

RF power transistor HF/VHF/UHF n-channel MOSFETs

Features

- Gold metallization
- Excellent thermal stability
- Common source configuration
- $P_{OUT} = 30\text{ W min. with } 18\text{ dB gain @ } 30\text{ MHz}$

Description

The SD2918 is a n-channel MOS field-effect RF power transistor. It is intended for use in 50 V dc large signal applications up to 200 MHz.

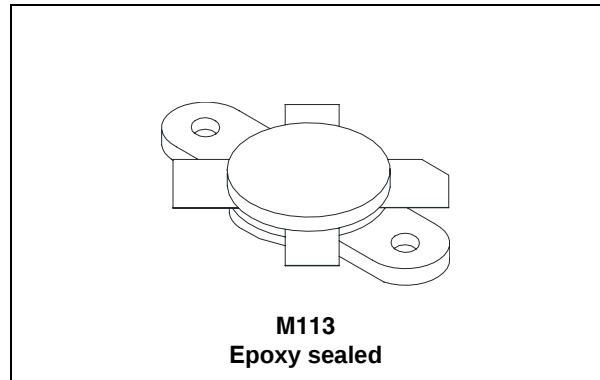


Figure 1. Pin connection

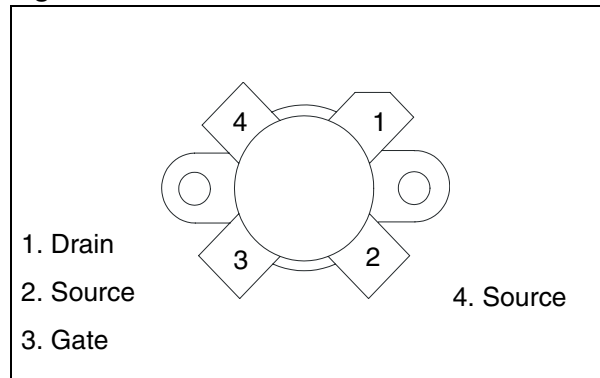


Table 1. Device summary

Order code	Marking	Package	Packaging
SD2918	SD2918	M113	Plastic tray

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1 Electrical data

1.1 Maximum ratings

Table 2. Absolute maximum ratings ($T_{CASE} = 25\text{ °C}$)

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain source voltage	125	V
V_{DGR}	Drain-gate voltage ($R_{GS} = 1\text{ M}\Omega$)	125	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current	6	A
P_{DISS}	Power dissipation	175	W
T_J	Max. operating junction temperature	200	°C
T_{STG}	Storage temperature	-65 to +150	°C

1.2 Thermal data

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJ-C}	Junction-case thermal resistance	1.0	°C/W
R_{thC-S}	Junction-heatsink thermal resistance ⁽¹⁾	0.3	

1. Determined using a flat aluminum or copper heatsink with thermal compound applied (dow corning 340 or equivalent).

2 Electrical characteristics

$T_{CASE} = +25\text{ }^{\circ}\text{C}$

2.1 Static

Table 4. Static

Symbol	Test conditions		Min	Typ	Max	Unit
$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$	$I_{DS} = 10\text{ mA}$	125			V
I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}$			1.0	mA
I_{GSS}	$V_{GS} = 20\text{ V}$	$V_{DS} = 0\text{ V}$			1	μA
$V_{GS(Q)}$	$V_{DS} = 10\text{ V}$	$I_D = 10\text{ mA}$	1.0		5.0	V
$V_{DS(ON)}$	$V_{GS} = 10\text{ V}$	$I_D = 2.5\text{ A}$			5.0	V
g_{FS}	$V_{DS} = 10\text{ V}$	$I_D = 2.5\text{ A}$	0.8			mho
C_{ISS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}$		58		pF
C_{OSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}$		35.5		pF
C_{RSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}$		7.5		pF

2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions	Min	Typ	Max	Unit
P_{OUT}	$V_{DD} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$, $f = 30\text{ MHz}$, $P_{IN} = 0.475\text{ W}$	30		-	W
G_{PS}	$V_{DD} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$, $f = 30\text{ MHz}$, $P_{out} = 30\text{ W}$	18	22		dB
h_D	$V_{DD} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$, $f = 30\text{ MHz}$, $P_{out} = 30\text{ W}$	50	55		%
Load mismatch	$V_{DD} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$, $f = 30\text{ MHz}$, $P_{out} = 30\text{ W}$ All phase angles	30:1		-	VSWR

