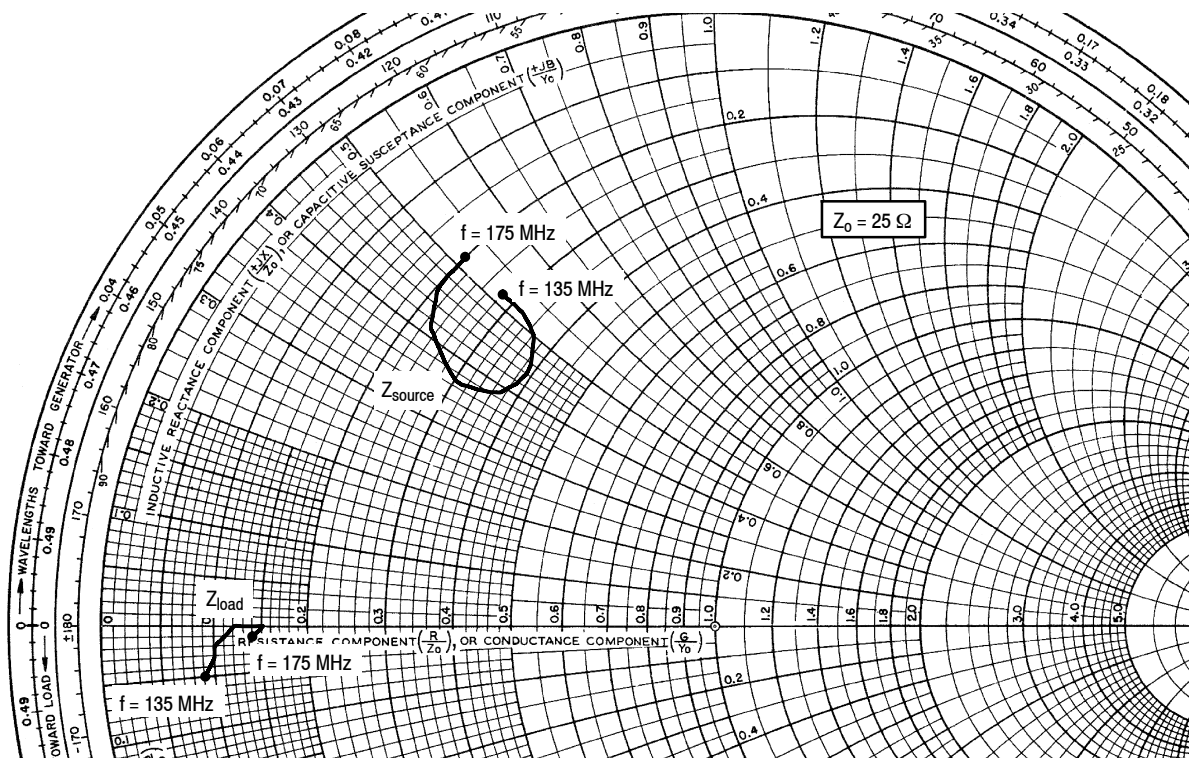


Figure 13. Power Gain, Drain Efficiency and Output Power versus Input Power and Frequency

### 136–174 MHz VHF BROADBAND REFERENCE CIRCUIT



$V_{DD} = 7.5 \text{ Vdc}$ ,  $I_{DQ} = 100 \text{ mA}$ ,  $P_{out} = 4 \text{ W}$

f MHz	$Z_{source} \Omega$	$Z_{load} \Omega$
135	$7.02 + j13.05$	$2.24 - j1.21$
140	$8.07 + j13.00$	$2.42 - j0.87$
145	$9.05 + j12.43$	$2.56 - j0.54$
150	$9.68 + j11.26$	$2.79 - j0.24$
155	$9.16 + j9.82$	$3.08 - j0.07$
160	$7.39 + j9.21$	$3.23 - j0.03$
165	$5.83 + j10.15$	$3.52 - j0.09$
170	$5.09 + j11.62$	$3.77 - j0.01$
175	$5.06 + j12.97$	$3.40 - j0.27$

$Z_{source}$  = Test circuit impedance as measured from gate to ground.

