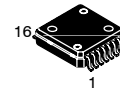


The RF Line
921 MHz - 960 MHz SiFET
RF Integrated Power Amplifier

MHVIC910HR2

960 MHz, 10 W, 26 V
GSM CELLULAR
RF LDMOS INTEGRATED CIRCUIT



CASE 978-03
PFP-16

The MHVIC910HR2 integrated circuit is designed for GSM base stations, uses Motorola's newest High Voltage (26 Volts) LDMOS IC technology, and contains a three-stage amplifier. Target applications include macrocell (driver function) and microcell base stations (final stage). The device is in a PFP-16 Power Flat Pack package which gives excellent thermal performances through a solderable backside contact.

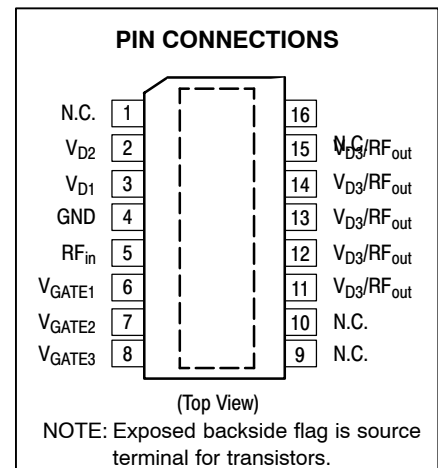
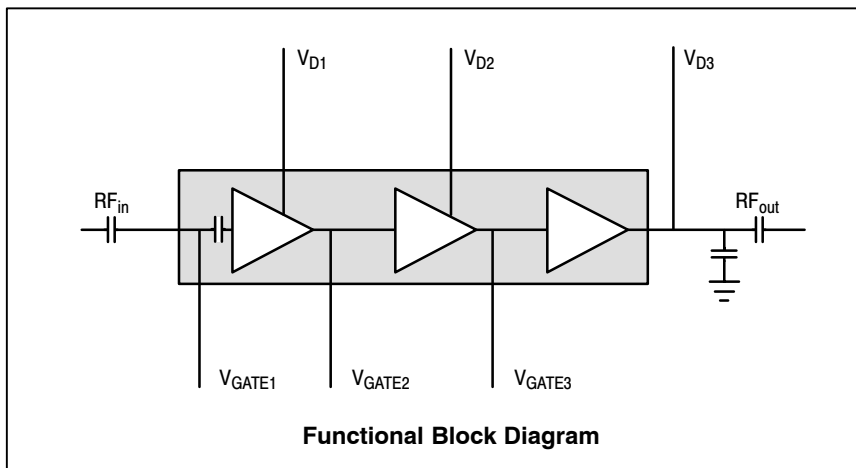
- Typical GSM Performance @ Full Frequency Band (921 - 960 MHz), 26 Volts
 Output Power - 40 dBm (CW) @ P1dB
 Power Gain - 39 dB @ P1dB
 Efficiency - 48% @ P1dB
- On-Chip Matching (50 Ohm Input, DC Blocked, >5 Ohm Output)
- Integrated ESD Protection
- Usable Frequency Range - 921 to 960 MHz
- In Tape and Reel. R2 Suffix = 1,500 Units per 16 mm, 13 inch Reel.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain Supply Voltage	V _{DD}	28	Vdc
Gate Supply Voltage	V _{GS}	6	Vdc
RF Input Power	P _{in}	5	dBm
Case Operating Temperature	T _C	- 30 to + 85	°C
Storage Temperature Range	T _{stg}	- 65 to + 150	°C
Operating Channel Temperature	T _{ch}	150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case	R _{θJC}	2.9	°C/W



NOTE: MHVIC910HR2 Moisture Sensitivity Level (MSL) = 3.

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ESD PROTECTION CHARACTERISTICS

