POINT NINE
Technologies, Inc.

D1016 TetraFET

20W - 28V - 500MHz
GOLD METALLISED MULTI-PURPOSE SILICON DMOS RF FET

FEATURES

- **METAL GATE**
- **EXTRA LOW C_{rss}**
- **BROAD BAND**
- **SIMPLE BIAS CIRCUITS**
- **LOW NOISE**
- **HIGH GAIN**

APPLICATIONS

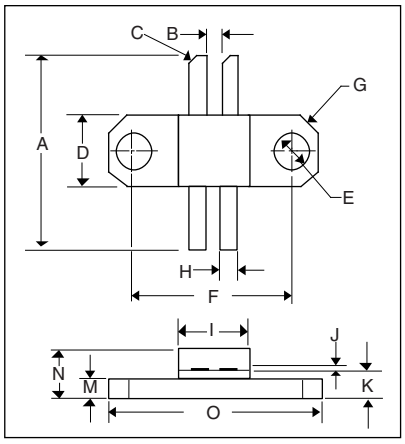
- **HF/VHF/UHF COMMUNICATIONS from DC to 1 GHz**

ABSOLUTE MAXIMUM RATINGS (T_{CASE} = 25°C unless otherwise stated)		
P_D	Power Dissipation	100W
BV_{DSS}	Drain-source breakdown voltage	70V
V_{GSS}	Gate-source voltage	±20V
I_D	Drain Current	5A
T_{stg}	Storage temperature	-65 to 150°C
T_j	Maximum operating junction temperature	200°C
$R_{THj\text{-}case}$	Thermal resistance junction-case	Max. 1.75°C/W

ELECTRICAL CHARACTERISTICS (T_{CASE} = 25°C unless otherwise stated)

Parameter		Test Conditions	Min.	Typ.	Max.	Unit
		PER SIDE				
BV_{DSS}	Breakdown voltage, drain source	V_{GS}=0 I_D=100mA	70			Vdc
I_{DSS}	Drain leakage current	V_{DS}=28V V_{GS}=0			1	mAdc
I_{GSS}	Gate leakage current	V_{GS}=20V V_{DS}=0			1	µAdc
$V_{GS(th)}$	Gate threshold voltage	I_D=10mA V_{DS}=V_{GS}	1		7	Vdc
gfs	Transconductance (300µs pulse)	V_{DS}=10V I_D=1A	0.8			Mhos
		TOTAL DEVICE				
G_{PS}	Common source power gain	P_O=20W	13			dB
η	Drain efficiency	V_{DS}=28V I_{DQ}=0.4A	50			%
VSWR	Load mismatch tolerance	f=500MHz	20:1			
		PER SIDE				
C_{iss}	Input capacitance	V_{DS}=0V V_{GS}=-5V f=1MHz			60	pF
C_{oss}	Output capacitance	V_{DS}=28V V_{GS}=0 f=1MHz			30	pF
C_{rss}	Reverse transfer capacitance	V_{DS}=28V V_{GS}=0 f=1MHz			2.5	pF

DIMENSIONS



DM	Millimeter	TOL	Inches	TOL
A	16.51	.26	.650	.010
B	1.52	.13	.060	.005
C	45°	5°	45°	5°
D	6.35	.13	.250	.005
E	3.30	.13	.130	.005
F	14.22	.13	.560	.005
G	1.27	.13	.05 x 45°	.005
H	1.52	.13	.060	.005
I	6.35	.13	.250	.005
J	.10	.03	.004	.001
K	2.16	.13	.085	.005
M	1.52	.13	.060	.005
N	5.08	MAX	.200	MAX
O	18.90	.13	.744	.005

HAZARDOUS MATERIAL WARNING

The ceramic portion of the device between leads and metal flange is beryllium oxide. Beryllium oxide dust is highly toxic and care must be taken during handling and mounting to avoid damage to this area. THESE DEVICES MUST NEVER BE THROWN AWAY WITH GENERAL INDUSTRIAL OR DOMESTIC WASTE.

