

# TYPES 3N211, 3N212, 3N213

## N-CHANNEL DUAL-GATE DEPLETION-TYPE INSULATED-GATE FIELD-EFFECT TRANSISTORS

### \*3N211 operating characteristics at 25°C free-air temperature

PARAMETER	TEST CONDITIONS	3N211			UNIT
		MIN	TYP	MAX	
F Common-Source Spot Noise Figure	$V_{DD} = 24 \text{ V}, V_{GG} = 6 \text{ V},$ $f = 45 \text{ MHz},$ See Figure 5			4	dB
$G_{ps}$ Small-Signal Common-Source Insertion Power Gain		29		37	dB
B Bandwidth		3.5		6	MHz
$V_{GG}(GC)$ Gain-Control Gate-Supply voltage	$V_{DD} = 24 \text{ V},$ $f = 45 \text{ MHz},$ $\Delta G_{ps} = -30 \text{ dB}^\dagger$ See Figure 5			+1 -1	V
F Common-Source Spot Noise Figure	$V_{DD} = 18 \text{ V}, V_{GG} = 7 \text{ V},$ $f = 200 \text{ MHz},$ See Figure 6			3.5	dB
$G_{ps}$ Small-Signal Common-Source Insertion Power Gain		24		35	dB
B Bandwidth		5		12	MHz
$V_{GG}(GC)$ Gain-Control Gate-Supply Voltage	$V_{DD} = 18 \text{ V},$ $f = 200 \text{ MHz},$ $\Delta G_{ps} = -30 \text{ dB}^\ddagger,$ See Figure 6	0		-2	V
F Common-Source Spot Noise Figure	$V_{DS} = 15 \text{ V}, V_{G2S} = 4 \text{ V},$ $I_D = 15 \text{ mA},$ $f = 450 \text{ MHz},$ See Figures 7 and 9			5	dB
$G_{ps}$ Small-Signal Common-Source Insertion Power Gain				21	dB

$^\dagger \Delta G_{ps}$  at 45 MHz is defined as the change in  $G_{ps}$  from the value at  $V_{GG} = 6$  volts.

$^\ddagger \Delta G_{ps}$  at 200 MHz is defined as the change in  $G_{ps}$  from the value at  $V_{GG} = 7$  volts.

### \*3N212 operating characteristics at 25°C free-air temperature

PARAMETER	TEST CONDITIONS	3N212		UNIT
		MIN	MAX	
$G_{ps}(\text{conv})$ Small-Signal Conversion Power Gain	$V_{DD} = 18 \text{ V}, f_{LO} = 245 \text{ MHz}^\S,$ $f_{RF} = 200 \text{ MHz},$ See Figure 8	21	28	dB
B Bandwidth		4	7	MHz

$^\S$  Amplitude at input from local oscillator is adjusted for maximum  $G_{ps}(\text{conv})$ .

### \*3N213 operating characteristics at 25°C free-air temperature

PARAMETER	TEST CONDITIONS	3N213		UNIT	
		MIN	MAX		
F Common-Source Spot Noise Figure	$V_{DD} = 24 \text{ V}, V_{GG} = 6 \text{ V},$ $f = 45 \text{ MHz},$ See Figure 5			4	dB
$G_{ps}$ Small-Signal Common-Source Insertion Power Gain		27		35	dB
B Bandwidth		3.5		6	MHz
$V_{GG}(GC)$ Gain-Control Gate-Supply Voltage	$V_{DD} = 24 \text{ V},$ $f = 45 \text{ MHz},$ $\Delta G_{ps} = -30 \text{ dB}^\dagger,$ See Figure 5			+1 -1	V

$^\dagger \Delta G_{ps}$  at 45 MHz is defined as the change in  $G_{ps}$  from the value at  $V_{GG} = 6$  volts.

