TYPES 2N5245 THRU 2N5247
N-CHANNEL SILICON JUNCTION FIELD-EFFECT TRANSISTORS

BULLETIN NO. DL-S 6810917, SEPTEMBER 1968

N-CHANNEL SILECT† FIELD-EFFECT TRANSISTORS‡ FOR VHF AMPLIFIER AND MIXER APPLICATIONS

- **High Power Gain . . . 10 dB Min at 400 MHz**
- **High Transconductance . . . 4000 μmho Min at 400 MHz (2N5245, 2N5247)**
- **Low C_{rss} . . . 1 pF Max**
- **High $|y_{fs}|/C_{iss}$ Ratio (High-Frequency Figure-of-Merit)**
- **Drain and Gate Leads Separated for High Maximum Stable Gain**
- **Cross-Modulation Minimized by Square-Law Transfer Characteristic**
- **For Use in VHF Amplifiers in FM, TV, and Mobile Communications Equipment**

mechanical data

These transistors are encapsulated in a plastic compound specifically designed for this purpose, using a highly mechanized process developed by Texas Instruments. The case will withstand soldering temperatures without deformation. These devices exhibit stable characteristics under high-humidity conditions and are capable of meeting MIL-STD-202C, Method 106B. The transistors are insensitive to light.

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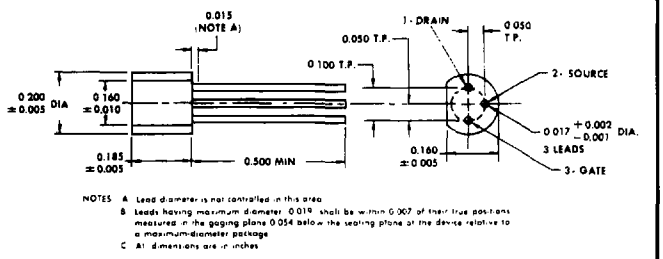
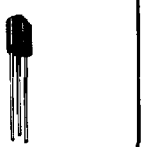
*CASE OUTLINE





***absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)**

Drain-Gate Voltage	30 V
Reverse Gate-Source Voltage	−30 V
Continuous Forward Gate Current	50 mA
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 1)	360 mW
Continuous Device Dissipation at (or below) 25°C Lead Temperature (See Note 2)	500 mW
Storage Temperature Range	−65°C to 150°C
Lead Temperature 1/16 Inch from Case for 10 Seconds	260°C

NOTES: 1. Derate linearly to 150°C free-air temperature at the rate of 2.88 mW/°C.

2. Derate linearly to 150°C lead temperature at the rate of 4 mW/°C. Lead temperature is measured on the gate lead 1/16 inch from the case

*Indicates JEDEC registered data

†Trademark of Texas Instruments

‡U.S. Patent No. 3,439,238

USES CHIP JN53

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*electrical characteristics at 25°C free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS	2N5245		2N5246		2N5247		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
$V_{(BR)GSS}$	Gate-Source Breakdown Voltage	$I_G = -1\ \mu A$, $V_{DS} = 0$	−30		−30		−30		V
I_{GSS}	Gate Reverse Current	$V_{GS} = -20$ V, $V_{DS} = 0$		−1		−1		−1	nA
		$V_{GS} = -20$ V, $V_{DS} = 0$, $T_A = 100°C$		−0.5		−0.5		−0.5	μA
$V_{GS(off)}$	Gate-Source Cutoff Voltage	$V_{DS} = 15$ V, $I_D = 10$ nA	−1	−6	−0.5	−4	−1.5	−8	V
I_{DSS}	Zero-Gate-Voltage Drain Current	$V_{DS} = 15$ V, $V_{GS} = 0$, See Note 3	5	15	1.5	7	8	24	mA
$\|y_{fs}\|$	Small-Signal Common-Source Forward Transfer Admittance	$V_{DS} = 15$ V, $V_{GS} = 0$, $f = 1$ kHz	4.5	7.5	3	6	4.5	8	mmho
$\|y_{os}\|$	Small-Signal Common-Source Output Admittance	$V_{DS} = 15$ V, $V_{GS} = 0$, $f = 1$ kHz		0.05		0.05		0.07	mmho
C_{iss}	Common-Source Short-Circuit Input Capacitance	$V_{DS} = 15$ V, $V_{GS} = 0$, $f = 1$ MHz		4.5		4.5		4.5	pF
C_{rss}	Common-Source Short-Circuit Reverse Transfer Capacitance			1		1		1	pF
$Re(y_{is})$	Small-Signal Common-Source Input Conductance	$V_{DS} = 15$ V, $V_{GS} = 0$, $f = 100$ MHz		0.1		0.1		0.1	mmho
$Im(y_{is})$	Small-Signal Common-Source Input Susceptance			3		3		3	mmho
$Re(y_{os})$	Small-Signal Common-Source Output Conductance			0.075		0.075		0.1	mmho
$Im(y_{os})$	Small-Signal Common-Source Output Susceptance			1		1		1	mmho
$Re(y_{is})$	Small-Signal Common-Source Input Conductance	$V_{DS} = 15$ V, $V_{GS} = 0$, $f = 400$ MHz		1		1		1	mmho
$Im(y_{is})$	Small-Signal Common-Source Input Susceptance			12		12		12	mmho
$Re(y_{fs})$	Small-Signal Common-Source Forward Transfer Conductance		4		2.5		4		mmho
$Re(y_{os})$	Small-Signal Common-Source Output Conductance			0.1		0.1		0.15	mmho
$Im(y_{os})$	Small-Signal Common-Source Output Susceptance			4		4		4	mmho

NOTE 3: This parameter must be measured using pulse techniques. $t_p = 100$ ms, duty cycle $\leq 10\%$.