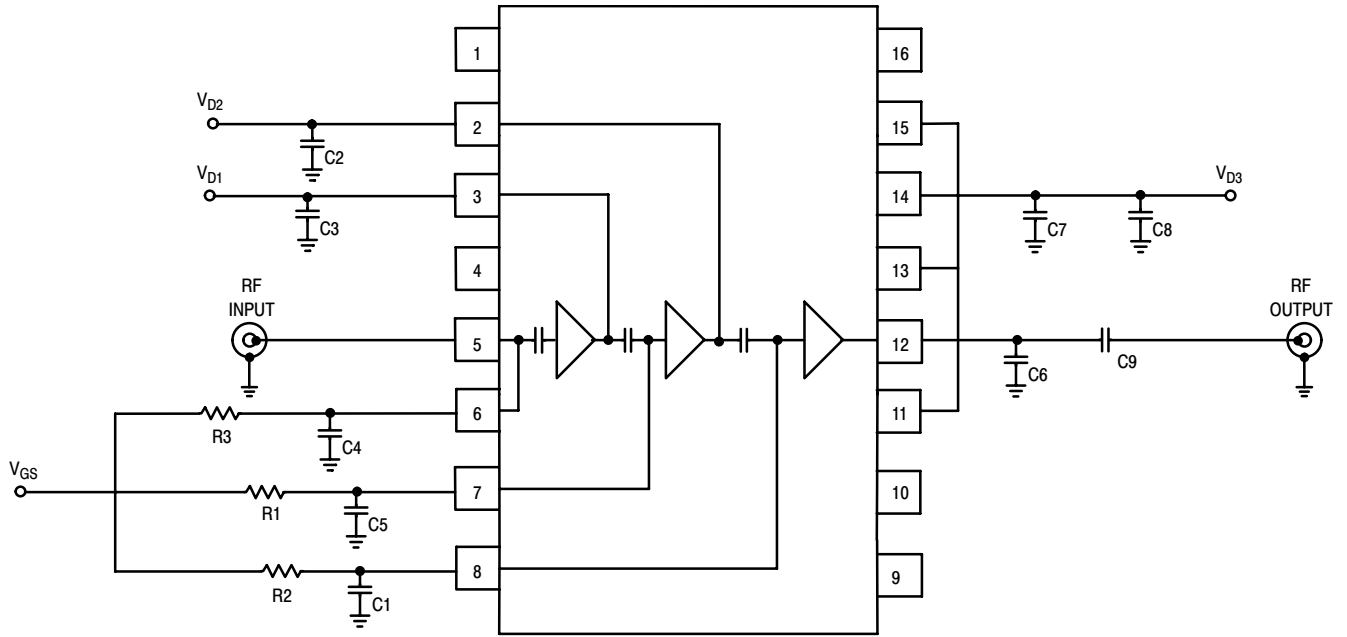
Test Conditions	Class
Human Body Model	0 (Minimum)
Machine Model	M2 (Minimum)

RECOMMENDED OPERATING RANGES

Parameter	Symbol	Value	Unit
Drain Supply Voltage	V_{DD}	26	Vdc
3rd Stage Quiescent Current	I_{DQ3}	150	mA
2nd Stage Quiescent Current	I_{DQ2}	50	mA
1st Stage Quiescent Current	I_{DQ1}	25	mA

ELECTRICAL CHARACTERISTICS ($V_{DD} = 26$ V, V_{GS} set for $I_{DQ3} = 150$ mA, $T_A = 25^\circ\text{C}$ matched to a $50\ \Omega$ system, frequency range 921 - 960 MHz, unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Frequency Range	f_{RF}	921	—	960	MHz
Output Power @ 1 dB Compression Point	P @ 1dB	39	40	—	dBm
Power Gain @ P1dB	G @ 1dB	38	39	—	dB
Power Added Efficiency @ 1 dB Compression Point	PAE @ 1dB	43	48	—	%
Input Return Loss @ P1dB	IRL @ 1dB	—	-15	-10	dB
Gain Flatness @ 40 dBm Variation ($T_C = -30$ to $+85^\circ\text{C}$ @ 40 dBm)	G_F G_V	— —	.5 5	— —	dB dB
Load Stability ($V_{DS} = 24$ V to 28 V, $P_{out} = P1dB$ Down to 0 dBm, All Phase Angles)	VSWR	10:1	—	—	—
Ruggedness ($V_{DS} = 26$ V, $P_{out} = 42$ dBm, Load VSWR = 10:1, All Phase Angles)	Ψ	No Damage After Test			



- | | | | |
|------------------------|--|------------|---------------------------------------|
| C1, C2, C3, C4, C5, C8 | 1 μ F Surface Mount Chip Capacitors | J1, J2 | Header (Break-away), HDR2X10STIMCSAFU |
| C6 | 4.7 pF AVX Chip Capacitor, ACCU-P (08051J4R7BBT) | J3, J4 | SMA Connector 2052-1618-02 (Threaded) |
| C7 | 47 pF AVX Chip Capacitor, ACCU-P (08055K470JBTTTR) | R1, R2, R3 | 100 Ω Chip Resistors (0402) |
| C9 | 33 pF AVX Chip Capacitor, ACCU-P (08053J330JBT) | PCB | Rogers 04350, 20 mils |