\*JEDEC registered data

# TYPES 3N211, 3N212, 3N213 N-CHANNEL DUAL-GATE DEPLETION-TYPE INSULATED-GATE FIELD-EFFECT TRANSISTORS

TYPICAL CHARACTERISTICS AT  $T_A = 25^\circ\text{C}$

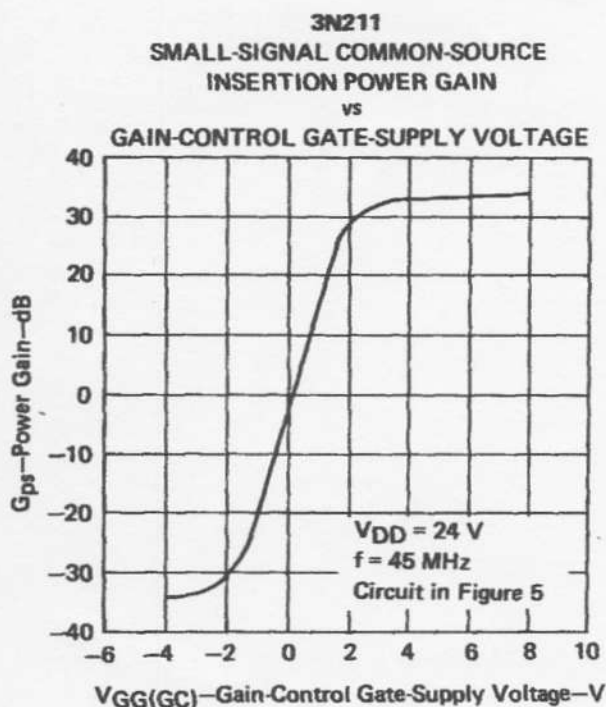


FIGURE 1

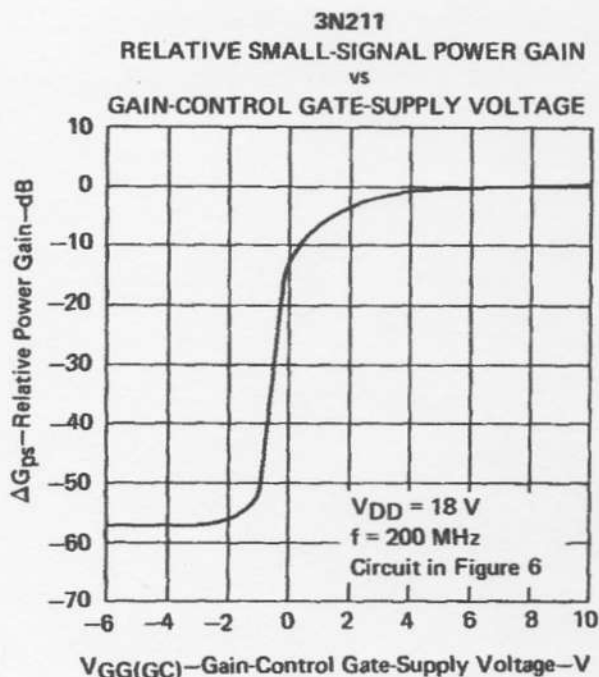


FIGURE 2