$Z_{load}$  = Test circuit impedance as measured from drain to ground.

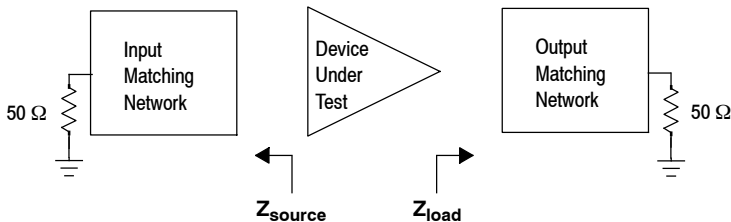


Figure 14. VHF Broadband Series Equivalent Source and Load Impedance — 136–174 MHz

## 350–520 MHz UHF BROADBAND REFERENCE CIRCUIT

**Table 12. 350–520 MHz UHF Broadband Performance** (In Freescale Reference Circuit, 50 ohm system)  
 $V_{DD} = 7.5$  Volts,  $I_{DQ} = 50$  mA,  $T_A = 25^\circ\text{C}$ , CW

Frequency (MHz)	$P_{in}$ (W)	$G_{ps}$ (dB)	$\eta_D$ (%)	$P_{out}$ (W)
350	0.11	15.5	48.7	4.0
470	0.04	19.8	67.7	4.0
520	0.09	16.3	71.1	4.0

**Table 13. Load Mismatch/Ruggedness** (In Freescale Reference Circuit)

Frequency (MHz)	Signal Type	VSWR	$P_{in}$ (W)	Test Voltage, $V_{DD}$	Result
435	CW	> 65:1 at all Phase Angles	0.24 (3 dB Overdrive)	9.0	No Device Degradation

### 350–520 MHz UHF BROADBAND REFERENCE CIRCUIT

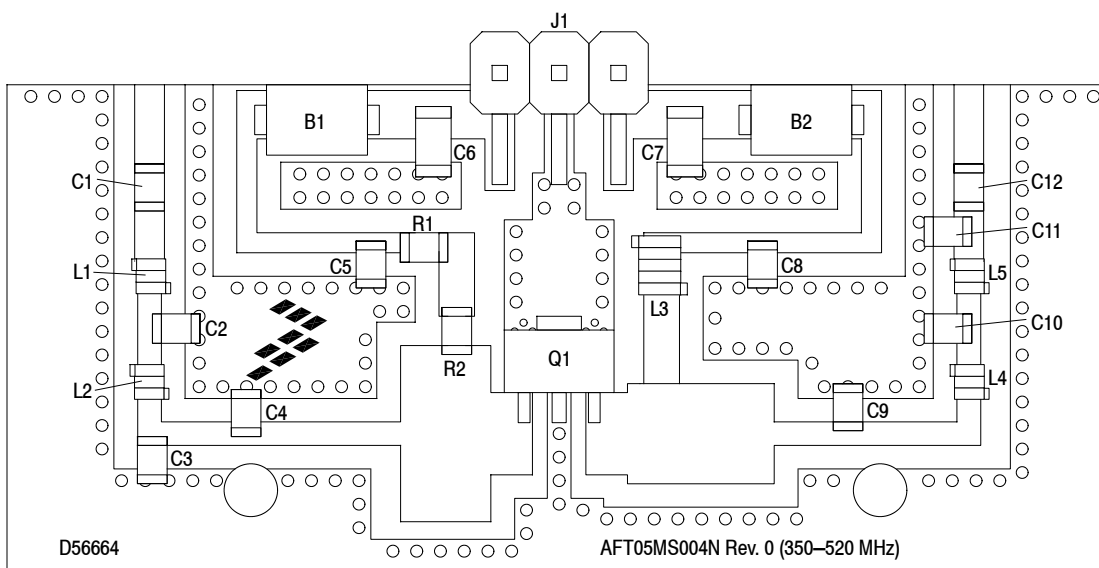


Figure 15. AFT05MS004NT1 UHF Broadband Reference Circuit Component Layout — 350–520 MHz

