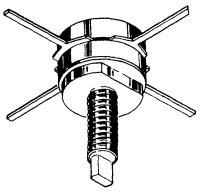
2N5641 (SILICON)
2N5642
2N5643

NPN SILICON RF POWER TRANSISTORS

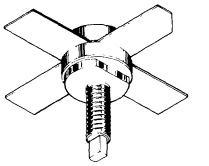
. . . designed for VHF power amplifier or oscillator applications in military and industrial equipment. These devices are particularly suited for use in Class AB, B, or C amplifier applications to 400 MHz.

- Balanced Emitter Construction to provide the designer with the device technology that assures ruggedness and resists transistor damage caused by load mismatch.
- Stripline packaging for lower lead inductance and better broadband capability.
- Ceramic Packaging
- Specified 28 Volt, 175 MHz Characteristics –
  2N5641 – 7.0 Watts Output Power at 8.4 dB Gain
  2N5642 – 20 Watts Output Power at 8.2 dB Gain
  2N5643 – 40 Watts Output Power at 7.6 dB Gain

NPN SILICON RF POWER TRANSISTORS



2N5641

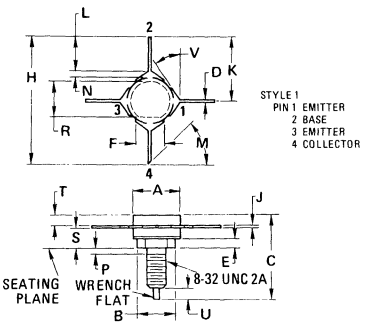


2N5642
2N5643

***MAXIMUM RATINGS**

Rating	Symbol	2N5641	2N5642	2N5643	Unit
Collector-Emitter Voltage	V_{CEO}	← 35 →			Vdc
Collector-Base Voltage	V_{CB}	← 65 →			Vdc
Emitter-Base Voltage	V_{EB}	← 4.0 →			Vdc
Collector Current – Continuous	I_C	1.0	3.0	5.0	Adc
Total Device Dissipation @ $T_A = 25^oC$	P_D	15	30	60	Watts
Derate above 25^oC		86	171	342	mW/^oC
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200			^oC

*Indicates JEDEC Registered Data.

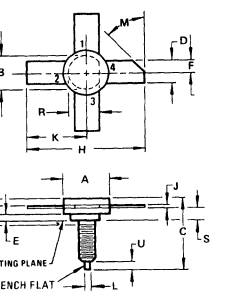


STYLE 1
PIN 1 EMITTER
2 BASE
3 EMITTER
4 COLLECTOR

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	17.63	19.46	0.694	0.766
D	0.64	0.89	0.025	0.035
E	1.78	2.03	0.070	0.080
F	5.59	5.84	0.220	0.230
H	26.16	27.69	1.030	1.090
J	0.10	0.15	0.004	0.006
K	13.08	13.84	0.515	0.545
L	7.11	7.37	0.280	0.290
M	40°	50°	40°	50°
N	1.27	1.52	0.050	0.060
P		1.27		0.050
R	7.59	7.80	0.299	0.307
S	4.01	4.52	0.158	0.178
T	2.16	2.41	0.085	0.095
U	2.54	3.30	0.100	0.130
V	10°	20°	10°	20°

2N5641

CASE 144B-03



STYLE 1
PIN 1 EMITTER
2 BASE
3 EMITTER
4 COLLECTOR

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	18.03	19.05	0.710	0.750
D	5.59	5.84	0.220	0.230
E	1.78	2.03	0.070	0.080
F	2.79	2.92	0.110	0.115
H	26.42	28.70	1.040	1.130
J	0.10	0.15	0.004	0.006
K	13.21	14.35	0.520	0.565
L	1.40	1.65	0.055	0.065
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
R	7.59	7.80	0.299	0.307
S	4.01	4.52	0.158	0.178
T	2.16	2.41	0.085	0.095
U	2.54	3.30	0.100	0.130

