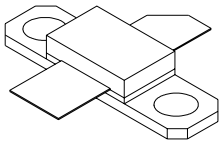
UltraRF
A CREE Company

UPF1030

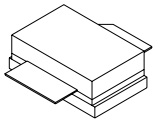
30W, 1GHz, 26V Broadband RF Power N-Channel Enhancement-Mode Lateral DMOS

This device is designed for base station applications up to frequencies of 1GHz. Rated with a minimum output power of 30W, it is ideal for CDMA, TDMA, GSM, FM, Single or Multi-Carrier Power Amplifiers in Class A or AB operation.

- Industry standard package.
- Low intermodulation distortion of–30dBc at 30W (PEP).
- Gold Metalization, Gold Bond Wires, Gold-Plated Packages.



Package Type 440095
UPF1030F



Package Type 440134
UPF1030P

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Maximum Ratings

Rating	Symbol	Value	Unit
Drain to Source Voltage, gate connected to source	V_{DSS}	65	Volts
Gate to Source Voltage	V_{GS}	$^{+}$/- 20	Volts
Total Device Dissipation @ Tcase = 70°C Derate above 70°C	P_D	65 0.5	Watts W/°C
Storage Temperature Range	T_{STG}	-65 to +150	°C
Operating Junction Temperature	T_J	200	°C

Thermal Characteristics

Characteristics	Symbol	Typical	Maximum	Unit
Thermal Resistance, Junction to Case	Θ_{JC}	1.6	1.75	°C/W

Electrical DC Characteristics (T_C=25°C unless otherwise specified)

Rating	Symbol	Min	Typ	Max	Unit
Drain to Source Voltage, gate connected to source (V_{GS}=0, I_{DS}=1mA)	BV_{DSS}	65	-	-	Volts
Drain to Source Leakage current (V_{DS}=28V, V_{GS}=0)	I_{DSS}	-	-	1.0	mA
Gate to Source Leakage current (V_{GS}=20V, V_{DS}=0)	I_{GSS}	-	-	1.0	µA
Threshold Voltage (V_{DS}=10V, I_{DS}=1mA)	V_{TH}	2.0	3.5	5.0	Volts
Gate Quiescent Voltage (V_{DS}=26 V, I_{DS}=200mA)	V_{GS}(on)	3.0	4.0	6.0	Volts
Drain to Source On Voltage (V_{GS}=10V, I_{DS}=1A)	V_{DS}(on)	-	0.28	-	Volts
Forward Transconductance (V_{DS}=10V, I_D=5A)	G_M	1.4	1.8	-	S

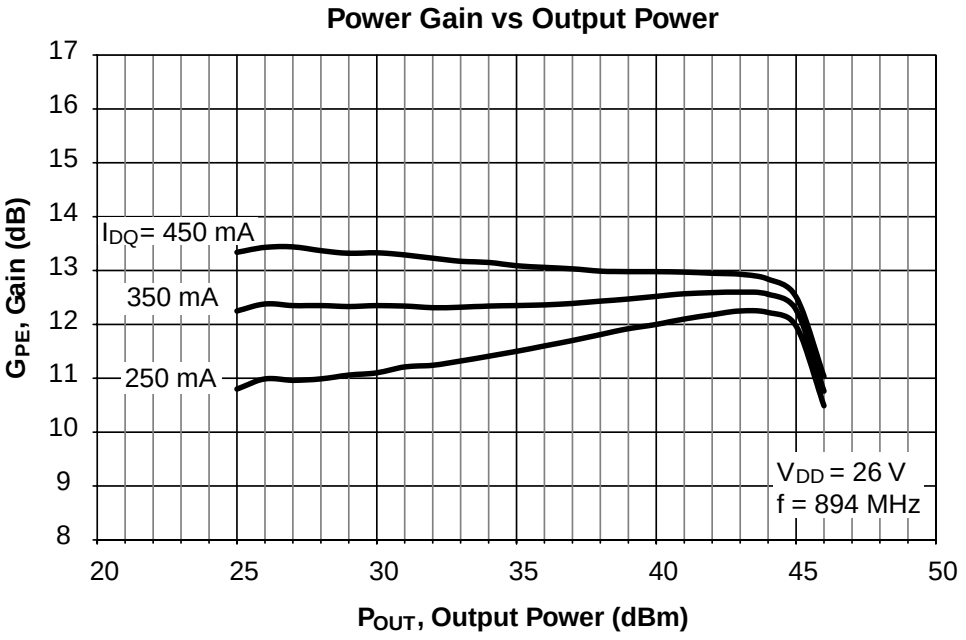
AC Characteristics (T_C=25°C unless otherwise specified)