Table 14. AFT05MS004NT1 UHF Broadband Reference Circuit Component Designations and Values — 350–520 MHz

Part	Description	Part Number	Manufacturer
B1, B2	RF Beads	2743019447	Fair-Rite
C1, C10	18 pF Chip Capacitors	GQM2195C2E180FB12D	Murata
C5, C8, C12	100 pF Chip Capacitors	GQM2195C2E101GB12D	Murata
C2, C3	15 pF Chip Capacitors	GQM2195C2E150FB12D	Murata
C4	56 pF Chip Capacitor	GQM2195C2E560GB12D	Murata
C6	1 $\mu$ F Chip Capacitor	GRM31CR72A105KA01L	Murata
C7	10 $\mu$ F Chip Capacitor	GRM31CR61H106KA12L	Murata
C9	39 pF Chip Capacitor	GQM2195C2E390GB12D	Murata
C11	5.1 pF Chip Capacitor	GQM2195C2E5R1BB12D	Murata
J1	Breakaway Header, Right-Angle 3 Pins	22-28-8360	Molex
L1, L2	5.5 nH Inductors	0806SQ5N5	Coilcraft
L3	16.6 nH Inductor	0908SQ17N	Coilcraft
L4	2.55 nH Inductor	0906-3JLC	Coilcraft
L5	8.1 nH Inductor	0908SQ8N1	Coilcraft
Q1	RF Power LDMOS Transistor	AFT05MS004NT1	Freescle
R1, R2	22 $\Omega$ , 1/10 W Chip Resistors	RR1220Q-220-D	Susumu
PCB	0.020", $\epsilon_r = 4.8$ , FR4 (S-1000)	D56664	MTL

