MITSUBISHI RF POWER TRANSISTOR

2SC3019

NPN EPITAXIAL PLANAR TYPE

DISCRIPTION

2SC3019 is silicon NPN epitaxial planar type transistor designed for RF power amplifiers in UHF band.

FEATURES

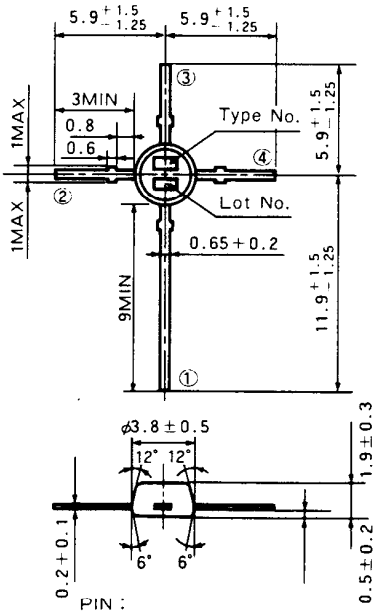
- High power gain: $G_{pe} \geqq 14$dB
  @P_O = 0.5W, f = 520MHz, V_{CC} = 12.5V
- Emitter ballasted construction for high reliability and good performance
- Small-disc-mold type package
- Collector dissipation: P_C = 0.6W, (@T_a = 25°C)
- Input/Output impedance:
  Z_{in} = 2.6 – j3.0Ω, Z_{out} = 16.5 – j56Ω
  @f = 520MHz, V_{CC} = 12.5V, P_O = 0.5W

APPLICATION

Exciter stage in UHF band mobile radio application

OUTLINE DRAWING

Dimensions in mm



T-43

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CBO}	Collector to base voltage		35	V
V_{EBO}	Emitter to base voltage		4	V
V_{CEO}	Collector to emitter voltage	$R_{BE} = \infty$	17	V
I_C	Collector current		0.4	A
P_C	Collector dissipation	T_a = 25°C	0.6	W
		T_C = 25°C	0.9	W
T_j	Junction temperature		135	°C
Tstg	Storage temperature		−55 to 135	°C
Rth-a	Thermal resistance	Junction to ambient	250	°C/W
Rth-c		Junction to case	166	°C/W

Note. Above parameters are guaranteed independently.

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise specified)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)EBO}$	Emitter to base breakdown voltage	I_E = 1mA, I_C = 0	4.0			V
$V_{(BR)CBO}$	Collector to base breakdown voltage	I_C = 1mA, I_E = 0	35			V
$V_{(BR)CEO}$	Collector to emitter breakdown voltage	I_C = 10mA, $R_{BE} = \infty$	17			V
I_{CBO}	Collector cutoff current	V_{CB} = 15V, I_E = 0			500	μA
I_{EBO}	Emitter cutoff current	V_{EB} = 3V, I_C = 0			500	μA
h_{FE}	DC forward current gain *	V_{CE} = 10V, I_C = 50mA	20	70	180	—
P_O	Output power	V_{CC} = 12.5V, f = 520MHz, P_{in} = 20mW	500	600		mW
η_C	Collector efficiency		40	50		%

Note. * Pulse test, P_W = 150μs, duty = 5%.
Above parameters, ratings, limits and conditions are subject to change.