3 Impedance data

Figure 2. Impedance data

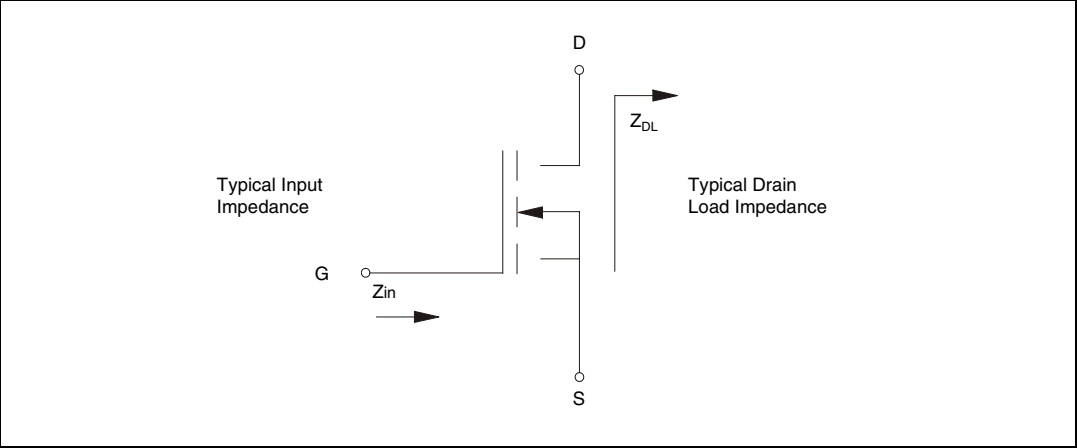


Table 6. Impedance data

Freq	$Z_{IN} (\Omega)$	$Z_{DL} (\Omega)$
30 MHz	$24.4 - j 13.4$	$28.8 + j 7.2$

4 Typical performances

Figure 3. Capacitance vs drain-source voltage

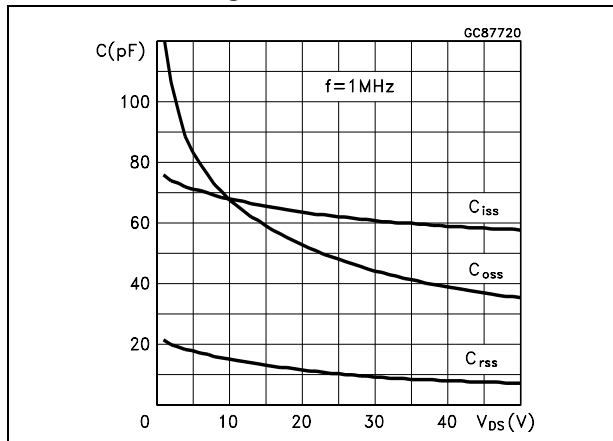