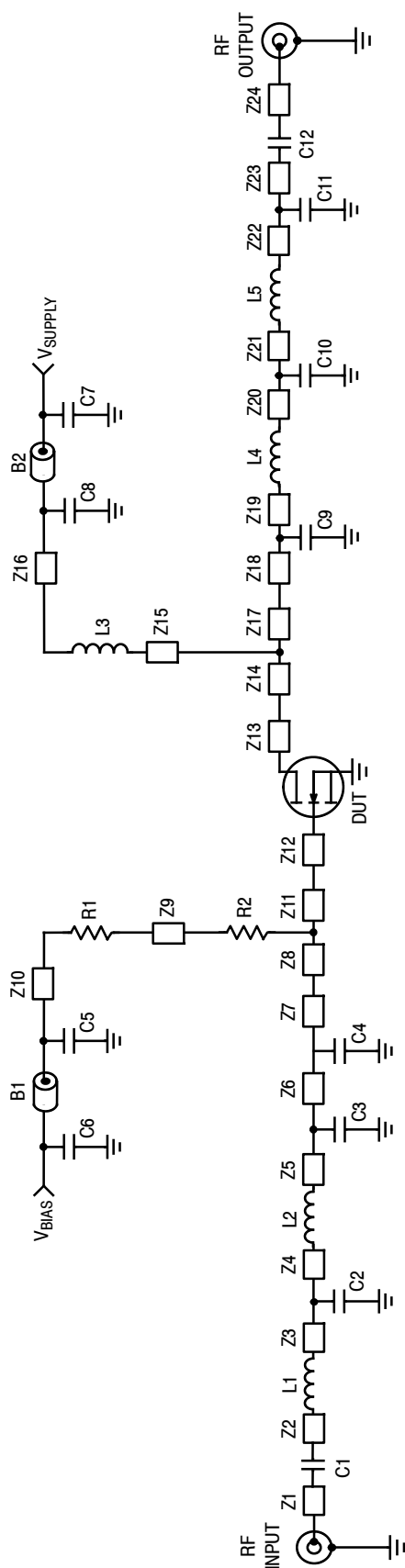


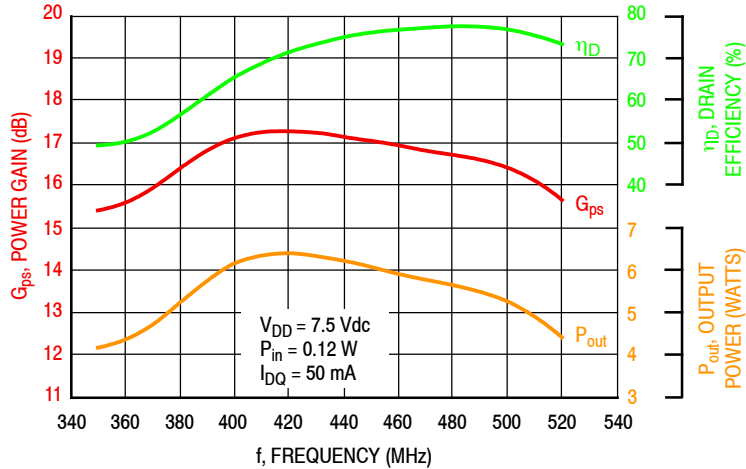
Figure 16. AFT05MS004NT1 UHF Broadband Reference Circuit Schematic — 350–520 MHz

Table 15. AFT05MS004NT1 UHF Broadband Reference Circuit Microstrips — 350–520 MHz

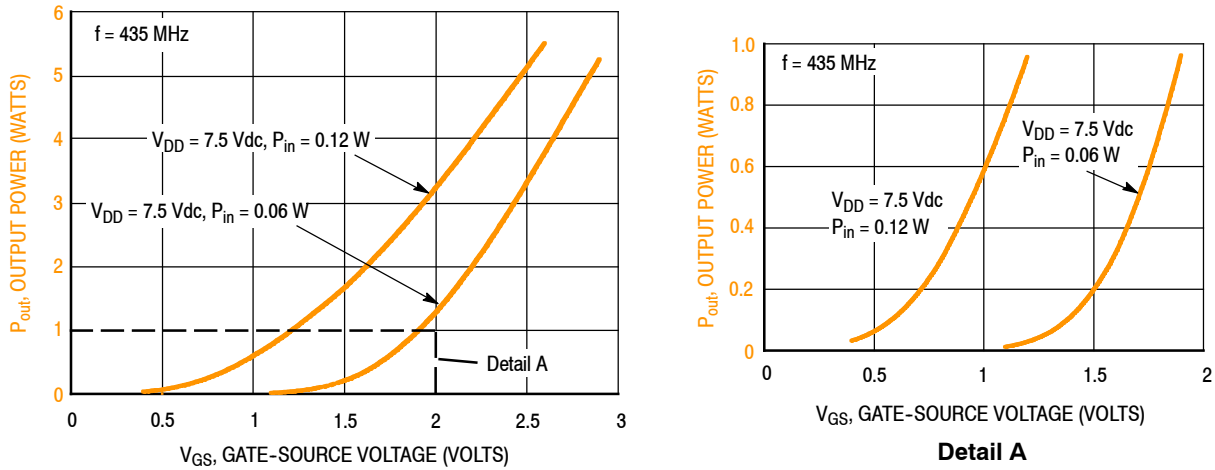
Microstrip	Description	Microstrip	Description
Z1	0.150" x 0.050" Microstrip	Z9	0.140" x 0.060" Microstrip
Z2	0.090" x 0.050" Microstrip	Z10	0.065" x 0.034" Microstrip
Z3	0.070" x 0.050" Microstrip	Z11	0.057" x 0.300" Microstrip
Z4	0.070" x 0.050" Microstrip	Z12	0.070" x 0.140" Microstrip
Z5*	0.090" x 0.050" Microstrip	Z13	0.070" x 0.140" Microstrip
Z6*	0.160" x 0.050" Microstrip	Z14	0.057" x 0.170" Microstrip
Z7	0.260" x 0.050" Microstrip	Z15	0.140" x 0.060" Microstrip
Z8	0.095" x 0.300" Microstrip	Z16	0.200" x 0.034" Microstrip
Z17	0.190" x 0.170" Microstrip	Z20	0.070" x 0.050" Microstrip
Z18	0.150" x 0.050" Microstrip	Z21	0.070" x 0.050" Microstrip
Z19*	0.270" x 0.050" Microstrip	Z22	0.050" x 0.050" Microstrip
Z20	0.070" x 0.050" Microstrip	Z23	0.050" x 0.050" Microstrip
Z21	0.070" x 0.050" Microstrip	Z24	0.150" x 0.050" Microstrip
Z22	0.050" x 0.050" Microstrip		
Z23	0.050" x 0.050" Microstrip		
Z24	0.150" x 0.050" Microstrip		

