MITSUBISHI RF POWER TRANSISTOR

2SC3102

NPN EPITAXIAL PLANAR TYPE

DESCRIPTION

2SC3102 is a silicon NPN epitaxial planar type transistor specifically designed for high power amplifiers applications in UHF band.

FEATURES

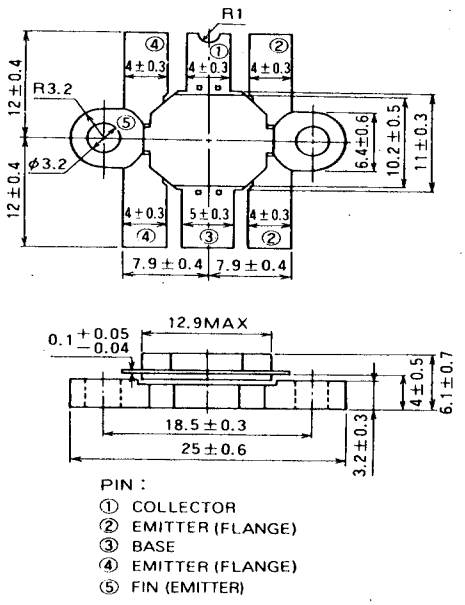
- High power output and high gain: $P_O \geqq 60W$, $G_{pe} \geqq 4.8dB$ @$V_{CC} = 12.5V$, $f = 520MHz$, $P_{in} = 20W$.
- Emitter ballasted construction.
- High ruggedness: Ability to withstand more than 20:1 load VSWR when operated at $V_{CC} = 15.2V$, $P_O = 60W$, $f = 520MHz$.
- High reliability due to gold metalization die
- Flange type ceramic package
- $Z_{in} = 1.0 + j1.0\Omega$, $Z_{out} = 1.1 + j1.0\Omega$ @$V_{CC} = 12.5V$, $f = 520MHz$, $P_O = 60W$.

APPLICATION

For output stage of 50W power amplifiers in UHF band.

OUTLINE DRAWING

Dimensions in mm



PIN :
① COLLECTOR
② EMITTER (FLANGE)
③ BASE
④ EMITTER (FLANGE)
⑤ FIN (EMITTER)

T-40E

ABSOLUTE MAXIMUM RATINGS ($T_C = 25°C$)

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		18	A
P_C	Collector dissipation	$T_C = 25°C$	170	W
Tj	Junction temperature		175	°C
Tstg	Storage temperature		−55 to 175	°C

Note. Above parameters are guaranteed independently.

ELECTRICAL CHARACTERISTICS ($T_C = 25°C$)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)EBO}$	Emitter to base breakdown voltage	$I_E = 20mA$, $I_C = 0$	4			V
$V_{(BR)CBO}$	Collector to base breakdown voltage	$I_C = 20mA$, $I_E = 0$	35			V
$V_{(BR)CEO}$	Collector to emitter breakdown voltage	$I_C = 0.2A$, $R_{BE} = \infty$	17			V
I_{CBO}	Collector cut off current	$V_{CB} = 15V$, $I_E = 0$			5	mA
I_{EBO}	Emitter cut off current	$V_{EB} = 3V$, $I_C = 0$			5	mA
h_{FE}	DC forward current gain *	$V_{CE} = 10V$, $I_C = 2A$	10	50	180	—
P_O	Power Output	$V_{CC} = 12.5V$, $P_{in} = 20W$, $f = 520MHz$	60	65		W
η_C	Collector efficiency		60	65		%

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

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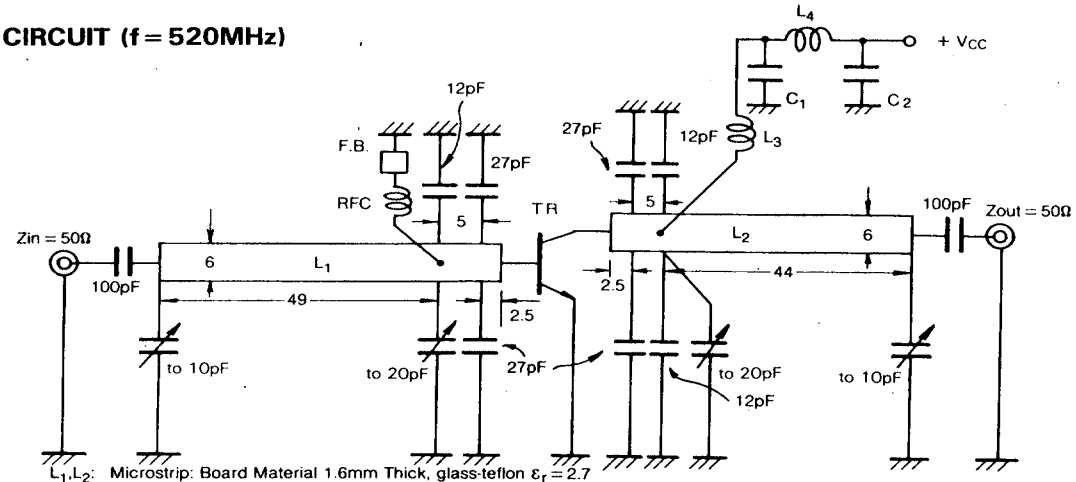
TEST CIRCUIT (f = 520MHz)