NOV. '97

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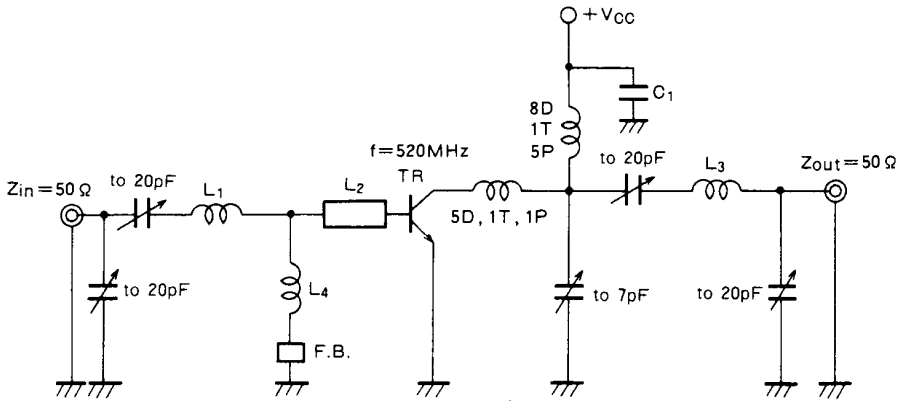
TEST CIRCUIT

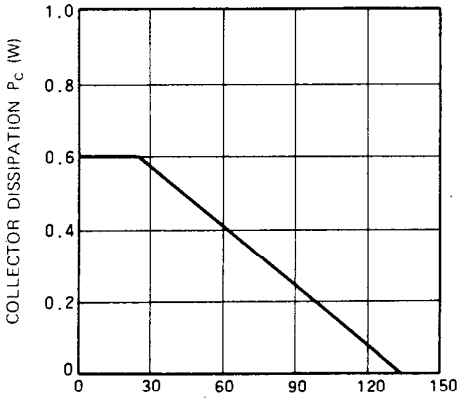


L_1: Length = 8, ϕ1.5 silver plated copper wire.
L_2: Width = 4, length = 12 (1.6 t glass-epoxy, ϵ_S = 4.7)
L_3: 10D, 1/2T, ϕ1.5 silver plated copper wire.
L_4: 3D, 8T, ϕ0.8 enameled wire.
C_1: 220pF, 330pF, 2200pF, 4700pF, 10μF in parallel

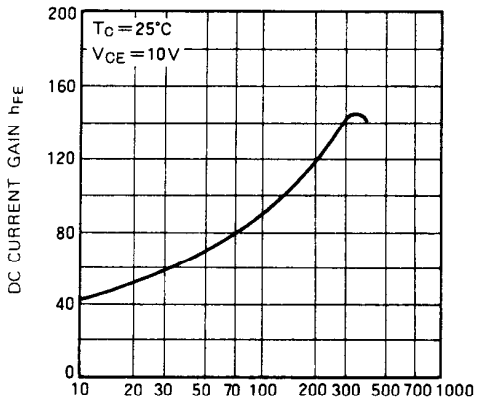
NOTES: ϕ1.5 silver plated copper wire except L_2 and L_4.
Dimension in milli-meter
D: Inner diameter of coil ferrite bead
T: Turn number of coil
P: Pitch of coil
F.B.: Ferrite bead

TYPICAL PERFORMANCE DATE

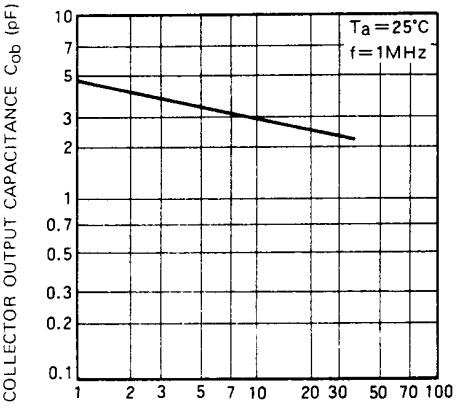
COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE