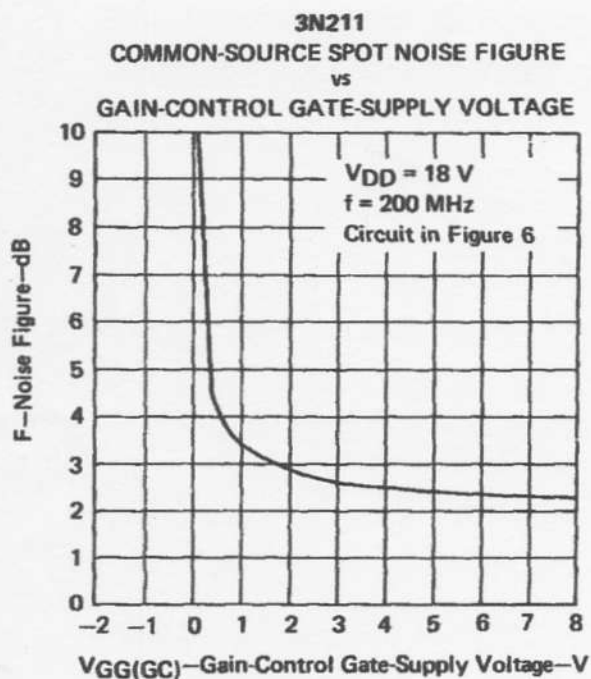


FIGURE 3

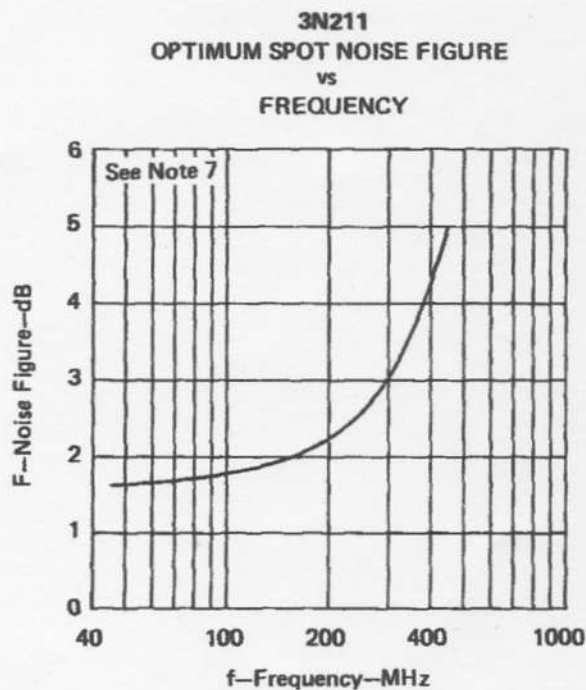
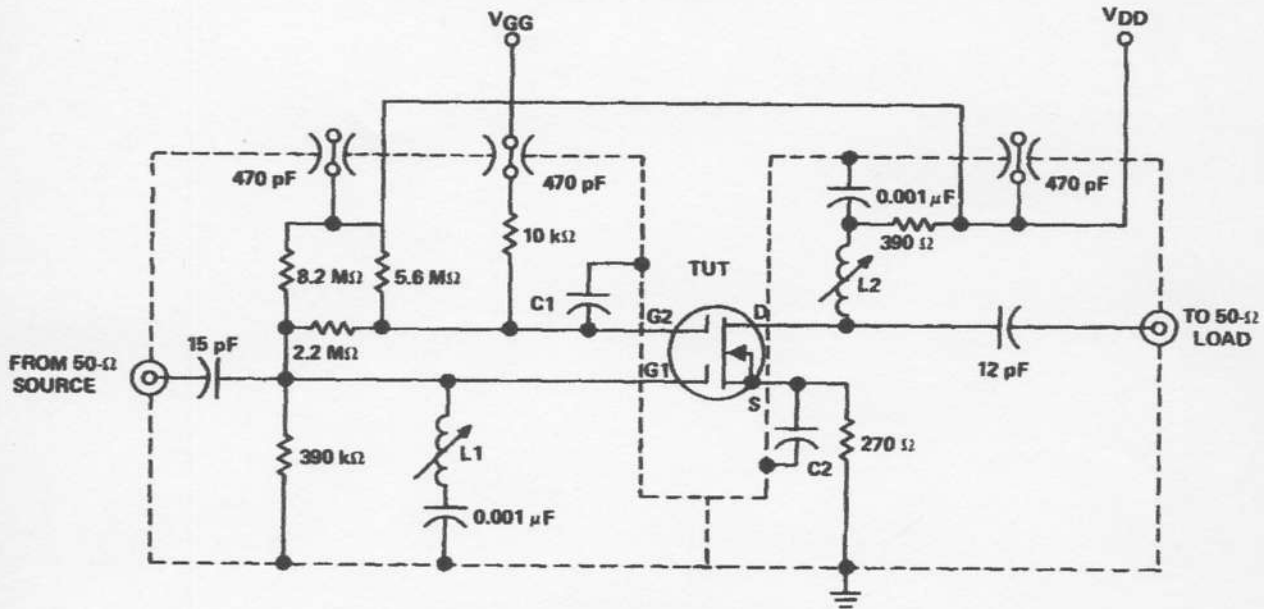


FIGURE 4

NOTE 7: Test conditions at 45 MHz, 200 MHz, and 450 MHz are the conditions given in the table of operating characteristics for 3N211.