*operating characteristics at 25°C free-air temperature

PARAMETER		TEST CONDITIONS	2N5245		UNIT
			MIN	MAX	
G_{ps}	Small-Signal Common-Source Neutralized Insertion Power Gain	$V_{DS} = 15$ V, $I_D = 5$ mA, $R_G' = 1$ kΩ, $f = 100$ MHz, See Figure 1	18		dB
		$V_{DS} = 15$ V, $I_D = 5$ mA, $R_G' = 1$ kΩ, $f = 400$ MHz, See Figure 1	10		
NF	Spot Noise Figure	$V_{DS} = 15$ V, $I_D = 5$ mA, $R_G' = 1$ kΩ, $f = 100$ MHz, See Figure 1		2	dB
		$V_{DS} = 15$ V, $I_D = 5$ mA, $R_G' = 1$ kΩ, $f = 400$ MHz, See Figure 1		4	

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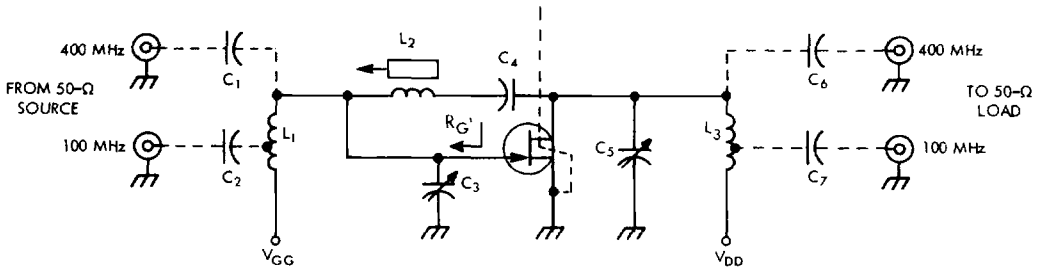
*PARAMETER MEASUREMENT INFORMATION



CIRCUIT COMPONENT INFORMATION

CAPACITORS		
	100 MHz	400 MHz
C_1	not used	1.8 pF
C_2	7 pF	not used
C_3	1 – 12 pF	0.8 – 8 pF
C_4	1000 pF	27 pF
C_5	1 – 12 pF	0.8 – 8 pF
C_6	not used	1 pF
C_7	3 pF	not used

COILS		
	100 MHz	400 MHz
L_1	8.5 T, #16 copper, tapped 2.5 T from bottom, 3/8" ID, 1 1/4" long	1.25 T, #20 copper, 3/16" ID, 3/8" long
L_2	15 T, #20 enameled copper, close-wound, 1/4" ID	4 T, #20 enameled copper, close-wound, 3/16" ID
L_3	13.5 T, #16 copper, tapped 5 T from bottom, 3/8" ID, 1 1/4" long	0.5 T, #20 copper, 1/2" ID, no length

FIGURE 1 — SCHEMATIC AND COMPONENT INFORMATION FOR 100-MHz AND 400-MHz NEUTRALIZED INSERTION POWER GAIN AND SPOT NOISE FIGURE TEST CIRCUITS

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TYPICAL CHARACTERISTICS

ALL TYPES
GATE REVERSE CURRENT
vs
FREE-AIR TEMPERATURE

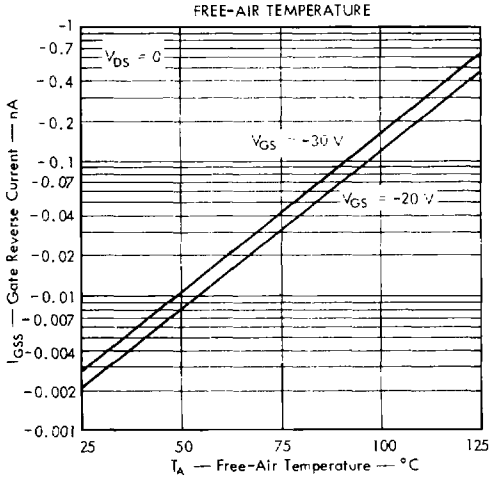

FIGURE 2

2N5245
CORRELATION OF SMALL-SIGNAL COMMON-SOURCE FORWARD TRANSFER ADMITTANCE and GATE-SOURCE CUTOFF VOLTAGE
with
INDIVIDUAL DEVICE ZERO-GATE-VOLTAGE DRAIN CURRENT

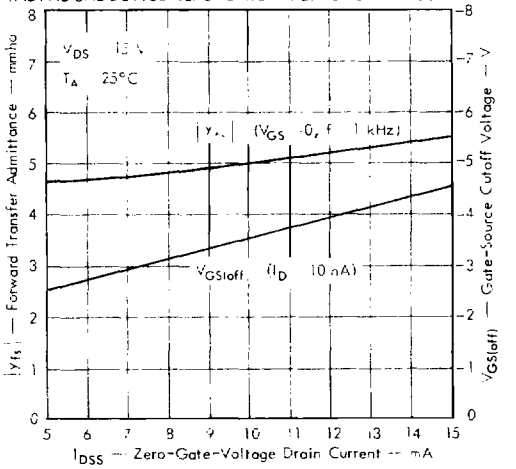

FIGURE 3

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