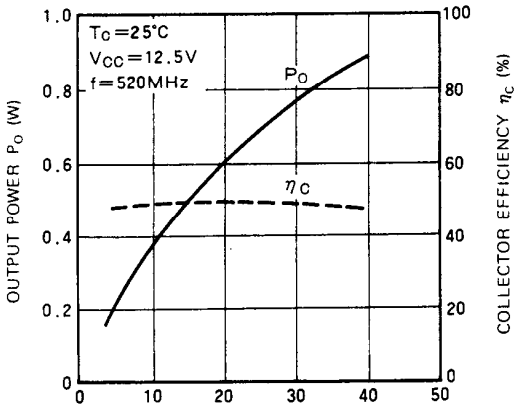
DC CURRENT GAIN VS. COLLECTOR CURRENT



COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE



OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER



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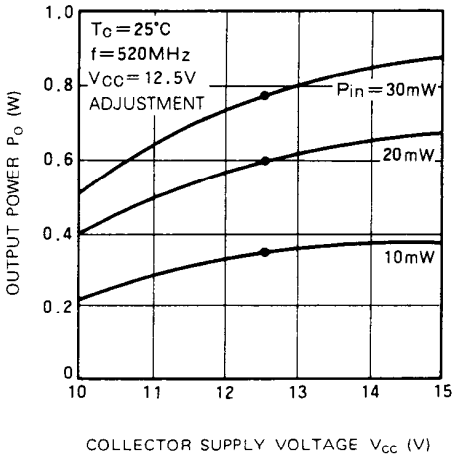
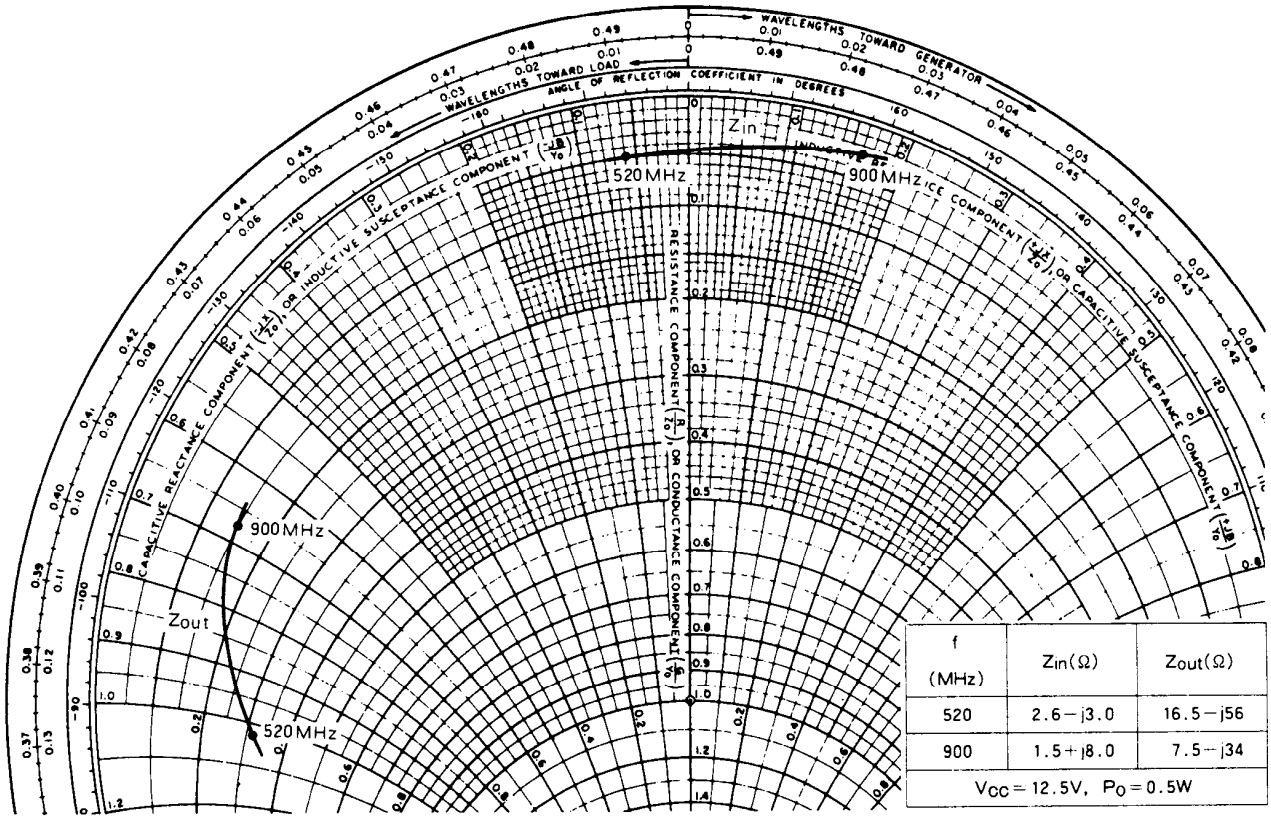
OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE CHARACTERISTICS