NOTE
CASE 145A-01 USE 8-32NC2A STUD

2N5642
2N5643

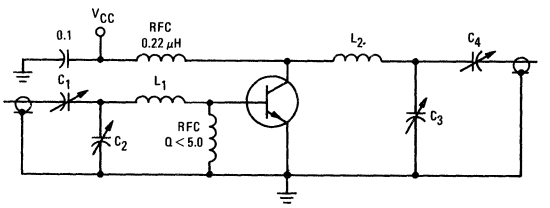
CASE 145A-01

*ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (Note 1) (I_C = 200 mAdc, I_B = 0)		BV_{CEO}	35	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 200 mAdc, V_{BE} = 0)		BV_{CES}	65	–	–	Vdc
Emitter-Base Breakdown Voltage		BV_{EBO}				Vdc
(I_E = 5.0 mAdc, I_C = 0)	2N5641		4.0	–	–	
(I_E = 10 mAdc, I_C = 0)	2N5642,2N5643		4.0	–	–	
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)		I_{CBO}	–	–	1.0	mAdc
ON CHARACTERISTICS						
DC Current Gain		h_{FE}				–
(I_C = 100 mAdc, V_{CE} = 5.0 Vdc)	2N5641		5.0	–	–	
(I_C = 200 mAdc, V_{CE} = 5.0 Vdc)	2N5642		5.0	–	–	
(I_C = 500 mAdc, V_{CE} = 5.0 Vdc)	2N5643		5.0	–	–	
DYNAMIC CHARACTERISTICS						
Output Capacitance		C_{ob}				pF
(V_{CB} = 30 Vdc, I_E = 0, f = 0.1 to 1.0 MHz)	2N5641		–	8.5	15	
	2N5642		–	22	35	
	2N5643		–	45	65	
FUNCTIONAL TEST						
Power Input (Figure 1)		P_{in}				Watts
(P_{out} = 7.0 Watts, V_{CE} = 28 Vdc, f = 175 MHz)	2N5641		–	0.4	1.0	
(P_{out} = 20 Watts, V_{CE} = 28 Vdc, f = 175 MHz)	2N5642		–	1.9	3.0	
(P_{out} = 40 Watts, V_{CE} = 28 Vdc, f = 175 MHz)	2N5643		–	5.0	7.0	
Common-Emitter Amplifier Power Gain (Figure 1)		G_{PE}				dB
(P_{out} = 7.0 Watts, V_{CE} = 28 Vdc, f = 175 MHz)	2N5641		8.4	12.5	–	
(P_{out} = 20 Watts, V_{CE} = 28 Vdc, f = 175 MHz)	2N5642		8.2	10.2	–	
(P_{out} = 40 Watts, V_{CE} = 28 Vdc, f = 175 MHz)	2N5643		7.6	8.1		
Collector Efficiency (Figure 1)		η				%
(P_{out} = 7.0 Watts, V_{CE} = 28 Vdc, f = 175 MHz)	2N5641		60	–	–	
(P_{out} = 20 Watts, V_{CE} = 28 Vdc, f = 175 MHz)	2N5642		60	–	–	
(P_{out} = 40 Watts, V_{CE} = 28 Vdc, f = 175 MHz)	2N5643		60	–	–	

Note 1: Pulsed through 25 mH inductor.
*Indicates JEDEC Registered Data.

FIGURE 1 – 175 MHz TEST CIRCUIT



2N5641	2N5642	2N5643
C_1, C_3, C_4 – 5.0 – 80 pF	C_1 – 3.0 – 30 pF	C_1, C_2, C_3, C_4, - ARCO 464 25-280 pF
C_2 – 9.0 – 180 pF	C_2, C_3, C_4, – 9.0 – 180 pF	L_1 – 1" Straight #14 AWG
L_1 – 1¼" Straight #14 AWG	L_1 – 1" Straight #14 AWG	L_2 – 1 Turn #16 AWG, ¼" I.D.
L_2 – 3 Turns #16 AWG, ¼" I.D.	L_2 – 1 Turn #16 AWG, ¼" I.D.	