Figure 4. Maximum thermal resistance vs case temperature

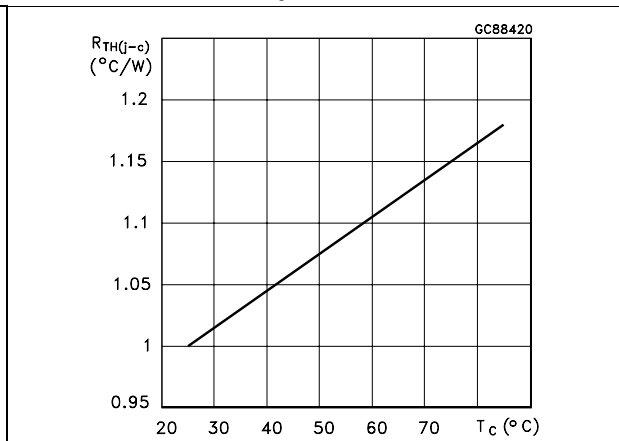


Figure 5. Drain current vs gate voltage

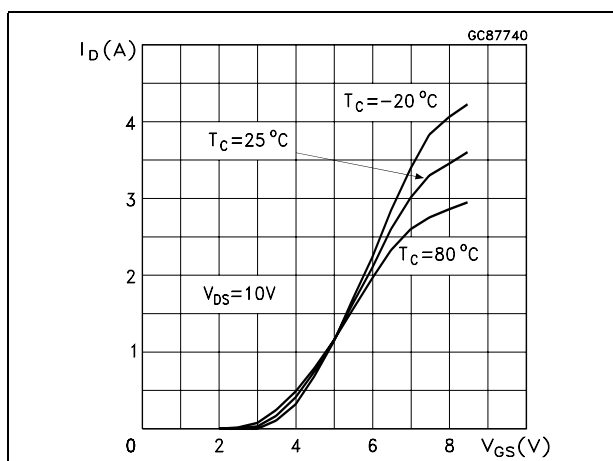


Figure 6. Gate-source voltages vs case temperature

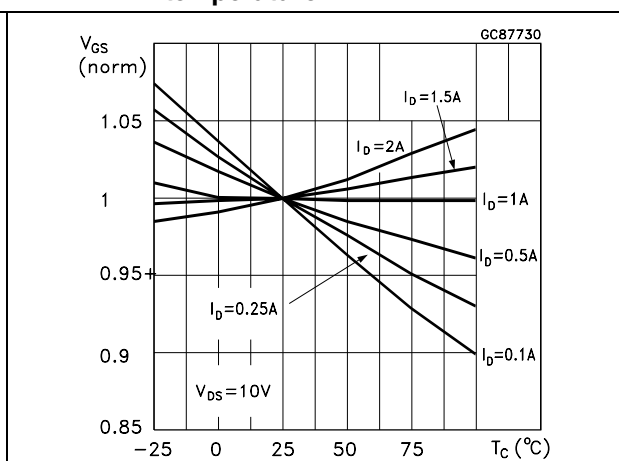


Figure 7. Output power vs input power

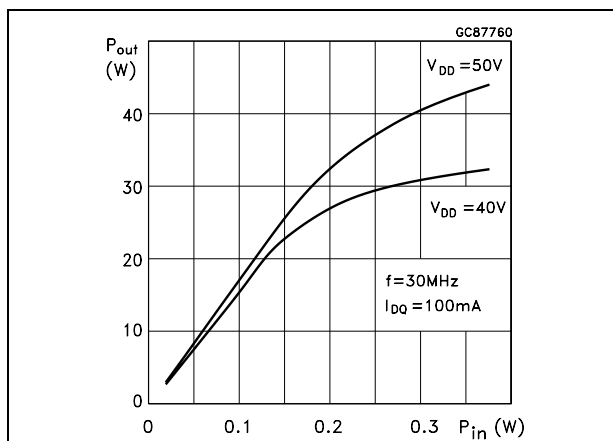