\* Line length includes microstrip bends

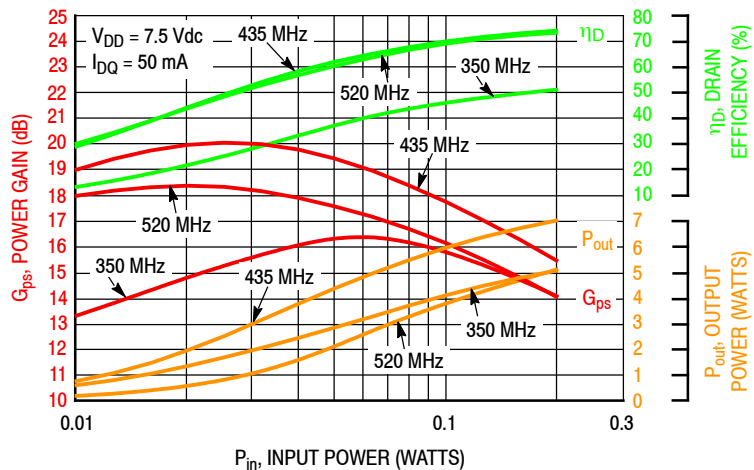
## TYPICAL CHARACTERISTICS — 350–520 MHz UHF BROADBAND REFERENCE CIRCUIT



**Figure 17. Power Gain, Drain Efficiency and Output Power versus Frequency at a Constant  $P_{in}$**



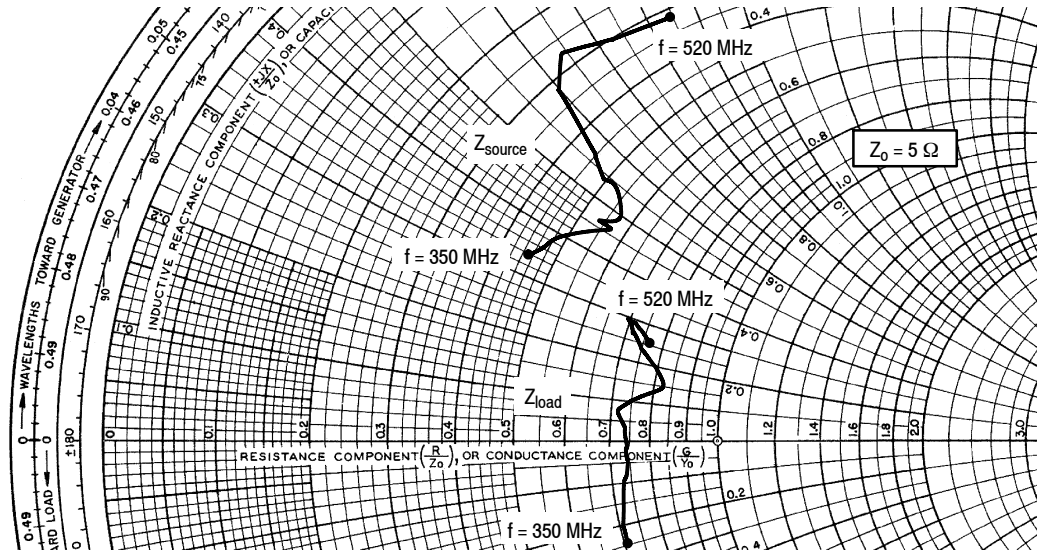
**Figure 18. Output Power versus Gate-Source Voltage**