TYPICAL PERFORMANCE DATA

POWER OUTPUT versus FREQUENCY

FIGURE 2

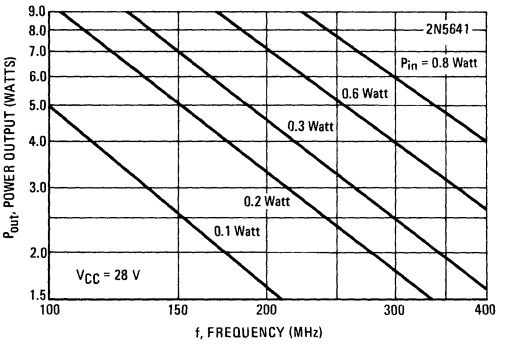


FIGURE 3

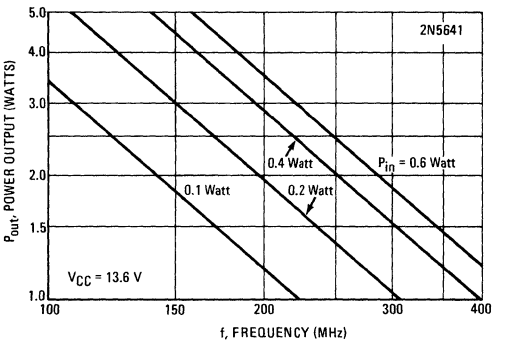


FIGURE 4

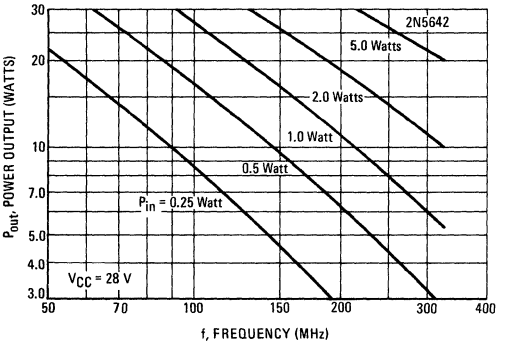


FIGURE 5

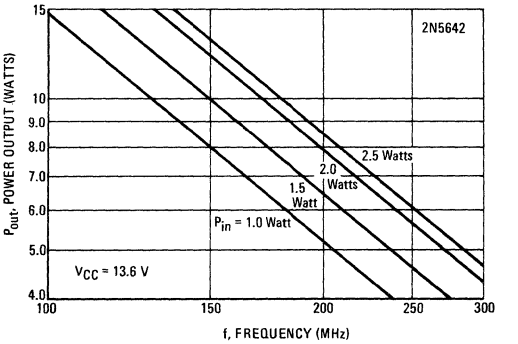


FIGURE 6

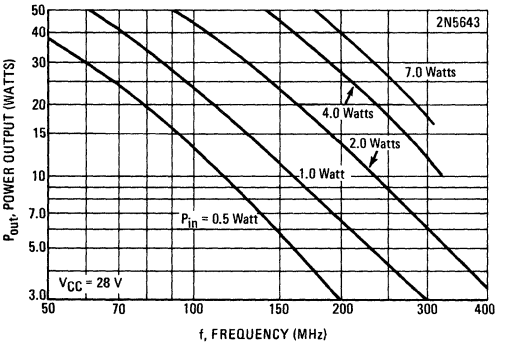
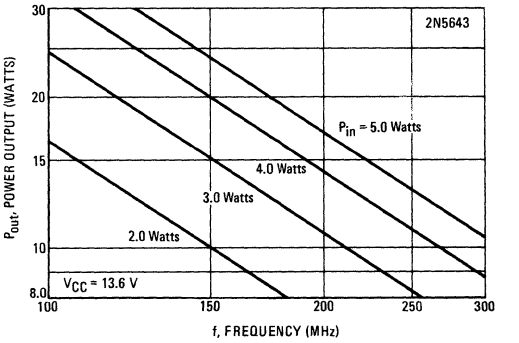