Figure 8. Output power vs input power at different T_c

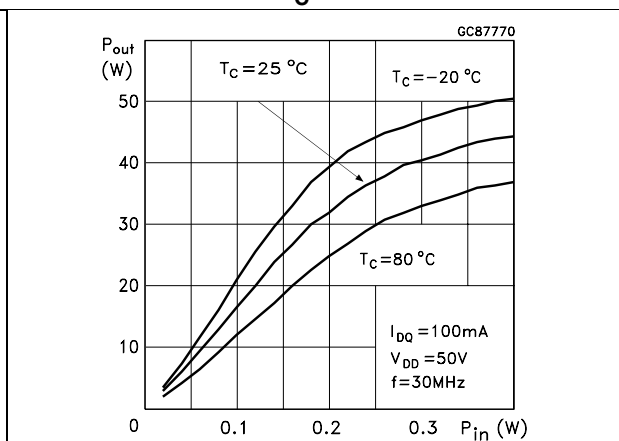


Figure 9. Output power vs supply voltage

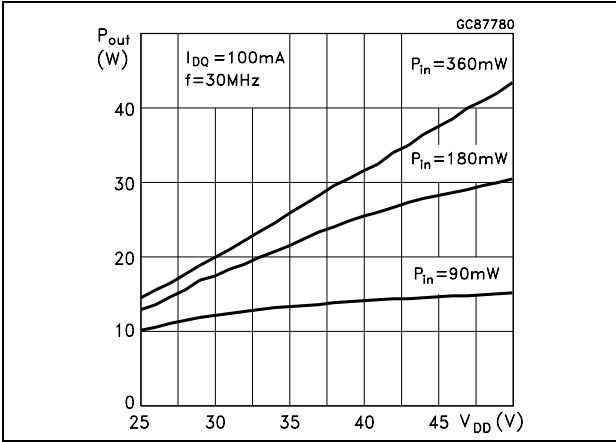


Figure 10. Output power vs gate voltage

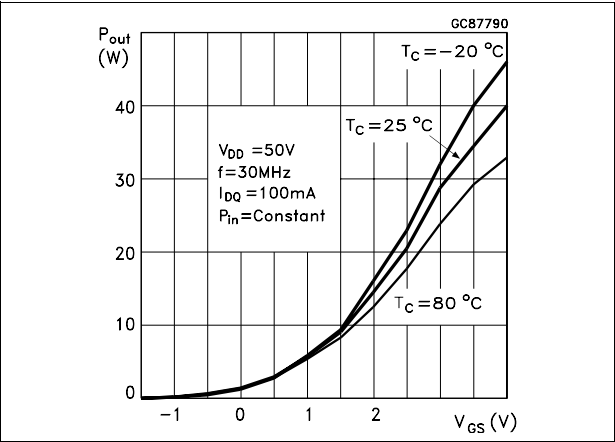
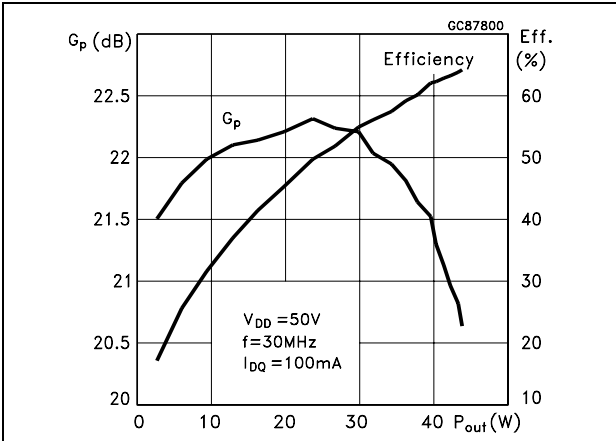