Figure 1. 921-960 MHz Demo Board Schematic

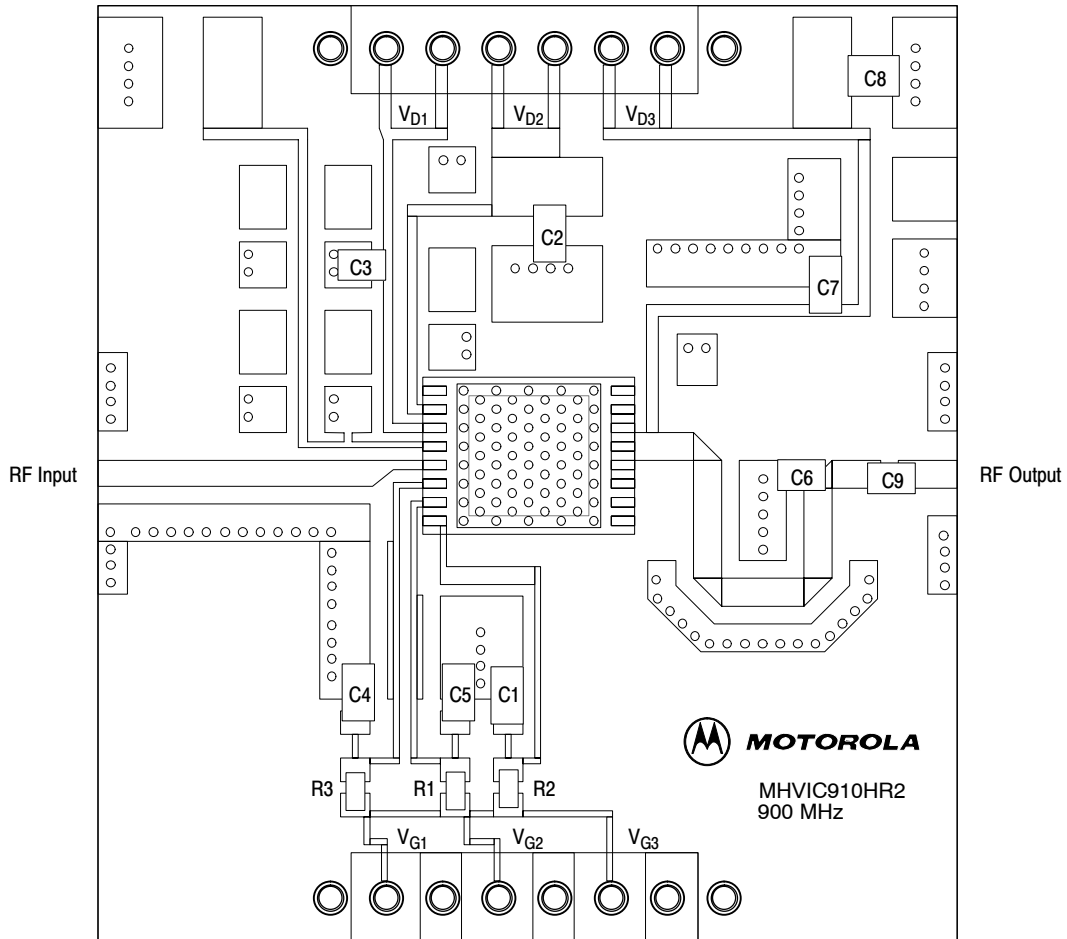


Figure 2. 921-960 MHz Demo Board Component Layout

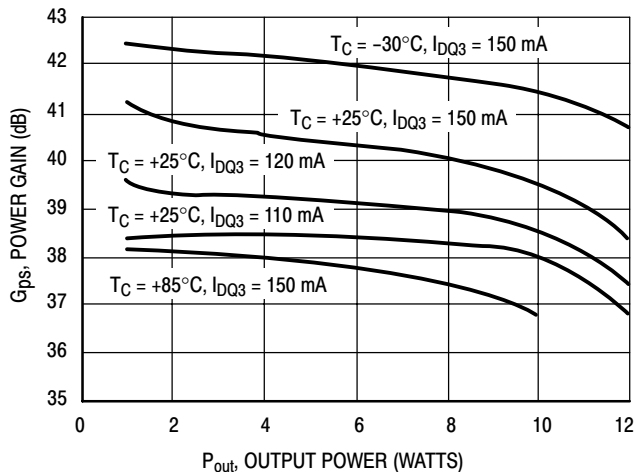


Figure 3. Power Gain versus Output Power

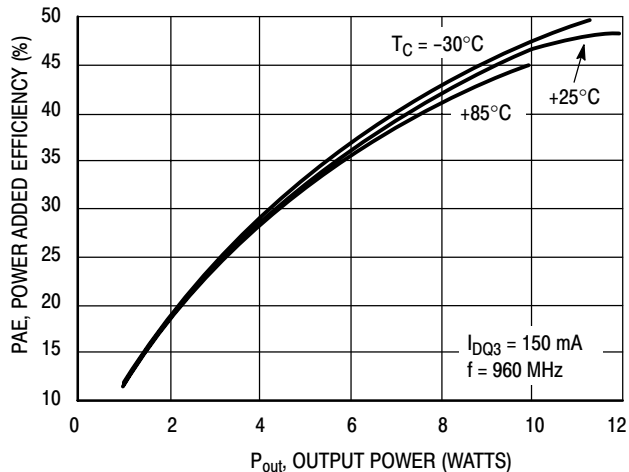


Figure 4. Power Added Efficiency versus Output Power

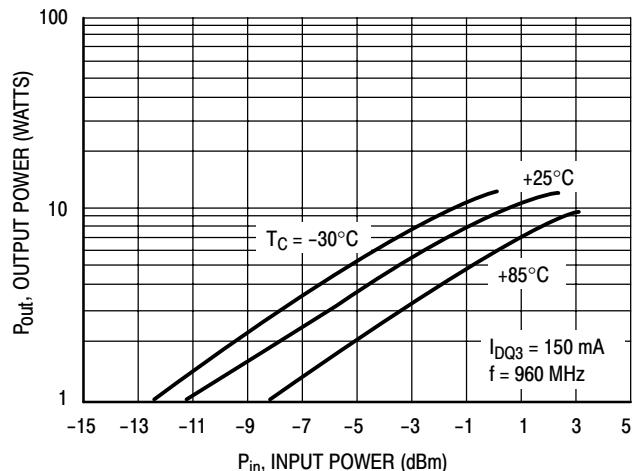


Figure 5. Output Power versus Input Power

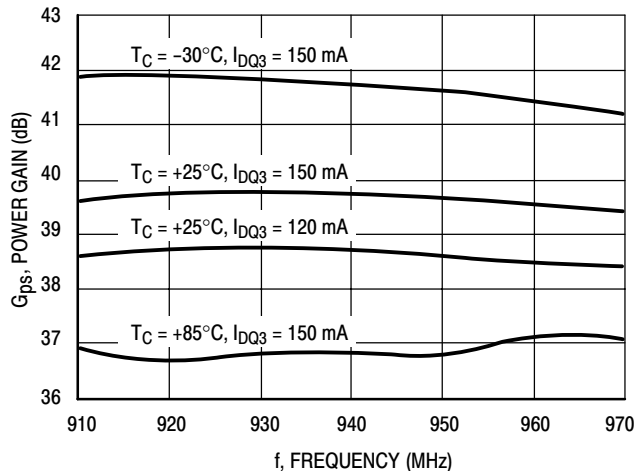