FIGURE 7



TYPICAL PERFORMANCE DATA
POWER OUTPUT versus POWER INPUT

FIGURE 8

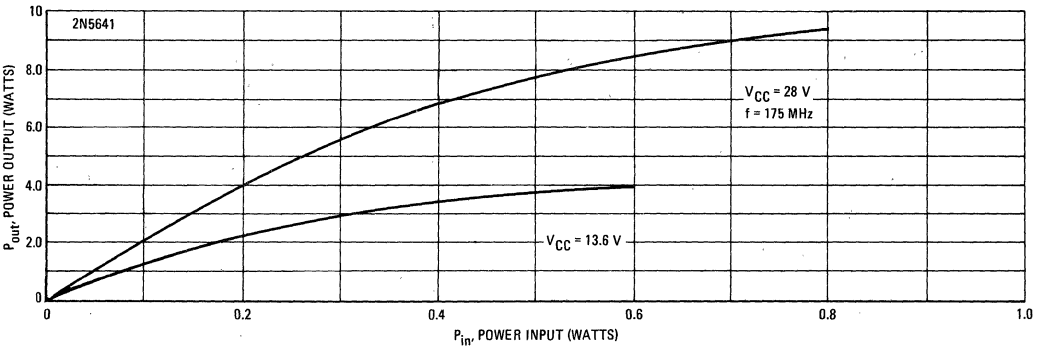


FIGURE 9

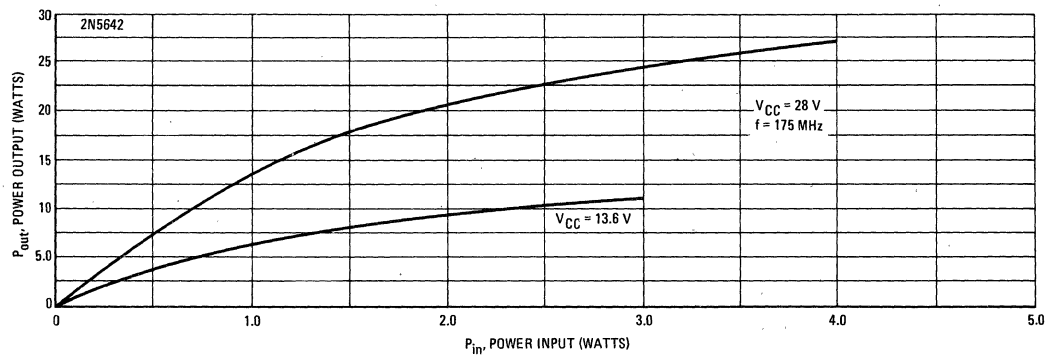
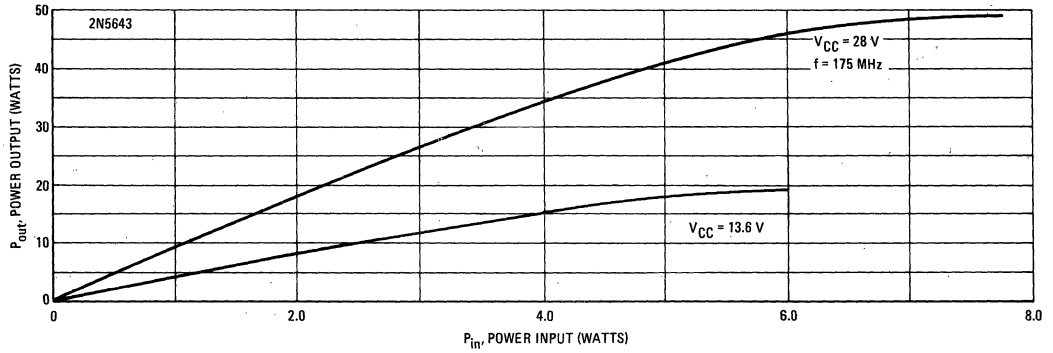