Figure 11. Power gain and efficiency vs output power



5 Test circuit and BOM list

Figure 12. 30 MHz test circuit schematic

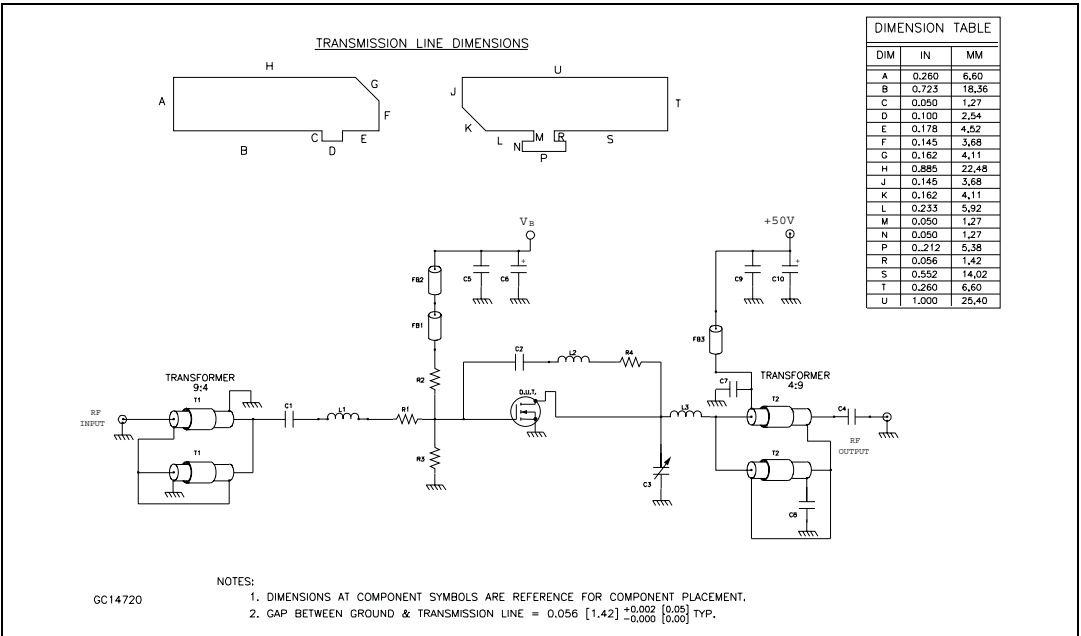


Table 7. Bill of material

Component	Part n.	Supplier	Description
R4	CR2512-1W-101JB	VENKEL	100 Ω 1 W surface mount chip resistor
R3	29SJ901	XICON	160 Ω 1 W carbon film axial-lead resistor
R2	29SJ901	XICON	160 Ω 1 W carbon film axial-lead resistor
R1	CR2512-1W-3R9JT	VENKEL	3.9 Ω 1 W surface mount chip resistor
FB3	2843000102	FAIR-RITE CORP.	Multi-aperture core
FB2	2743021447	FAIR-RITE CORP.	Shield bead surface mount EMI
FB1	2743021447	FAIR-RITE CORP.	Shield bead surface mount EMI
L3	8073	BELDEN	Inductor, 3 turns air wound #14AWG, ID= 0.375[9.53], poly coated magnet wire
L2	1557	ALPHA	Inductor, 7 turns around shield bead (PT# Fair-rite 2643801102) #16AWG hook up wire.
L1	8073	BELDEN	Inductor, 4 turns air wound #14AWG, ID= 0.375[9.53], poly coated magnet wire

Table 7. Bill of material (continued)

Component	Part n.	Supplier	Description
C10	SKA100M160	MALLORY	10 μ F/160 V axial-lead aluminium electrolytic capacitor
C9	C1812X7R501-103KNE	VENKEL	0.01 μ F/500 V surface mount ceramic chip capacitor
C8	C1812X7R501-103KNE	VENKEL	0.01 μ F/500 V surface mount ceramic chip capacitor
C7	C1812X7R501-103KNE	VENKEL	0.01 μ F/500 V surface mount ceramic chip capacitor
C6	RVS-50V100M-R	ELNA	10 μ F/50 V vertical surface mount chip aluminium electrolytic capacitor
C5	C1812X7R501-103KNE	VENKEL	0.01 μ F/500 V surface mount ceramic chip capacitor
C4	ATC200B103KW50X	ATC	10000 pF ATC 200B surface mount ceramic chip capacitor
C3	463	ARCO	20-180 pF type ST46 standard 3 turns variable capacitor
C2	ATC200B103KW50X	ATC	10000 pF ATC 200B surface mount ceramic chip capacitor
C1	ATC200B103KW50X	ATC	10000 pF ATC 200B surface mount ceramic chip capacitor
T2			Transformer: 4:9, 75.0 Ω , o.d. 0.090 1" LG. coaxial cable 5 turns around shield bead (PT#2643801002 FAIR-RITE CORP.)
T1			Transformer: 9:4, 75.0 Ω , o.d. 0.090 1" LG. coaxial cable 5 turns around shield bead (PT#2643801002 FAIR-RITE CORP.)
PCB	G0300M1026	ROGERS CORP.	Woven fiberglass reinforced PTFE 0.030" THK, $\epsilon_r = 2.55$, 2Oz ED Cu both sides