Figure 6. Power Gain versus Frequency
P_{out} = 10 W

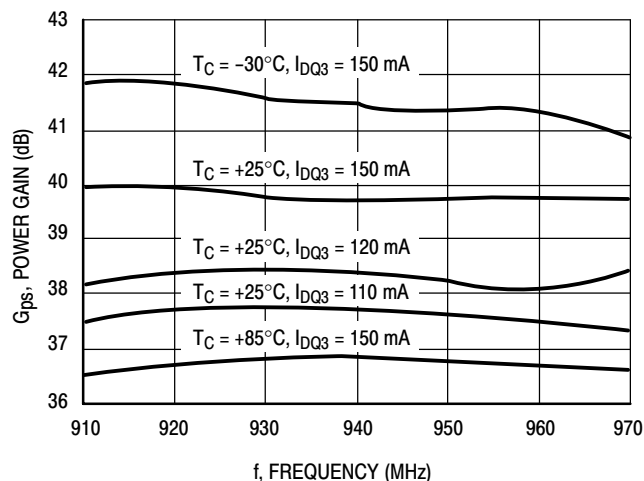


Figure 7. Power Gain versus Frequency
P_{out} = P1dB

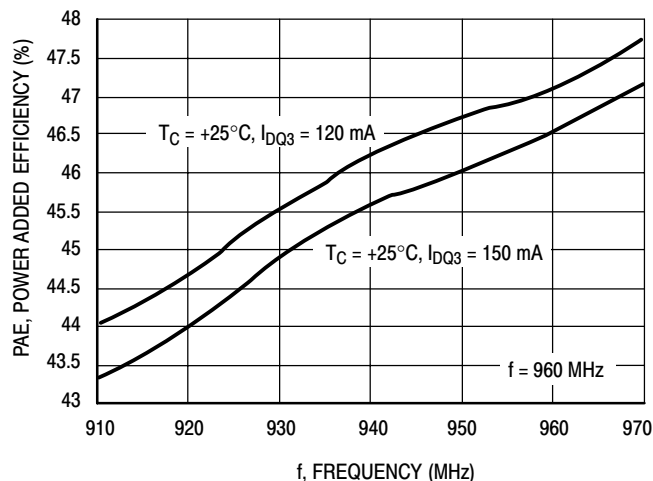


Figure 8. Power Added Efficiency versus Frequency
P_{out} = 10 W

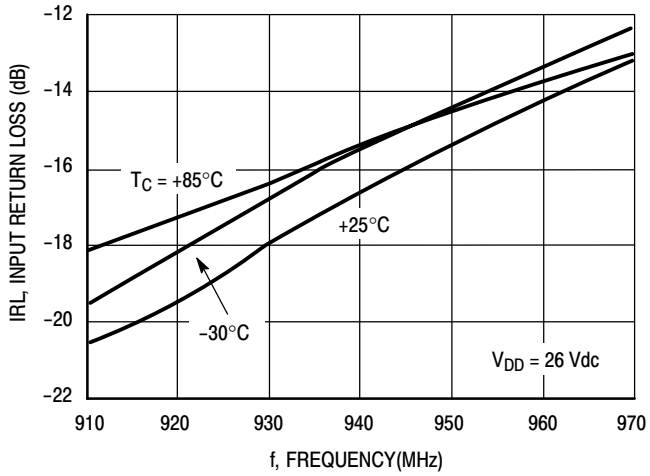


Figure 9. Input Return Loss versus Frequency
 $P_{out} = 10\text{ W}$

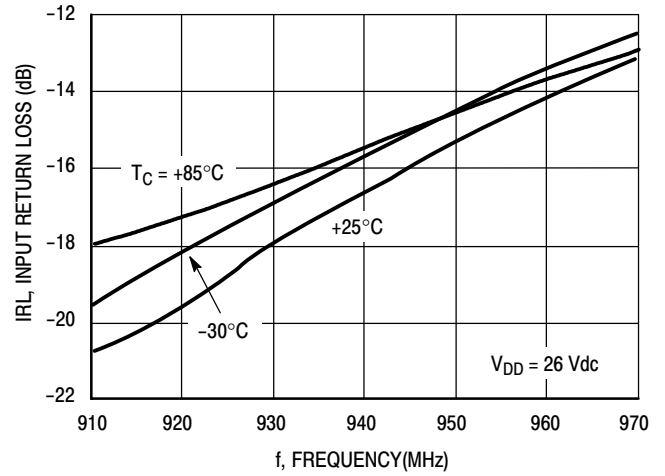