**Figure 19. Power Gain, Drain Efficiency and Output Power versus Input Power and Frequency**



### 350–520 MHz UHF BROADBAND REFERENCE CIRCUIT



$V_{DD} = 7.5 \text{ Vdc}$ ,  $I_{DQ} = 50 \text{ mA}$ ,  $P_{out} = 4 \text{ W}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
350	2.27 - j1.72	3.55 + j1.20
360	2.41 - j1.91	3.61 + j0.92
370	2.55 - j2.11	3.66 + j0.64
380	2.68 - j2.31	3.71 + j0.36
390	2.74 - j2.38	3.71 + j0.15
400	2.76 - j2.36	3.69 + j0.02
410	2.77 - j2.35	3.66 + j0.18
420	2.78 - j2.35	3.67 + j0.34
430	2.78 - j2.43	3.82 + j0.48
440	2.79 - j2.50	3.97 + j0.62
450	2.79 - j2.57	4.13 + j0.76
460	2.44 - j2.70	4.00 + j0.95
470	2.02 - j2.84	3.80 + j1.15
480	1.59 - j2.98	3.61 + j1.36
490	1.37 - j3.20	3.53 + j1.46
500	1.45 - j3.53	3.62 + j1.41
510	1.52 - j3.86	3.71 + j1.36
520	1.60 - j4.19	3.80 + j1.31

$Z_{source}$  = Test circuit impedance as measured from gate to ground.

$Z_{load}$  = Test circuit impedance as measured from drain to ground.

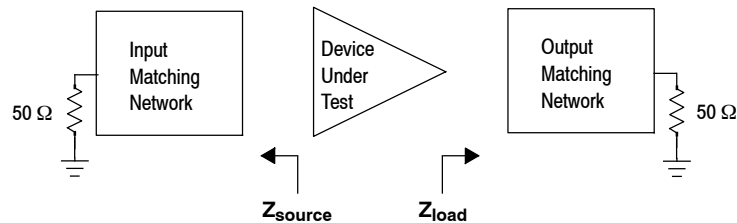


Figure 20. UHF Broadband Series Equivalent Source and Load Impedance — 350–520 MHz