Rating	Symbol	Min	Typ	Max	Unit
Input Capacitance (V_{DS}=26V, V_{GS}=0, freq= 1MHz)	C_{ISS}	-	44	-	pF
Output capacitance (V_{DS}= 26V, V_{GS}=0V, freq= 1MHz)	C_{OSS}	-	26	-	pF
Feedback capacitance (V_{DS}=26V, V_{GS}=0V, freq= 1MHz)	C_{RSS}	-	1.2	-	pF

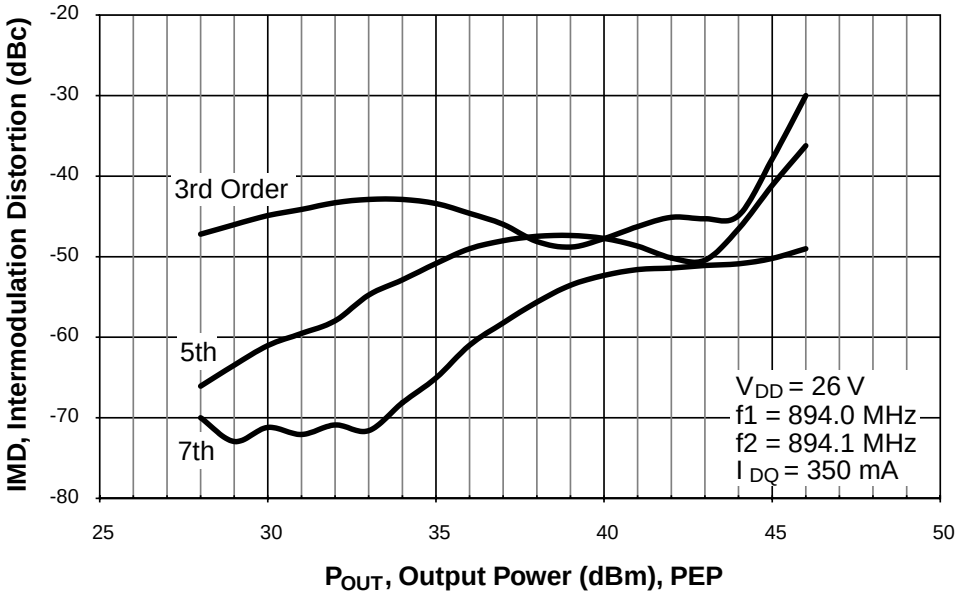
RF and Functional Tests (T_C=25°C unless otherwise specified, UltraRF Broadband Fixture)