Figure 10. Input Return Loss versus Frequency
 $P_{out} = P1dB$

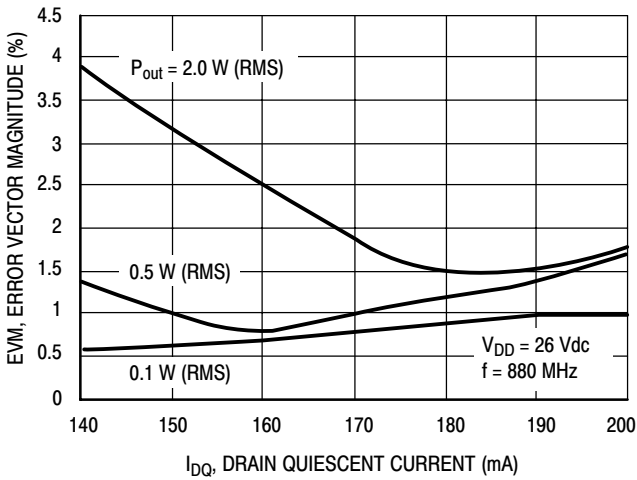


Figure 11. Error Vector Magnitude versus I_{DQ} Total

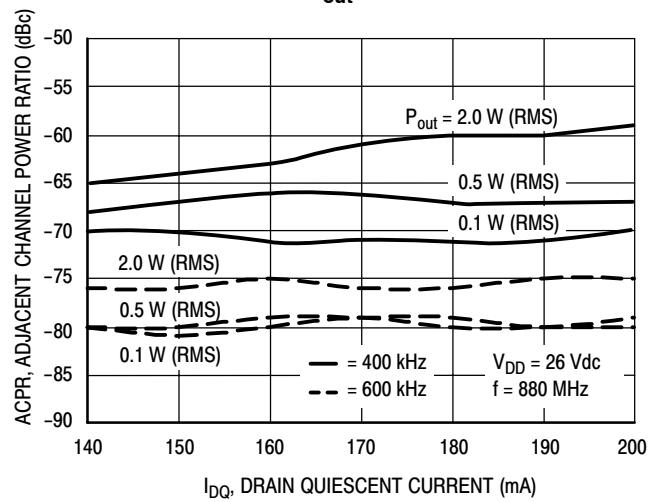


Figure 12. Adjacent Channel Power Ratio versus I_{DQ} Total

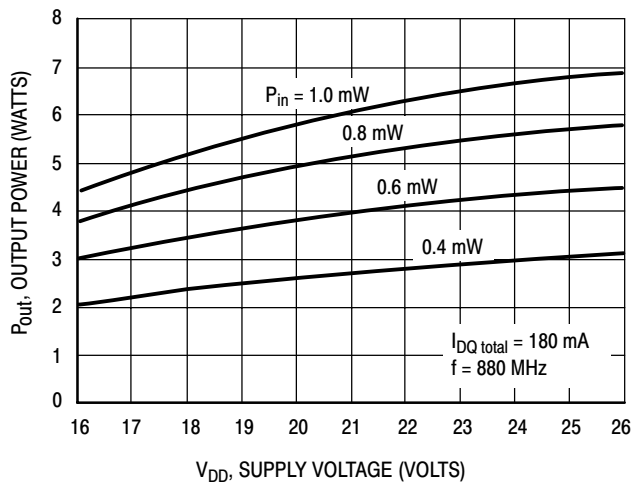


Figure 13. Output Power versus Supply Voltage

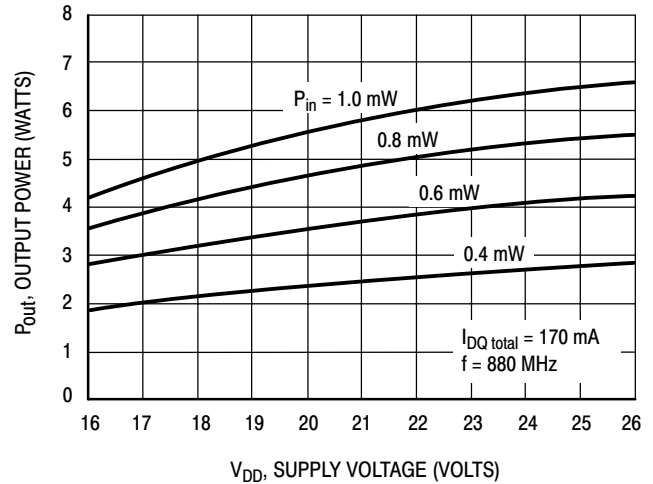


Figure 14. Output Power versus Supply Voltage