U.S. PATENTS 5,121,176 & 5,179,032
GLOBAL PATENTS PENDING

2697 Lavery Court #8 • Newbury Park, CA 91320 • (805) 375-6600 • Fax: (805) 375- 6602 • www.point9.com • www.rfmosfet.com

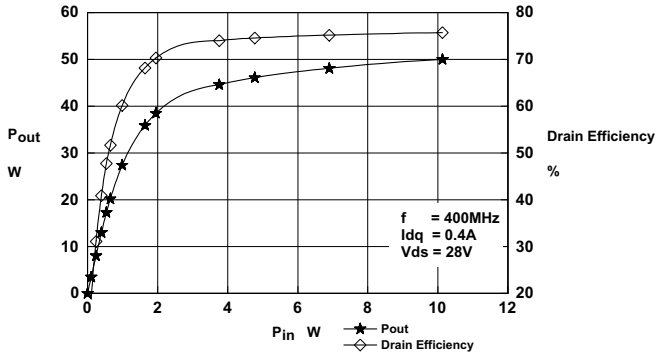


Figure 1

Power Output and efficiency vs. Power Input.

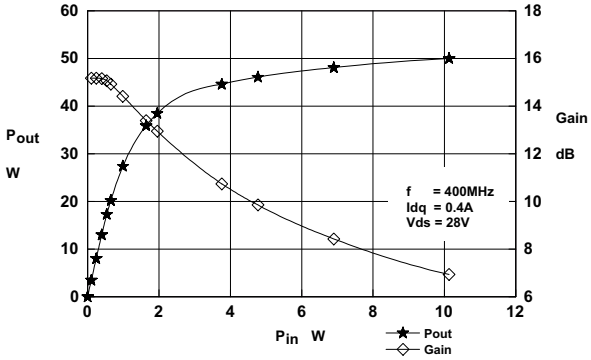


Figure 2

Power Output and Gain vs. Power Input.

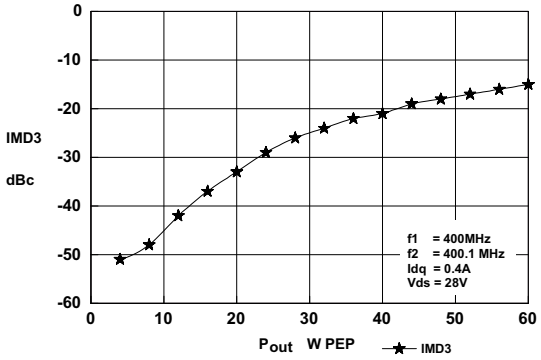


Figure 3

IMD Vs. Output Power.

OPTIMUM SOURCE AND LOAD IMPEDANCE

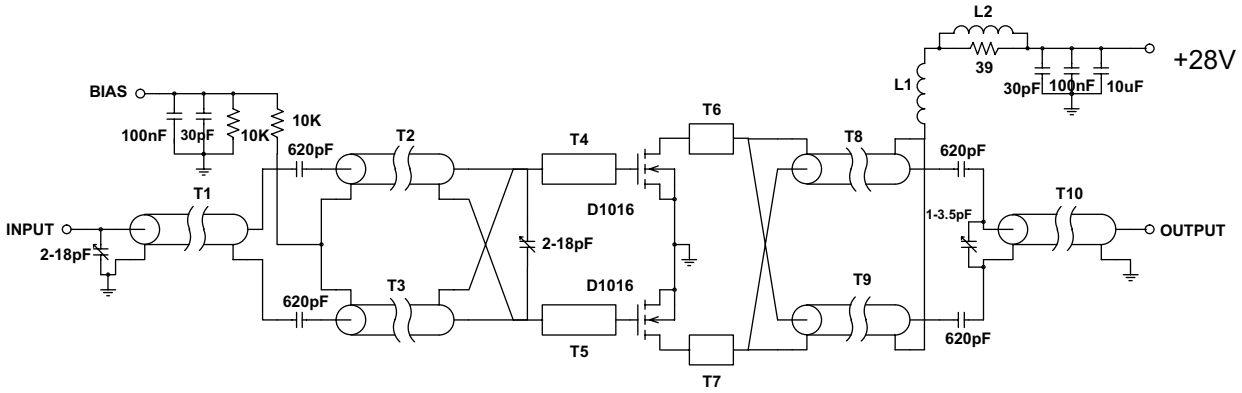
Frequency MHz	Z_S Ω	Z_L Ω
400MHZ	10.7 - j35.4	13.8 - j22.2