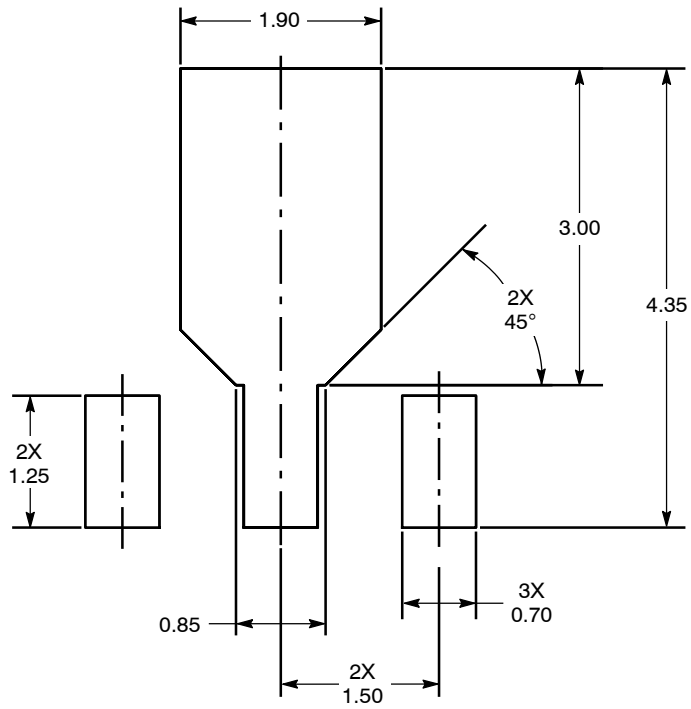
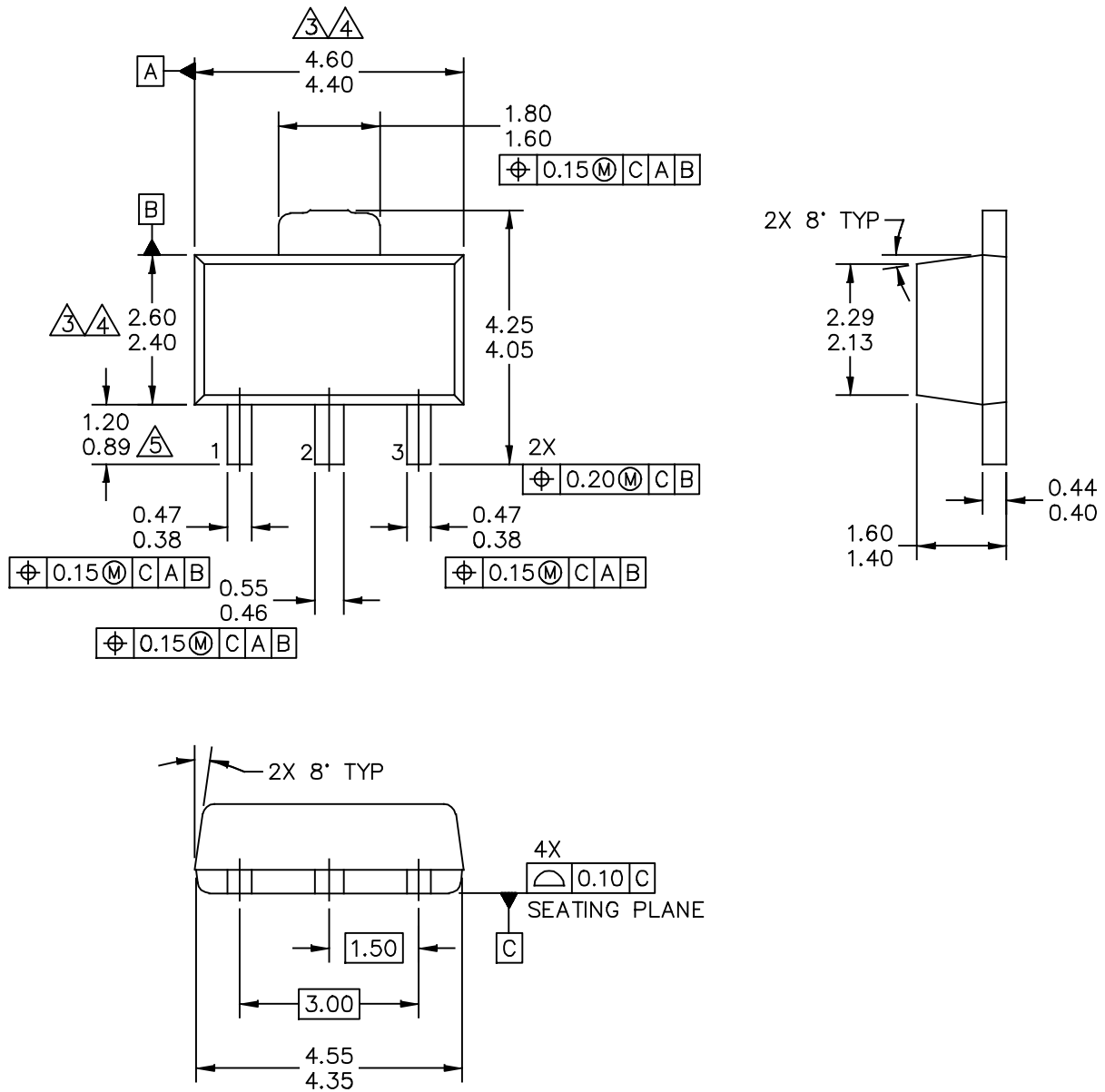