**TYPES 3N211, 3N212, 3N213**  
**N-CHANNEL DUAL-GATE DEPLETION-TYPE**  
**INSULATED-GATE FIELD-EFFECT TRANSISTORS**

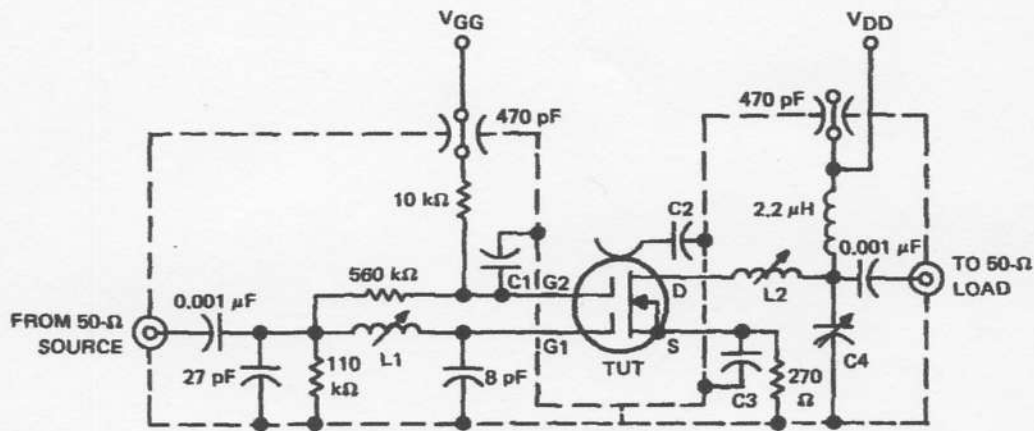
**PARAMETER MEASUREMENT INFORMATION**



**CIRCUIT COMPONENT INFORMATION**

- C1: Leadless disc ceramic, 0.001  $\mu$ F
- C2: Leadless disc ceramic, 0.01  $\mu$ F
- L1: 8T # 28, 5/32-inch-dia form, type "J" slug
- L2: 9T # 28, 5/32-inch-dia form, type "J" slug

**FIGURE 5—45-MHz POWER GAIN AND NOISE FIGURE TEST CIRCUIT FOR 3N211 AND 3N213\***



**CIRCUIT COMPONENT INFORMATION**

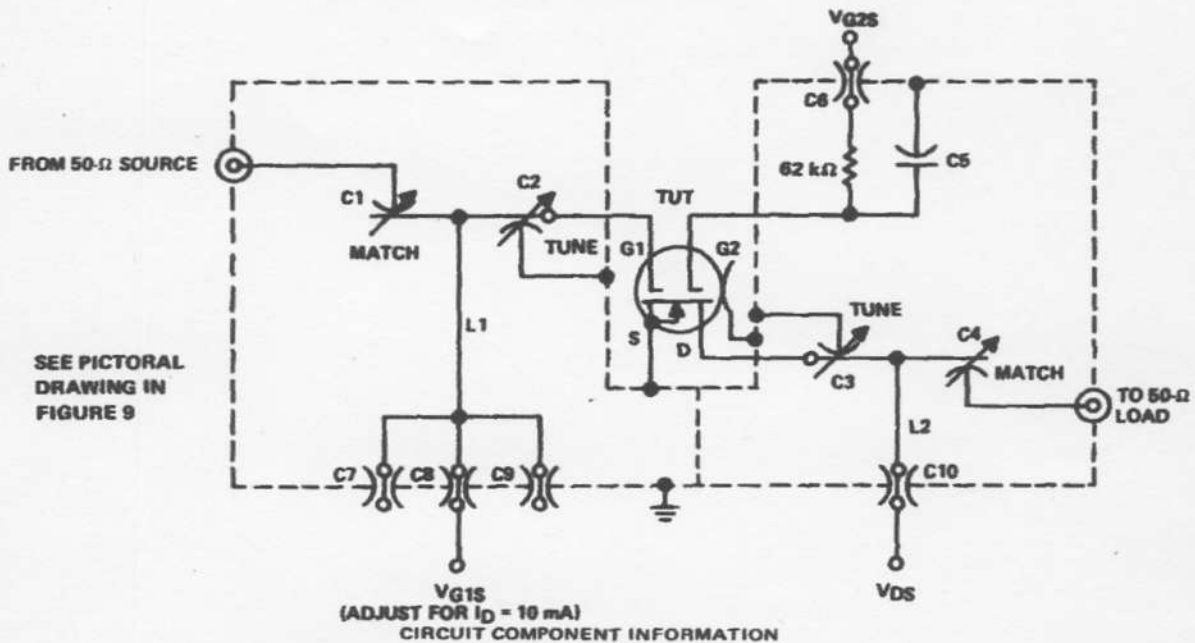
- C1, C2, & C3: Leadless disc ceramic, 0.001  $\mu$ F
- C4: ARCO 462, 5-80 pF, or equivalent
- L1: 3T #18, 3/16-inch-dia aluminum slug
- L2: 8T #20, 3/16-inch-dia aluminum slug