6 Circuit layout

Figure 13. 30 MHz test circuit photomaster

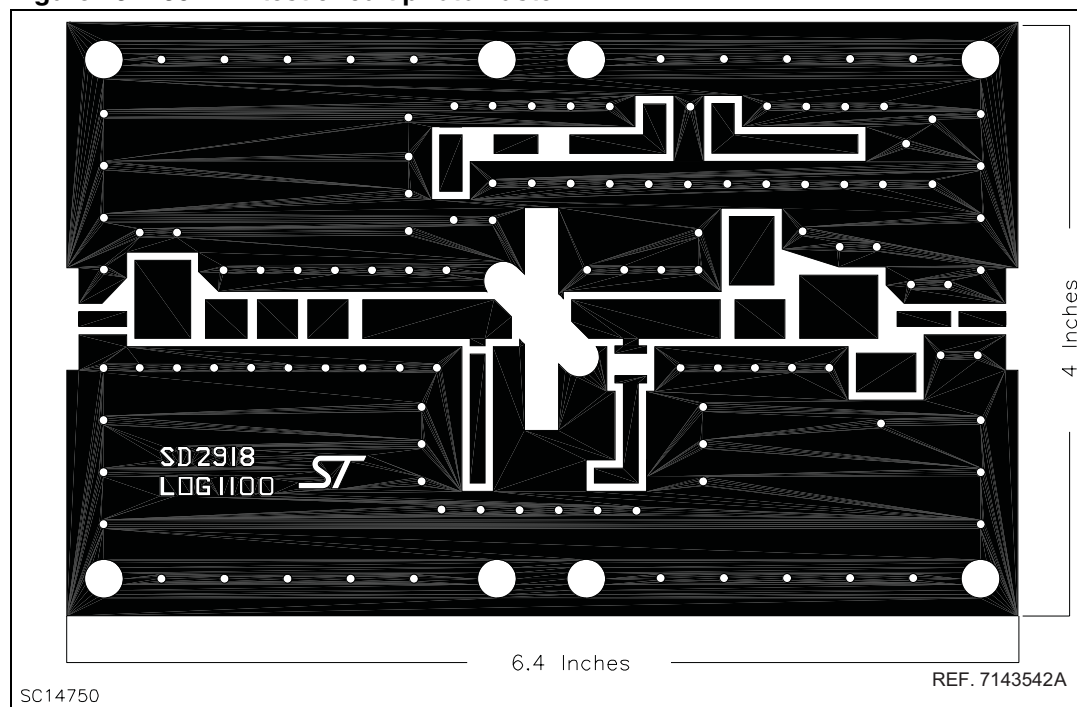
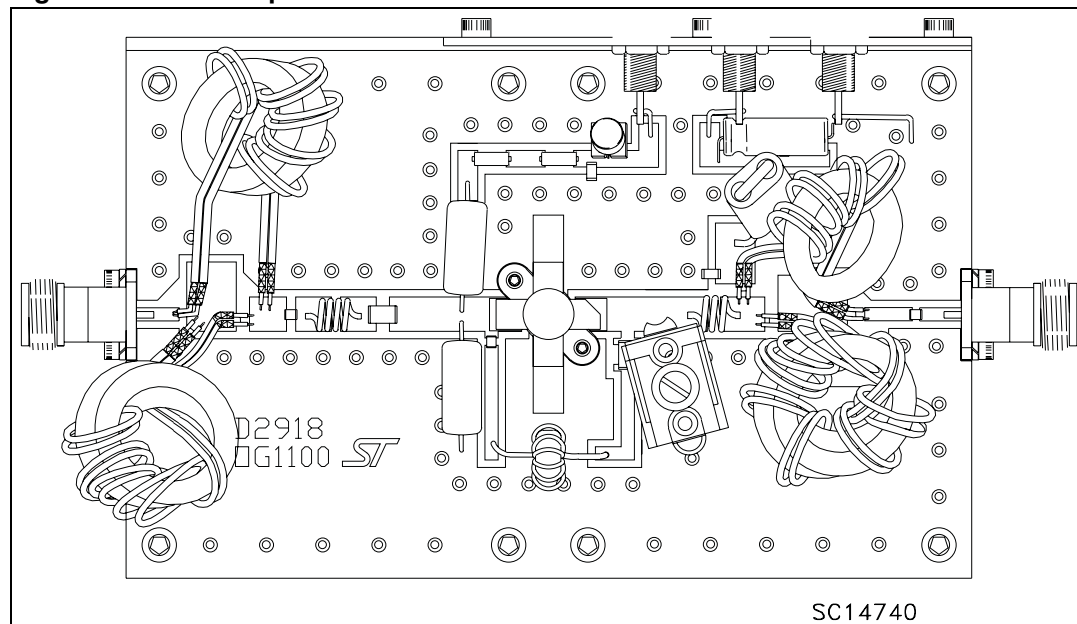