Figure 21. PCB Pad Layout for SOT-89A

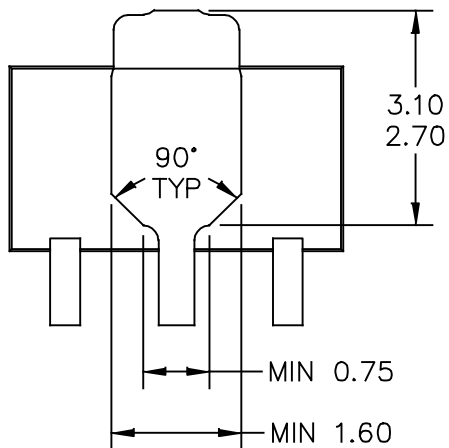


Figure 22. Product Marking

PACKAGE DIMENSIONS



© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE	
TITLE: SOT-89A, 3 LEAD, 4.5 X 2.5 PKG, 1.5 MM PITCH	DOCUMENT NO: 98ASA00241D	REV: 0	
	CASE NUMBER: 2142-01	15 JUL 2010	
	STANDARD: NON-JEDEC		



BOTTOM VIEW

© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE	
TITLE: SOT-89A, 3 LEAD, 4.5 X 2.5 PKG, 1.5 MM PITCH	DOCUMENT NO: 98ASA00241D	REV: 0	
	CASE NUMBER: 2142-01	15 JUL 2010	
	STANDARD: NON-JEDEC		

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M – 1994.
2. ALL DIMENSIONS ARE IN MILLIMETERS.

3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.5 MM PER END. DIMENSION DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.5 MM PER SIDE.

4. DIMENSION ARE DETERMINED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.

5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE	
TITLE: SOT-89A, 3 LEAD, 4.5 X 2.5 PKG, 1.5 MM PITCH	DOCUMENT NO: 98ASA00241D	REV: 0	
	CASE NUMBER: 2142-01	15 JUL 2010	
	STANDARD: NON-JEDEC		

## PRODUCT DOCUMENTATION, SOFTWARE AND TOOLS

Refer to the following documents, software and tools to aid your design process.

### Application Notes

- AN1955: Thermal Measurement Methodology of RF Power Amplifiers

### Engineering Bulletins

- EB212: Using Data Sheet Impedances for RF LDMOS Devices

### Software

- Electromigration MTTF Calculator
- RF High Power Model
- .s2p File

### Development Tools

- Printed Circuit Boards

For Software and Tools, do a Part Number search at <http://www.freescale.com>, and select the “Part Number” link. Go to the Software & Tools tab on the part’s Product Summary page to download the respective tool.

## REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
0	July 2014	• Initial Release of Data Sheet

### ***How to Reach Us:***

**Home Page:**  
[freescale.com](http://freescale.com)

**Web Support:**  
[freescale.com/support](http://freescale.com/support)

Information in this document is provided solely to enable system and software implementers to use Freescale products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits based on the information in this document.

Freescale reserves the right to make changes without further notice to any products herein. Freescale makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does Freescale assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters that may be provided in Freescale data sheets and/or specifications can and do vary in different applications, and actual performance may vary over time. All operating parameters, including "typicals," must be validated for each customer application by customer's technical experts. Freescale does not convey any license under its patent rights nor the rights of others. Freescale sells products pursuant to standard terms and conditions of sale, which can be found at the following address: [freescale.com/SalesTermsandConditions](http://freescale.com/SalesTermsandConditions).

Freescale and the Freescale logo are trademarks of Freescale Semiconductor, Inc., Reg. U.S. Pat. & Tm. Off. Airfast is a trademark of Freescale Semiconductor, Inc. All other product or service names are the property of their respective owners.

© 2014 Freescale Semiconductor, Inc.