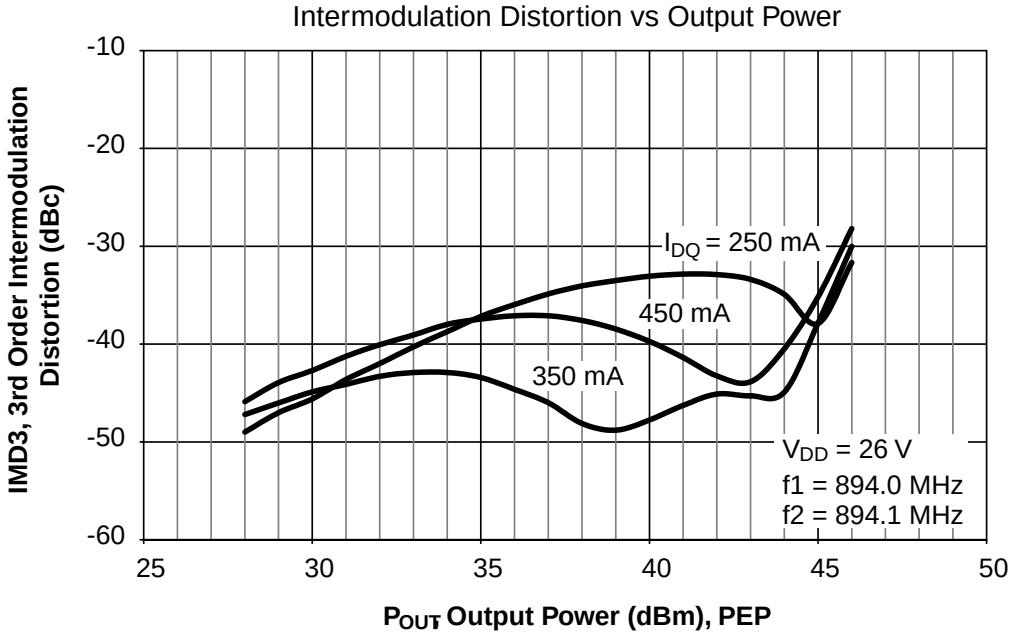
Rating	Symbol	Min	Typ	Max	Unit
Linear Power Gain, Single Tone (V_{DS}=26V, I_{DQ}=350mA, P_{OUT}=5W, f=894 MHz)	G_{plin}	13	14.5	-	dB
Compressed Power Gain, Single tone (V_{DS}=26V, I_{DQ}=350mA, P_{OUT}=30W, f=894 MHz)	G_{PS}	12	14	-	dB
Drain Efficiency, Single Tone (V_{DS}=26V, I_{DQ}=350mA, P_{OUT}=30W, f=894 MHz)	η	45	52	-	%
Intermodulation Distortion, Two Tone (V_{DS}=26V, I_{DQ}=350mA, P_{OUT}=30W PEP f1=894 MHz, f2=894.1MHz)	IMD	-	-35	-30	dBc
Load Mismatch Tolerance (V_{DS}=26V, I_{DQ}=350mA, P_{OUT}=30W, f=894 MHz)	VSWR	10:1	-	-	

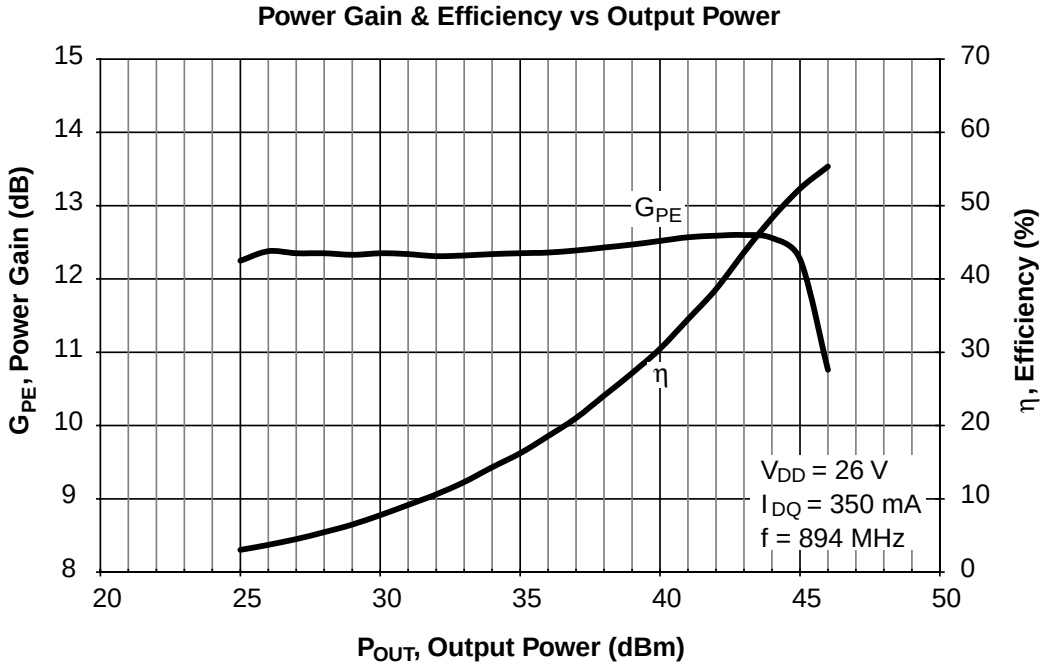
CAUTION - MOS Devices are susceptible to damage from ElectroStatic Discharge (ESD). Appropriate precautions in handling, packaging and testing MOS devices must be observed.