Typical S Parameters

! V_{DS} = 28V, I_{DQ} = 1A

MHZ S MA R 50

!Freq	S11		S21		S12		S22	
!MHz	mag	ang	mag	ang	mag	ang	mag	ang
100	0.767	-135	22.646	88	0.0155	9	0.531	-103
200	0.813	-153	10.116	57	0.0099	4	0.692	-131
300	0.841	-161	5.623	39	0.0076	49	0.794	-143
400	0.861	-169	3.548	25	0.013	79	0.841	-151
500	0.882	-175	2.82	20	0.021	78	0.875	-156
600	0.902	180	2.093	14	0.0285	78	0.91	-161
700	0.923	174	1.365	9	0.0376	77	0.944	-166
800	0.912	170	1.096	2	0.0457	66	0.944	-170
900	0.923	164	0.902	-3	0.0484	66	0.933	-176
1000	0.923	161	0.724	-4	0.0596	64	0.944	-177



TEST FIXTURE

Substrate 1.6mm FR4
All microstrip lines W = 2.5mm

T1	45mm 50 OHM UT34 semi-rigid coax
T2, T3	55mm 50 OHM UT 34 semi-rigid coax
T4, T5	25mm microstrip line
T6, T7	10mm microstrip line
T8, T9	45mm 25 OHM UT 34-25 semi-rigid coax
T10	60mm 50OHM UT34 semi-rigid coax
L1	4 turns 19swg enamelled copper wire, 7mm i.d.
L2	2.5 turns of 19swg enamelled copper wire on T50-6 ferrite toroid

```
*D1016 (PER SIDE)

*PSPICE MODEL FOR POINT NONE TECHNOLOGIES, Inc RF N-CHANNEL VERTICAL DMOS POWER FET
*PRELIMINARY DATA, SEPTEMBER 1995

*THIS IS A PUSH-PULL DEVICE, MODEL DATA IS PER SIDE

*       ____GATE
*       I   ____DRAIN
*       I   I   ____SOURCE
*       I   I   I
.SUBCKT D1016  10      20      30
LG      10      11      1.71N
RGATE   11      12      0.78
CG      10      30      0.05P
CRSS    12      17      2.5P
CISS    12      14      60P
LS      14      30      0.30N
CS      14      30      0.1P
LD      17      20      0.85N
CD      20      30      1.44P
R_RC    16      17      35.73
C_RC    14      16      11.8P
MOS     13      12      14 15   D1016MOS  L=0.71U  W=0.056332  ;D G S B LEVEL1
JFET    17      14      13      D1016JF                       ;D G S
DBODY   14      17              D1016DB                       ;P N

.MODEL D1016MOS NMOS  (VTO=2.2 KP=1.8E-5 LAMBDA=0.1  RD=0.25 RS=0.5)
.MODEL D1016JF  NJF   (VTO=-7.5 BETA=0.04 LAMBDA=1)
.MODEL D1016DB  D     (CJO=88.5P RS=0.25 VJ=0.7 M=0.33 BV=70)
.ENDS
```

D1016.s2p (each side)

```
!       Vds=28V, Idq=1A
#       MHz S MA R 50
```

!Freq	S11		S21		S12		S22	
!MHz	mag	ang	mag	ang	mag	ang	mag	ang
100	0.767	-135	22.646	88	0.0155	9	0.531	-103
200	0.813	-153	10.116	57	0.0099	4	0.692	-131
300	0.841	-161	5.623	39	0.0076	49	0.794	-143
400	0.861	-169	3.548	25	0.013	79	0.841	-151
500	0.882	-175	2.82	20	0.021	78	0.875	-156
600	0.902	180	2.093	14	0.0285	78	0.91	-161
700	0.923	174	1.365	9	0.0376	77	0.944	-166
800	0.912	170	1.096	2	0.0457	66	0.944	-170
900	0.923	164	0.902	-3	0.0484	66	0.933	-176
1000	0.923	161	0.724	-4	0.0596	64	0.944	-177