INPUT/OUTPUT IMPEDANCE

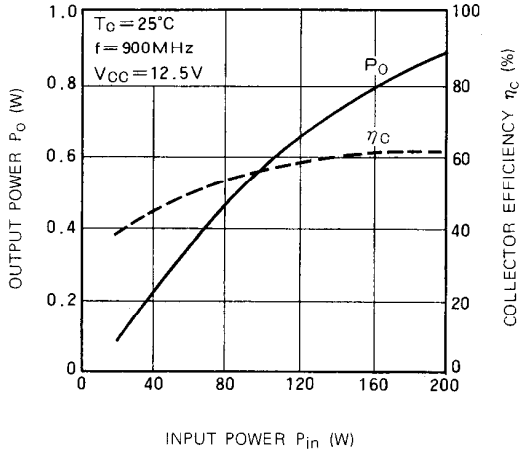


f (MHz)	Zin(Ω)	Zout(Ω)
520	2.6−j3.0	16.5−j56
900	1.5+j8.0	7.5−j34
V_{CC}=12.5V, P_O=0.5W		

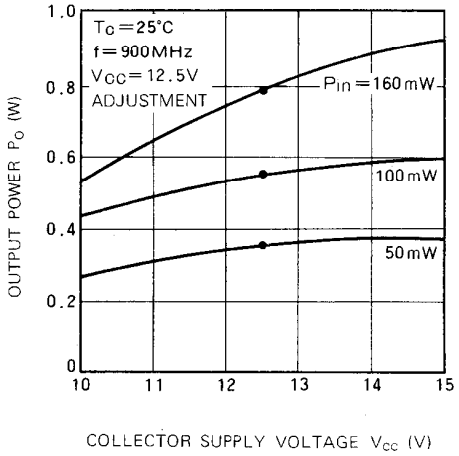
MITSUBISHI ELECTRIC

REFERENCE DATA (f = 900MHz)

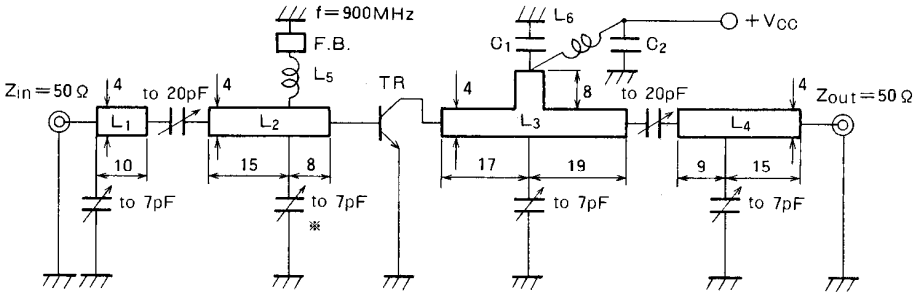
OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER



OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE



TEST CIRCUIT



L_1 to L_4 : Strip-line: 1.6 t glass-teflon ϵ_r = 2.7
L_5 : 4D, 6T, AWG #20 enameled wire (ϕ0.8 mm)
L_6 : 4D, 5T, AWG #20 enameled wire (ϕ0.8 mm)
F.B. : Ferrite bead
C_1 : 1000pF in parallel
C_2 : 100pF, 56pF, 560pF, 4.7μF in parallel

Unit: mm

MATCHING PATTERN