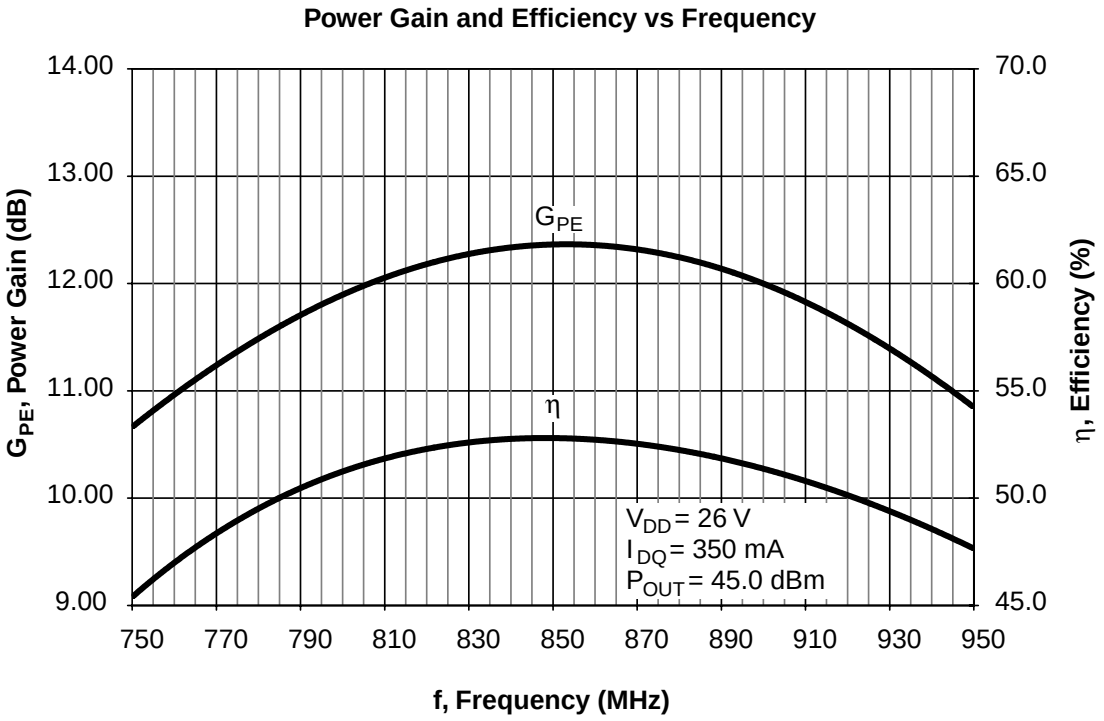

Power Gain vs Output Power
17
16
15
14
13
12
11
10
9
8
GPE, Gain (dB)
IDQ= 450 mA
350 mA
250 mA
VDD = 26 V
f = 894 MHz
20
25
30
35
40
45
50
POUT, Output Power (dBm)