**FIGURE 6—200-MHz POWER GAIN, GAIN-CONTROL VOLTAGE, AND NOISE FIGURE TEST CIRCUIT FOR 3N211\***

\*JEDEC registered data

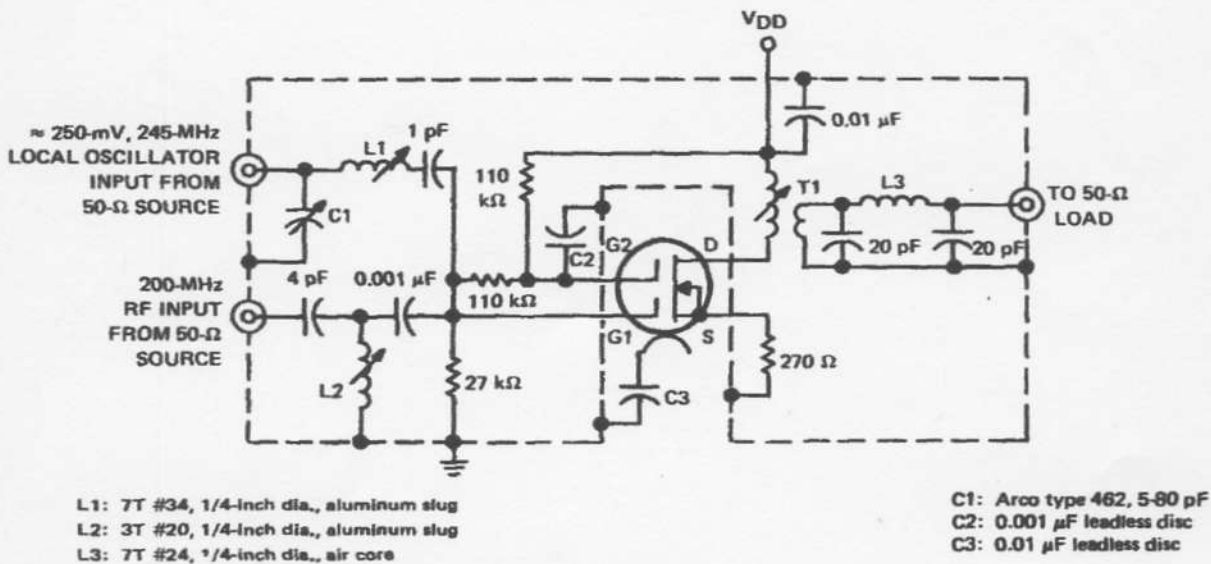
# TYPES 3N211, 3N212, 3N213 N-CHANNEL DUAL-GATE DEPLETION-TYPE INSULATED-GATE FIELD-EFFECT TRANSISTORS

## PARAMETER MEASUREMENT INFORMATION



- C1 thru C4: See Figure 9, Note D  
 C5: 0.001  $\mu$ F leadless disc capacitor  
 C6 thru C10: Allen-Bradley F5AU 0.001  $\mu$ F feed-through capacitors  
 L1 & L2: See Figure 9

FIGURE 7—450-MHz POWER GAIN AND NOISE TEST CIRCUIT FOR 3N211



- L1: 7T #34, 1/4-inch dia., aluminum slug  
 L2: 3T #20, 1/4-inch dia., aluminum slug  
 L3: 7T #24, 1/4-inch dia., air core
- T1: Pri: 25T #30, close wound on 1/4-inch-dia form, type "J" slug  
 Sec: 4T #30, centered over primary

FIGURE 8—200-MHz-to-45-MHz CIRCUIT FOR CONVERSION POWER GAIN FOR 3N212\*

\*JEDEC registered data

# TYPES 3N211, 3N212, 3N213 N-CHANNEL DUAL-GATE DEPLETION-TYPE INSULATED-GATE FIELD-EFFECT TRANSISTORS

**NOTES:**

- A. All dimensions are in inches.
- B. The removable top of test fixture is not shown.
- C. For clarity, the 62 kΩ resistor, the source and gate-2 socket pins, and insulating stand-off terminals (ISOT) soldered into the fold of L1 and L2 respectively for mechanical support, are not shown in view A.
- D. C1 and C2 (C3 and C4) consist of shim brass and the "C" portion of L1 (L2) separated by air and the mylar tape covering the "C" portion of L1 (L2).