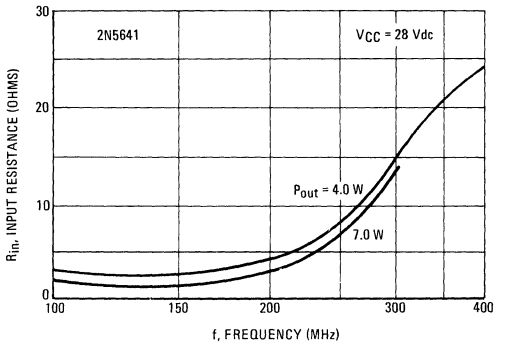
FIGURE 10



CIRCUIT DESIGN DATA

PARALLEL EQUIVALENT INPUT RESISTANCE versus FREQUENCY

FIGURE 11



PARALLEL EQUIVALENT INPUT CAPACITANCE versus FREQUENCY

FIGURE 12

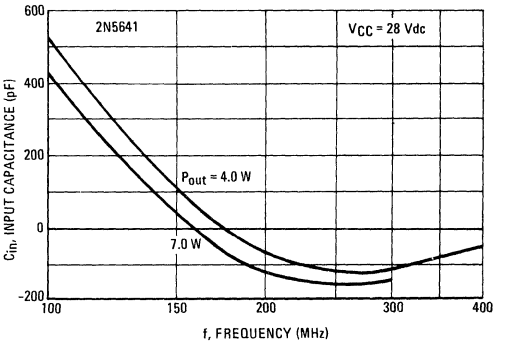


FIGURE 13

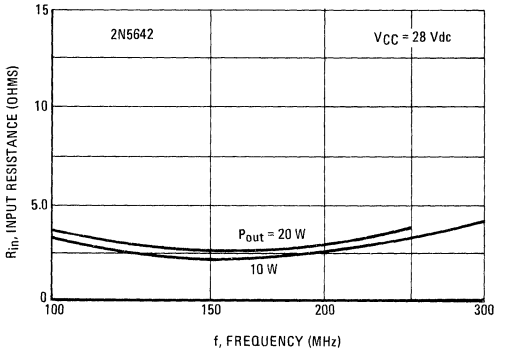


FIGURE 14

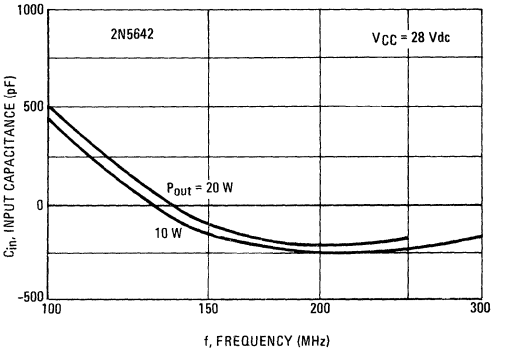


FIGURE 15

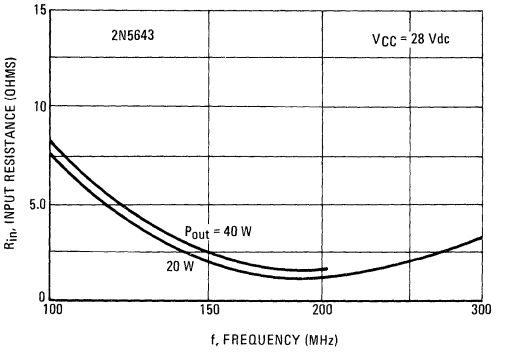
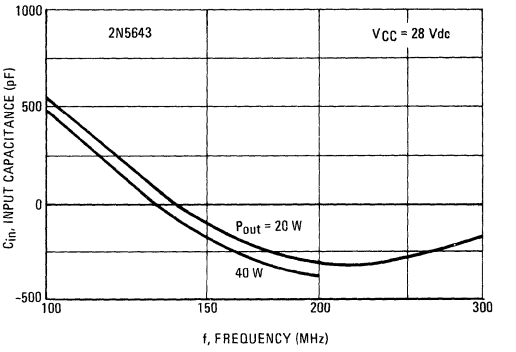


FIGURE 16



CIRCUIT DESIGN DATA

LARGE SIGNAL OUTPUT CAPACITANCE versus FREQUENCY

FIGURE 17

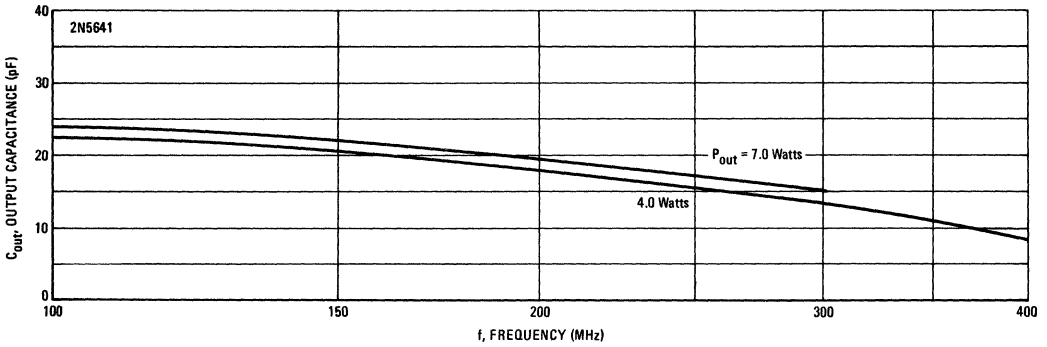


FIGURE 18

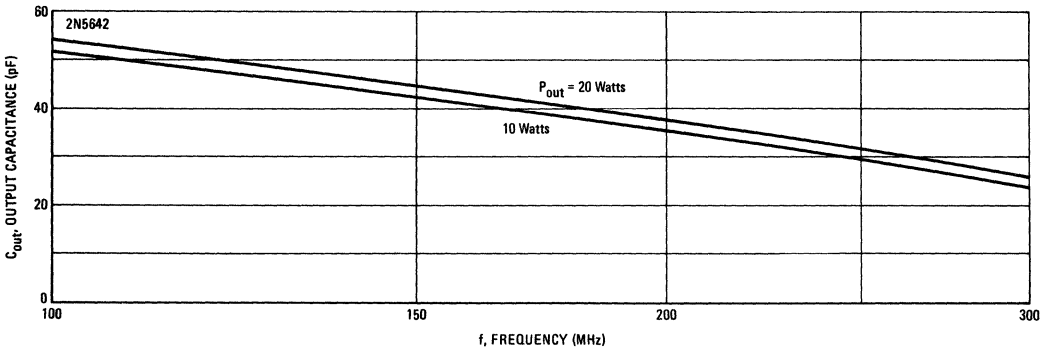


FIGURE 19