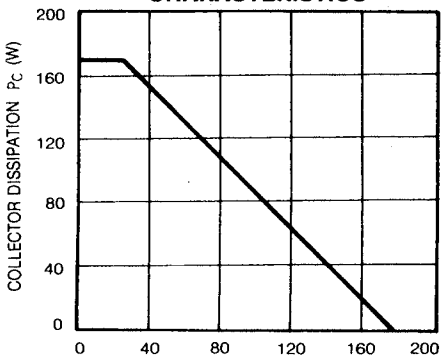
L_1,L_2: Microstrip: Board Material 1.6mm Thick, glass-teflon $\varepsilon_r = 2.7$
L_3: 1 Turn, AWG #13, 8mm I.D.
L_4: 4 Turns, AWG #13, 8mm I.D.
RFC: 8 Turns, AWG #20, 4mm I.D.

F.B.: Ferrite Bead
C_1: 82pF, 220pF, 2200pF, 4700pF, 33μF in Parallel
C_2: 82pF, 220pF, 2200pF, 4700pF, 22μF in Parallel

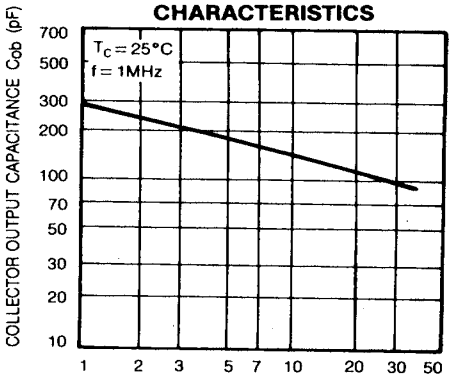
Dimensions: mm

TYPICAL PERFORMANCE DATA

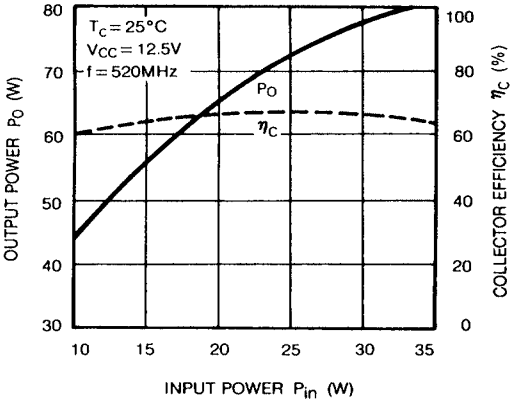
COLLECTOR DISSIPATION VS. CASE TEMPERATURE CHARACTERISTICS



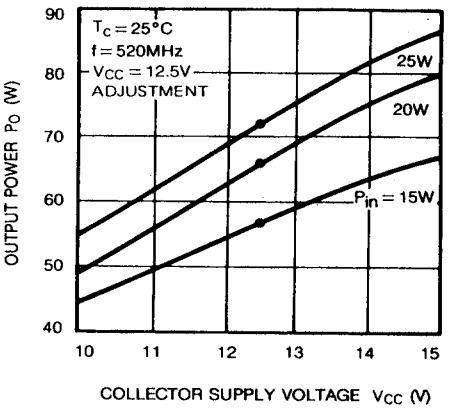
COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE CHARACTERISTICS



OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE CHARACTERISTICS



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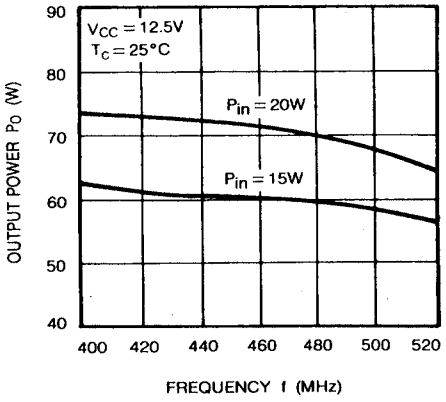
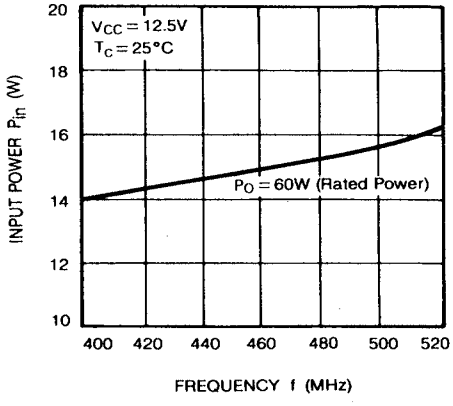
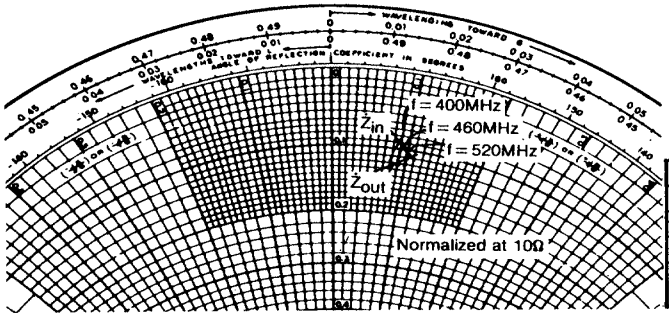
OUTPUT POWER VS. FREQUENCY CHARACTERISTICS



INPUT POWER VS. FREQUENCY CHARACTERISTICS @ RATED POWER

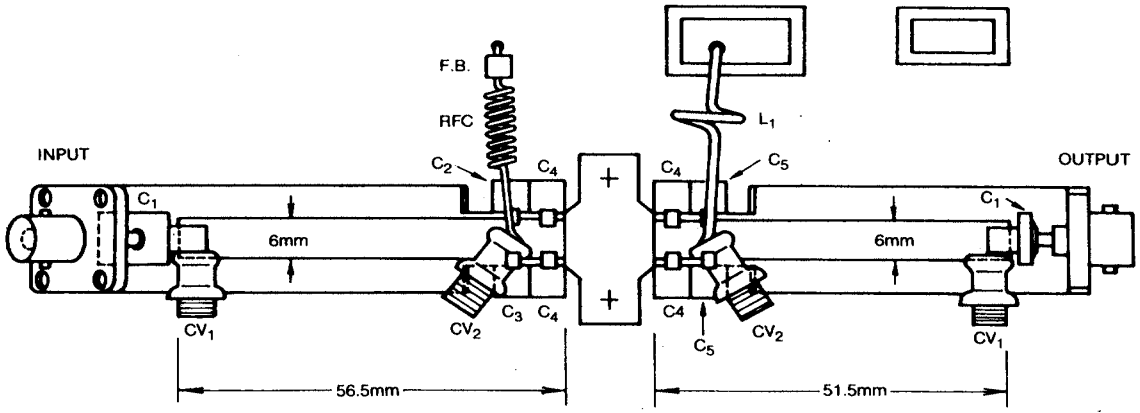


SERIES INPUT AND OUTPUT IMPEDANCE VS. FREQUENCY CHARACTERISTICS, 2SC3102



f(MHz)	Z_{in}(Ω)	Z_{out}(Ω)
400	0.9 + j0.9	1.1 + j1.0
460	0.95 + j0.95	1.18 + j0.9
520	1.0 + j1.0	1.25 + j0.8
Conditions: V_{CC} = 12.5V P_O = 60W		

TEST CIRCUIT BOARD LAYOUT (f = 520MHz)



C_1:	100pF (Ribbon Lead Mica)	CV_1:	to10pF (Air Variable Capacitor) muRata TTA 43 A 100A	RFC:	8 Turns, AWG #20, 4mm I.D.
C_2:	12pF (Ribbon Lead Mica)			L_1:	1 Turn, AWG #13, 8mm I.D.
C_3:	0	CV_2:	to 20pF (Air Variable Capacitor) muRata TTA 45 A 200A	Microstrip:	Board Material 1.6mm Thick, glass-teflon εr = 2.7
C_4:	27pF (Ribbon Lead Mica)				
C_5:	12pF (Ribbon Lead Mica)	F.B.:	Ferrite Bead		