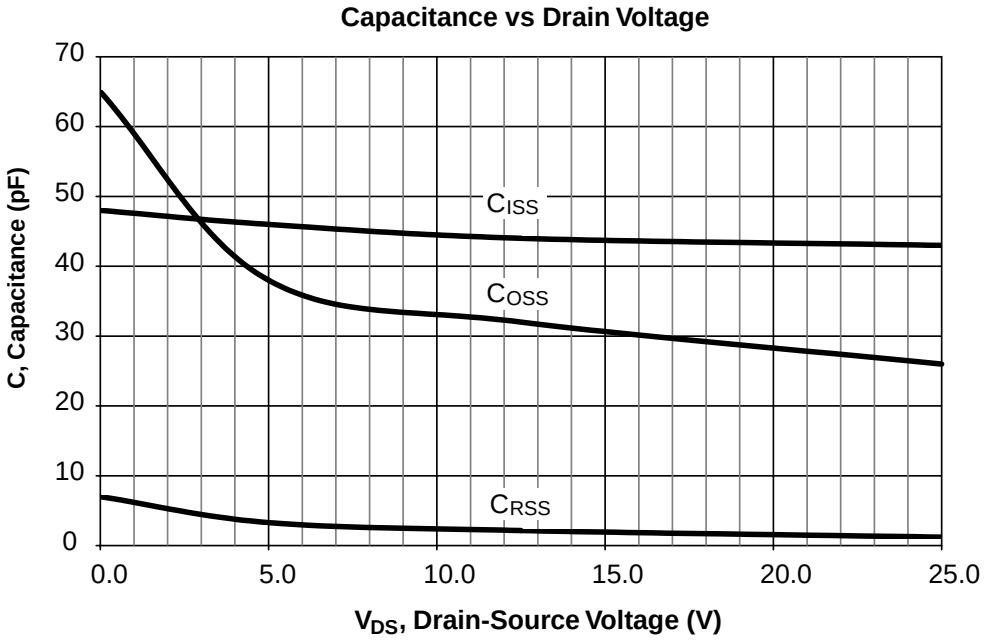
Intermodulation Distortion vs Output Power