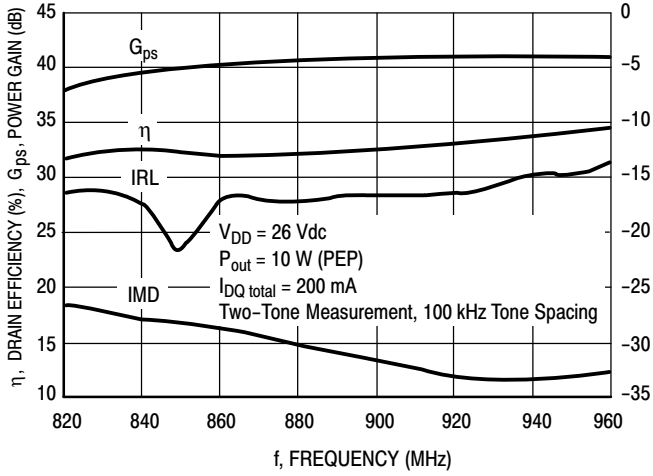


Figure 15. Two-Tone Broadband Performance

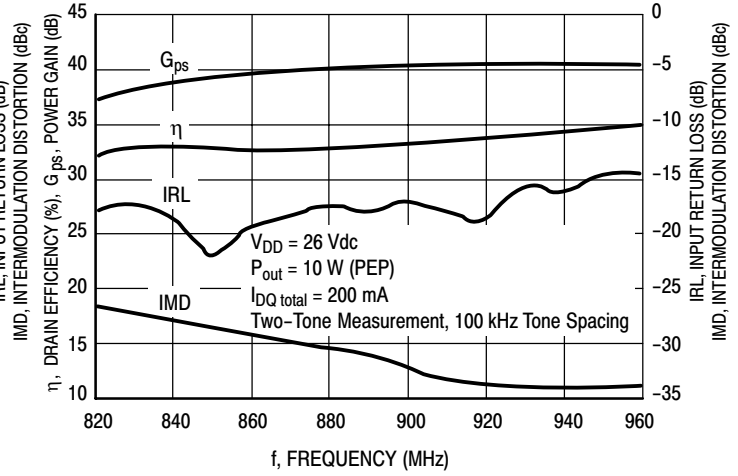


Figure 16. Two-Tone Broadband Performance

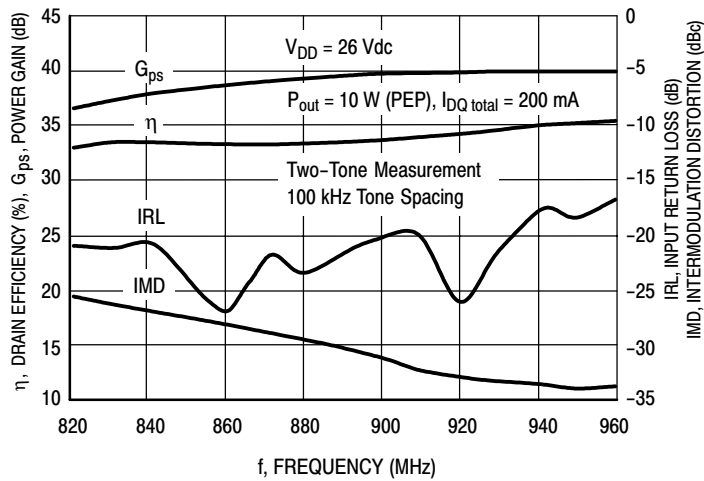


Figure 17. Two-Tone Broadband Performance

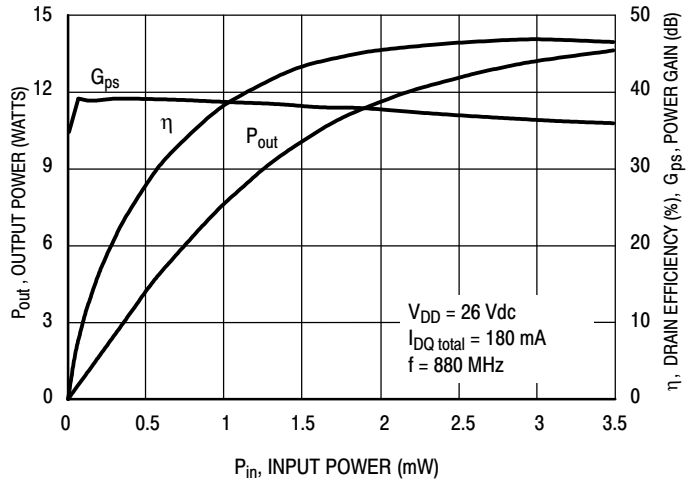


Figure 18. CW Performance @ 880 MHz

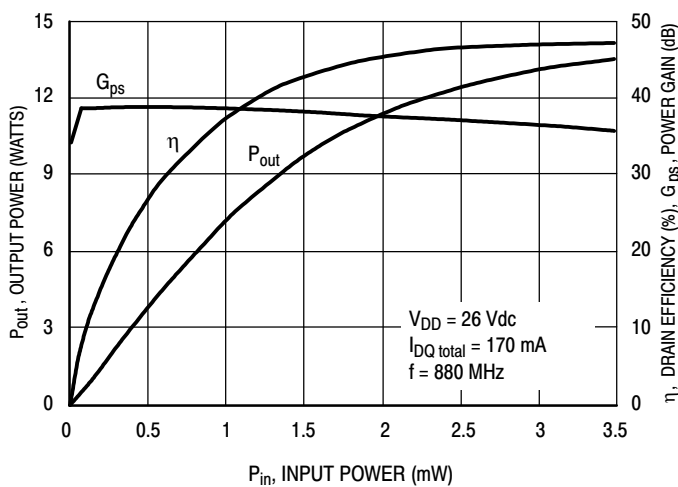


Figure 19. CW Performance @ 880 MHz