Figure 14. 30 MHz production test fixture

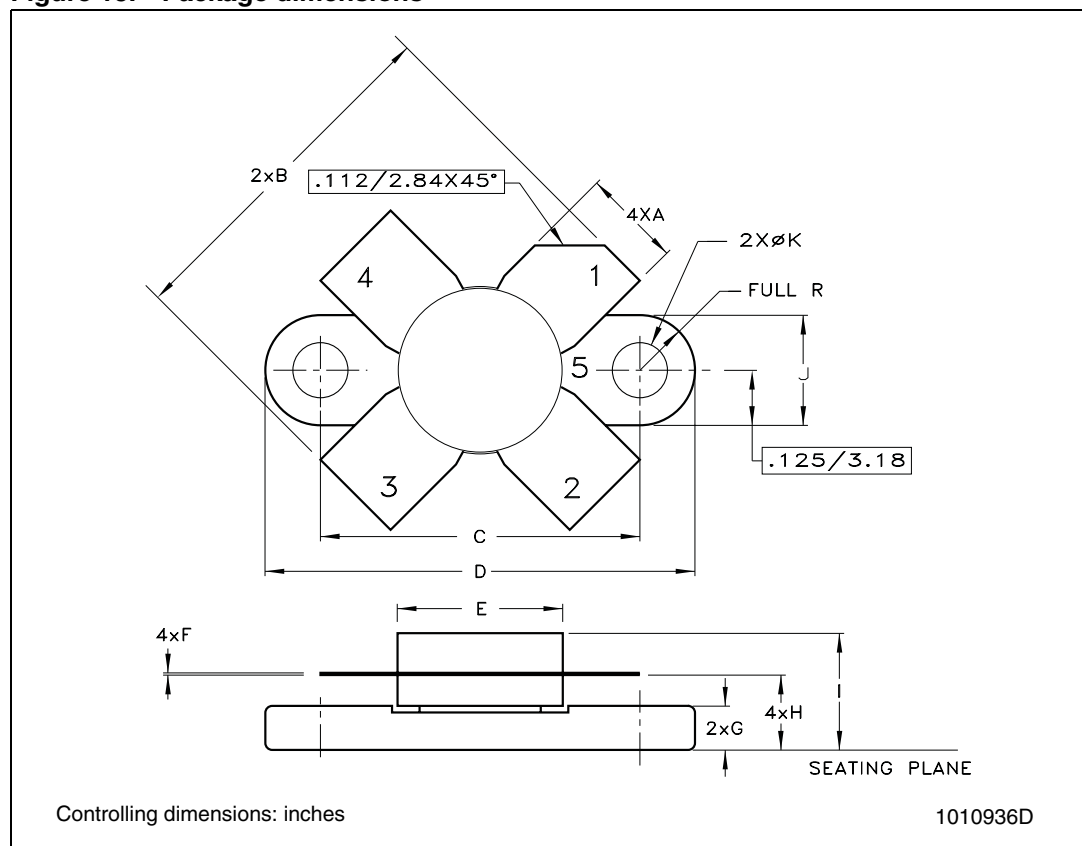


7 Package mechanical data

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Table 8. M113 (.380 DIA 4/L N/HERM W/FLG) mechanical data

Dim.	mm.			Inch		
	Min	Typ	Max	Min	Typ	Max
A	5.59		5.84	0.220		0.230
B	19.81		20.83	0.780		0.820
C	18.29		18.54	0.720		0.730
D	24.64		24.89	0.970		0.980
E	9.40		9.78	0.370		0.385
F	0.10		0.15	0.004		0.006
G	2.16		2.67	0.085		0.105
H	4.06		4.57	0.160		0.180
I			7.14			0.281
J	6.22		6.48	0.245		0.255
K	3.05		3.30	0.120		0.130

Figure 15. Package dimensions

8 Revision history

Table 9. Document revision history

Date	Revision	Changes
21-Jun-2004	1	First release
05-Nov-2009	2	Updated marking on Table 1 .

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