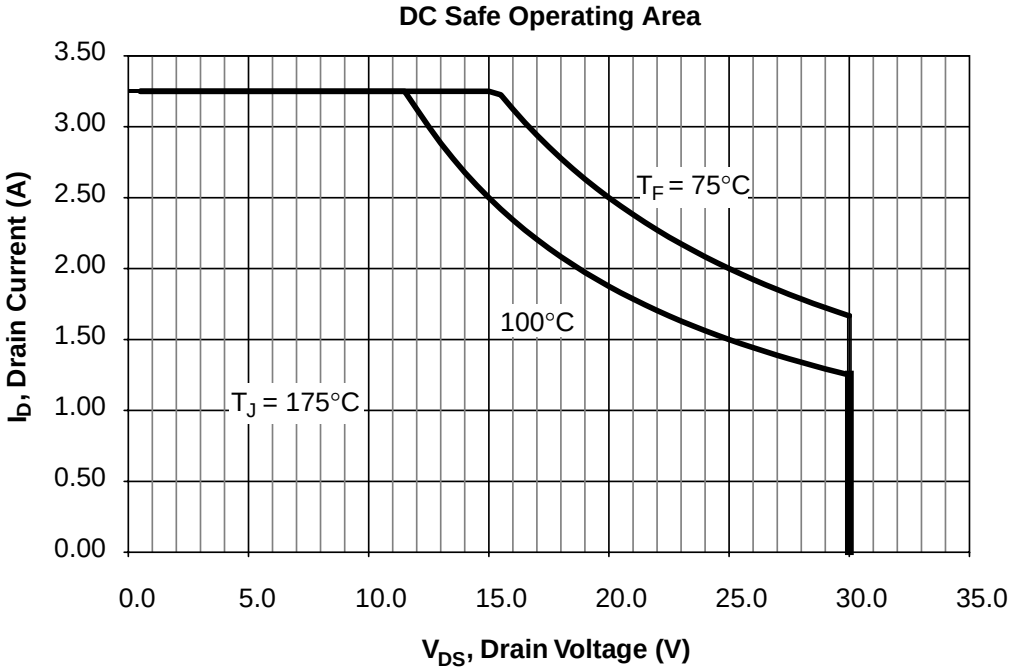


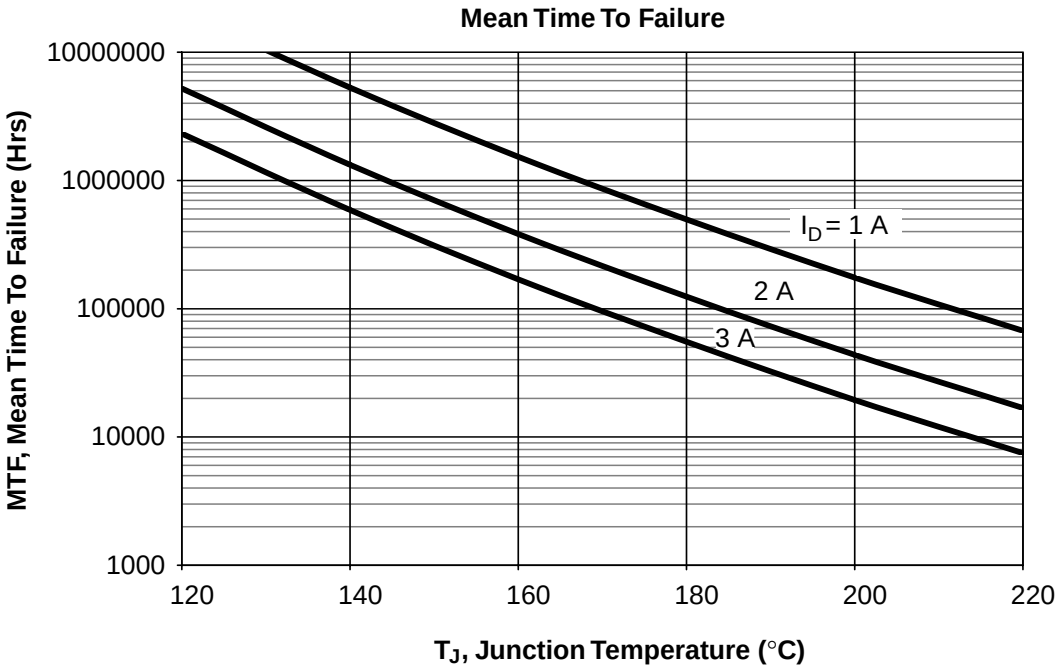

Intermodulation Distortion vs Output Power
IMD3, 3rd Order Intermodulation Distortion (dBc)
-10
-20
-30
-40
-50
-60
25
30
35
40
45
50
I_{DQ} = 250 mA
450 mA
350 mA
V_{DD} = 26 V
f1 = 894.0 MHz
f2 = 894.1 MHz
P_{OUT} Output Power (dBm), PEP

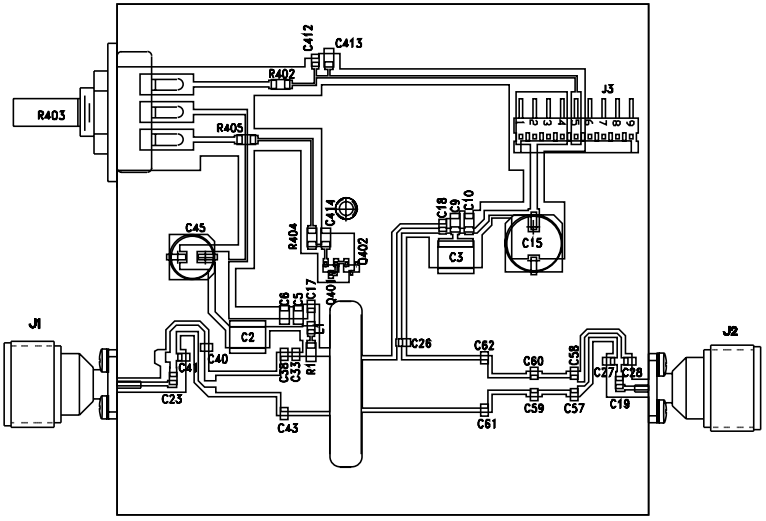

Power Gain & Efficiency vs Output Power
15
14
13
12
11
10
9
8
70
60
50
40
30
20
10
0
20
25
30
35
40
45
50
G_{PE}
η
V_{DD} = 26 V
I_{DQ} = 350 mA
f = 894 MHz
G_{PE}, Power Gain (dB)
η, Efficiency (%)
P_{OUT}, Output Power (dBm)