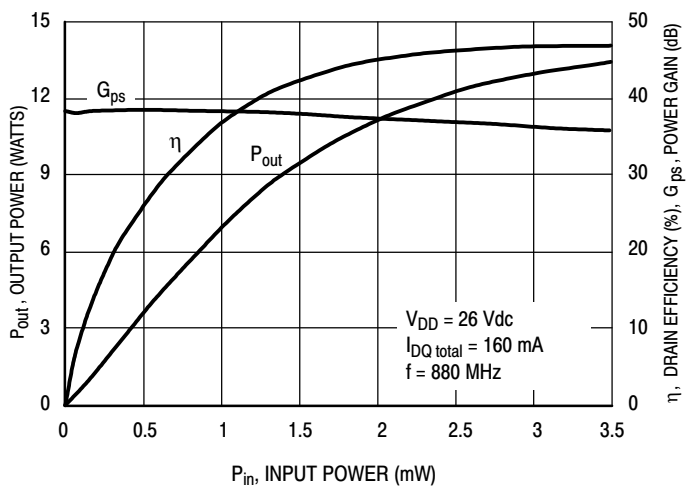


Figure 20. CW Performance @ 880 MHz

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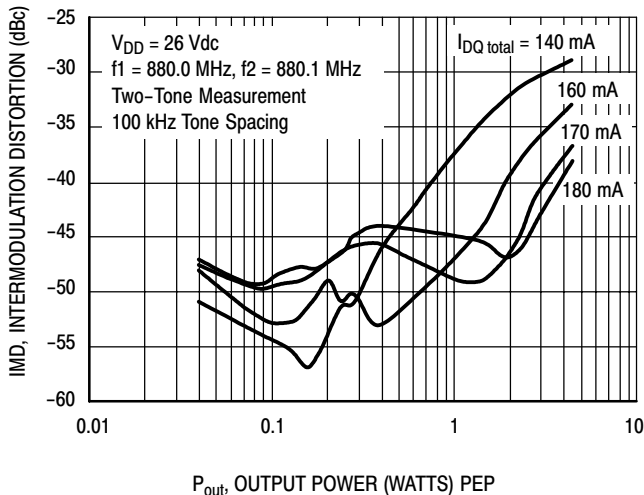


Figure 21. Intermodulation Distortion versus Output Power

$V_{DD} = 26\text{ V}$, $I_{DQ} = 225\text{ mA}$, $P_{out} = 40\text{ dBm}$

f MHz	Z_{load} Ω
900	$7.81 + j4.61$
920	$7.27 + j4.90$
940	$6.77 + j5.23$
960	$6.31 + j5.59$
980	$5.90 + j5.96$
1000	$5.53 + j6.36$