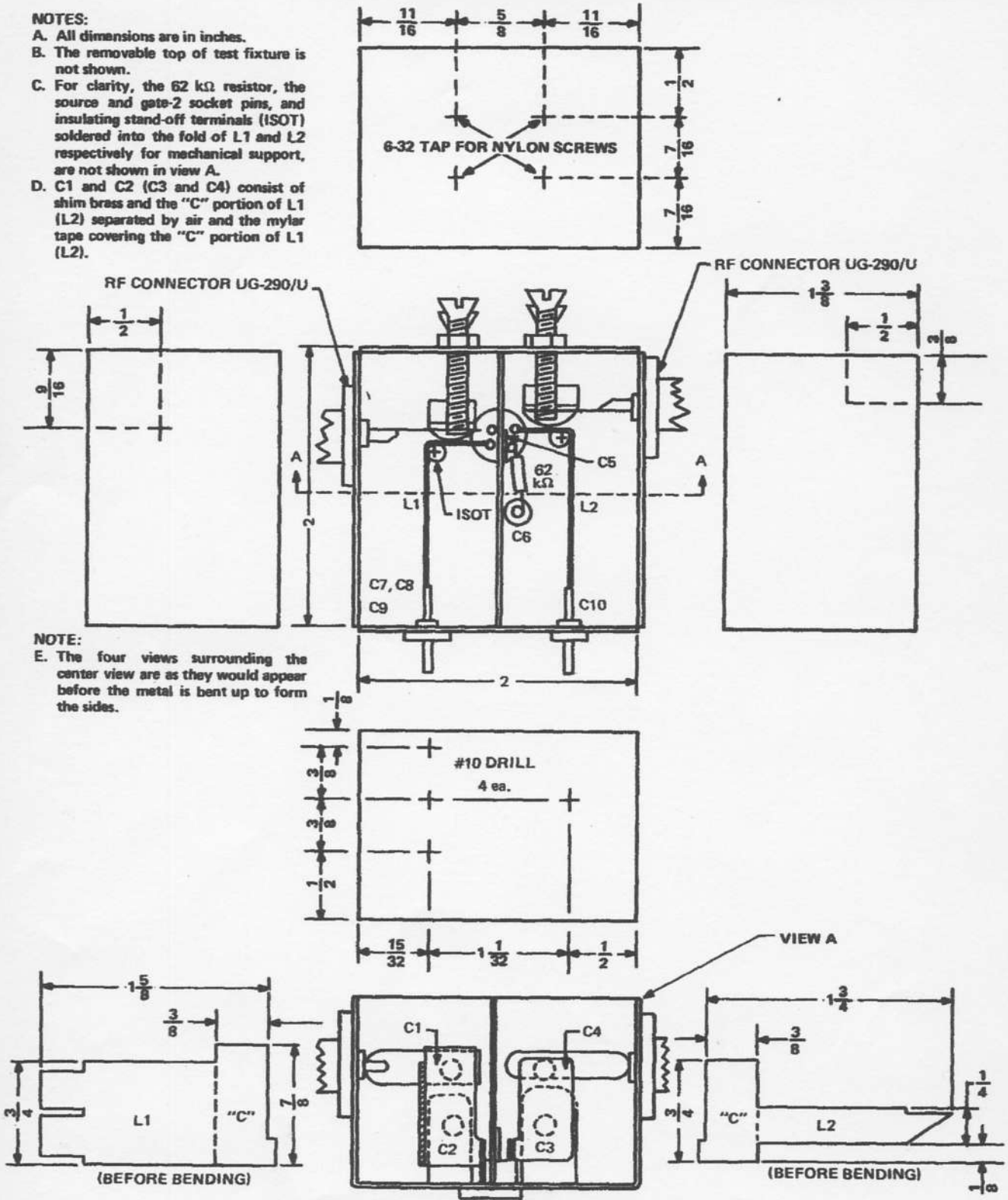


FIGURE 9—450-MHz POWER GAIN AND NOISE TEST FIXTURE