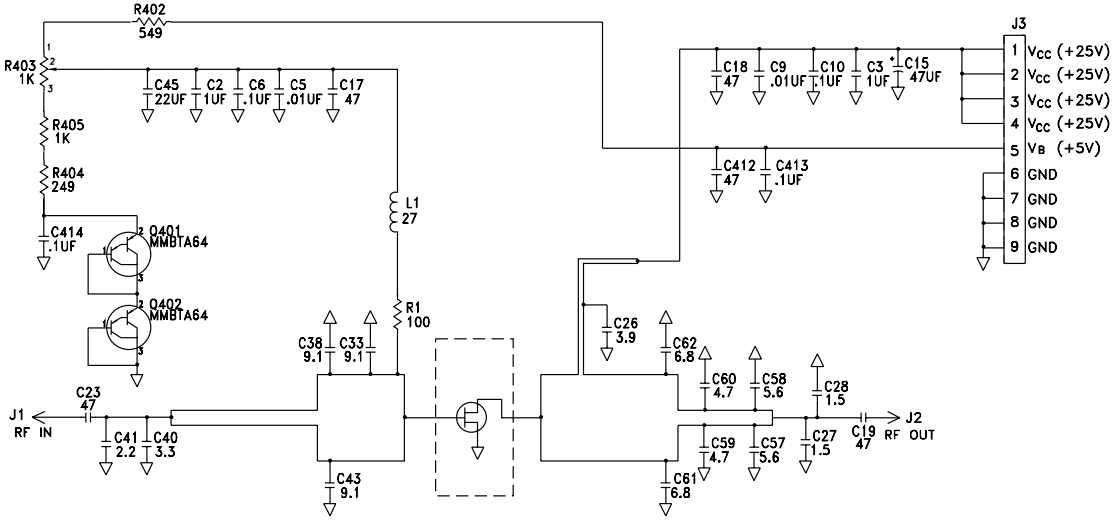

Power Gain and Efficiency vs Frequency
14.00
13.00
12.00
11.00
10.00
9.00
70.0
65.0
60.0
55.0
50.0
45.0
750
770
790
810
830
850
870
890
910
930
950
G_PE
η
V_DD = 26 V
I_DQ = 350 mA
P_OUT = 45.0 dBm
G_PE, Power Gain (dB)
η, Efficiency (%)
f, Frequency (MHz)

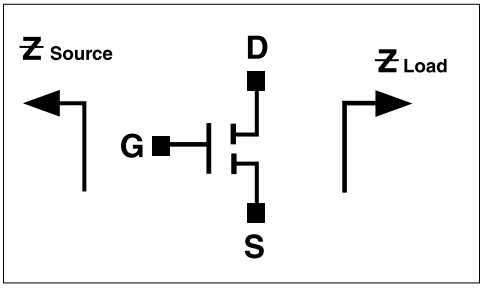

Capacitance vs Drain Voltage
C, Capacitance (pF)
70
60
50
40
30
20
10
0
0.0
5.0
10.0
15.0
20.0
25.0
CISS
COSS
CRSS
VDS, Drain-Source Voltage (V)


DC Safe Operating Area
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
I_D, Drain Current (A)
T_F = 75°C
100°C
T_J = 175°C
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
V_{DS}, Drain Voltage (V)