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

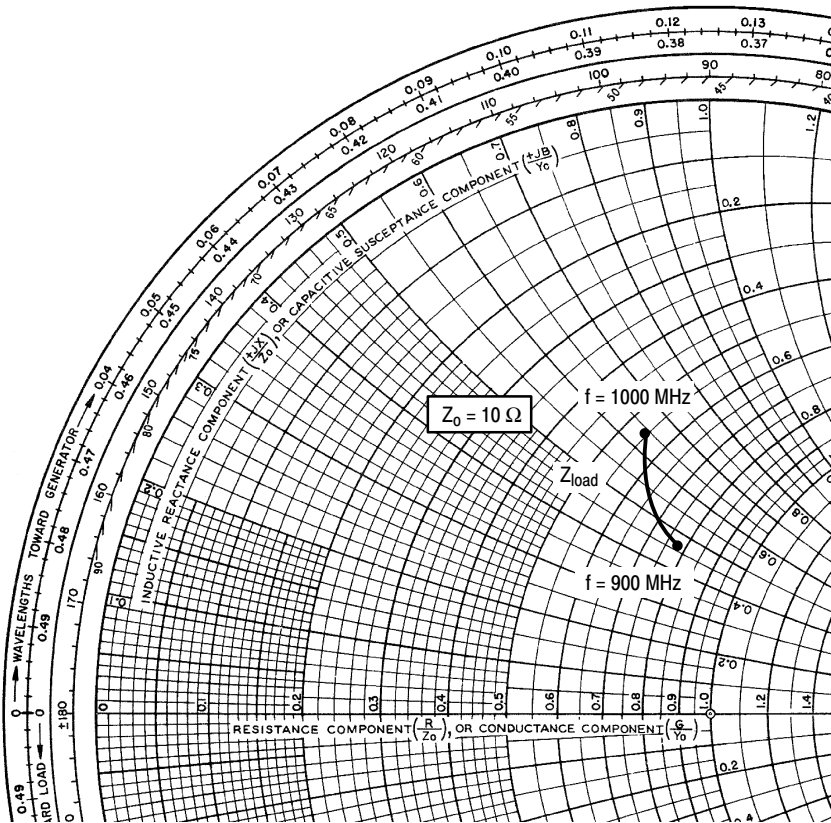
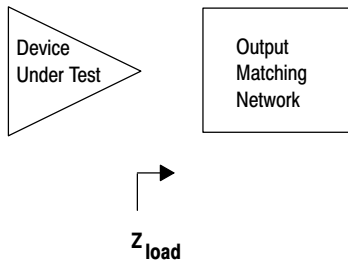
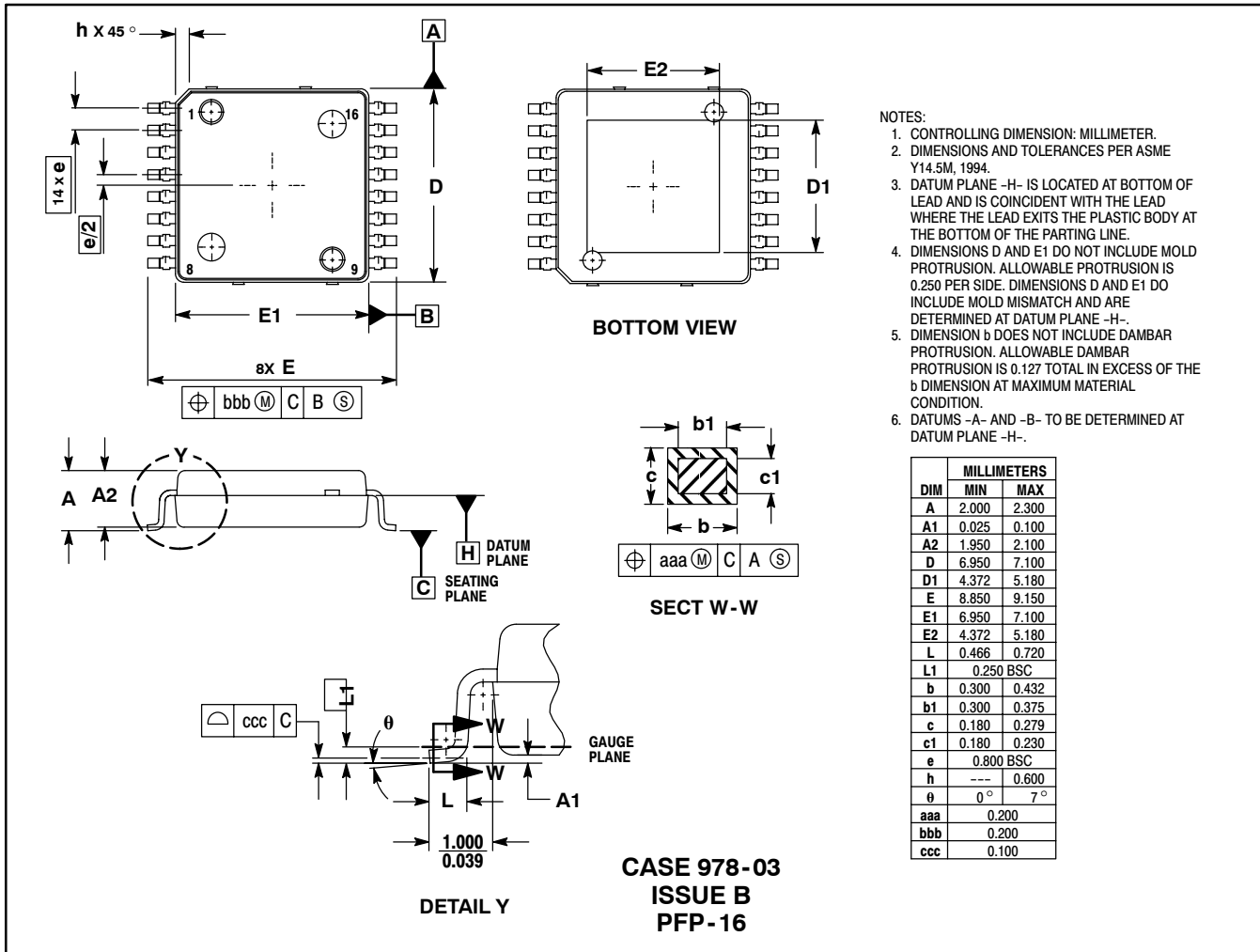


Figure 22. Series Equivalent Load Impedance

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PACKAGE DIMENSIONS



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