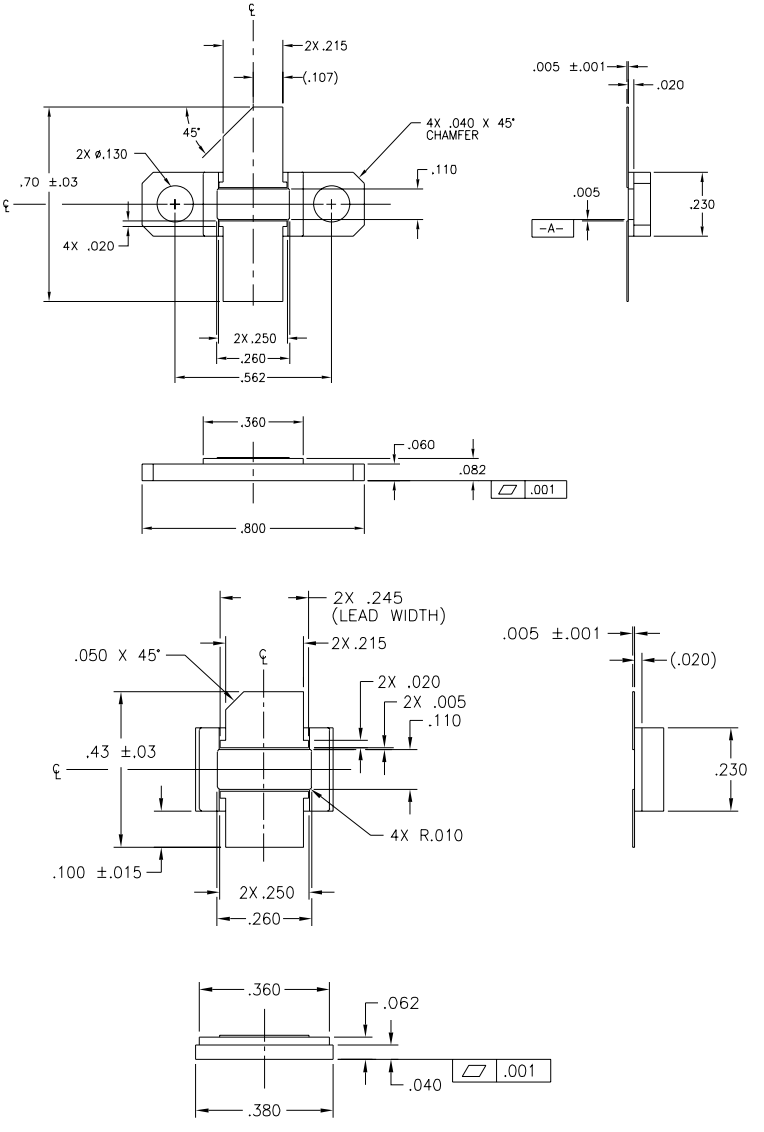

Mean Time To Failure
MTF, Mean Time To Failure (Hrs)
10000000
1000000
100000
10000
1000
120
140
160
180
200
220
I_D = 1 A
2 A
3 A
T_J, Junction Temperature (°C)


C412
C413
R402
J3
R403
R405
C414
C18
C9
C10
C45
R404
Q402
C3
C15
Q401
C36
C37
C17
J1
C2
C26
C62
J2
C41
C40
C38
C33
R1
C60
C58
C28
C27
C23
C43
C61
C59
C57
C19


R402
549
R403
1K
C45
22UF
C2
1UF
C6
.1UF
C5
.01UF
C17
47
R405
1K
R404
249
C414
.1UF
Q401
MMBTA64
Q402
MMBTA64
L1
27
R1
100
C38
9.1
C33
9.1
C23
47
J1
RF IN
C41
2.2
C40
3.3
C43
9.1
C26
3.9
C62
6.8
C60
4.7
C58
5.6
C28
1.5
C59
4.7
C57
5.6
C27
1.5
C61
6.8
C19
47
J2
RF OUT
C18
47
C9
.01UF
C10
.1UF
C3
1UF
C15
47UF
C412
47
C413
.1UF
J3
1 VCC (+25V)
2 VCC (+25V)
3 VCC (+25V)
4 VCC (+25V)
5 VB (+5V)
6 GND
7 GND
8 GND
9 GND



Frequency (MHz)	Z Source	Z Load
800	1.58- j1.84	3.36 + j2.03
810	1.57- j1.83	3.44 + j2.03
820	1.56- j1.77	3.50 + j2.09
830	1.56- j1.70	3.60 + j2.11
840	1.56- j1.63	3.67 + j2.12
850	1.54- j1.58	3.73 + j2.13
860	1.53- j1.56	3.80 + j2.15
870	1.50- j1.52	3.85 + j2.16
880	1.50- j1,51	3.92 + j2.16
890	1.49- j1.48	3.99 + j2.18
900	1.49- j1.46	4.06 + j2.16


2X .215
(.107)
45°
4X .040 X 45°
CHAMFER
2X ø.130
.110
.70 ±.03
4X .020
2X .250
.260
.562
.005 ±.001
.020
.005
.230
-A-
.360
.060
.082
.001
.800
2X .245
(LEAD WIDTH)
2X .215
.050 X 45°
2X .020
2X .005
.110
.43 ±.03
4X R.010
.100 ±.015
2X .250
.260
.005 ±.001
(.020)
.230
.360
.062
.040
.001
.380