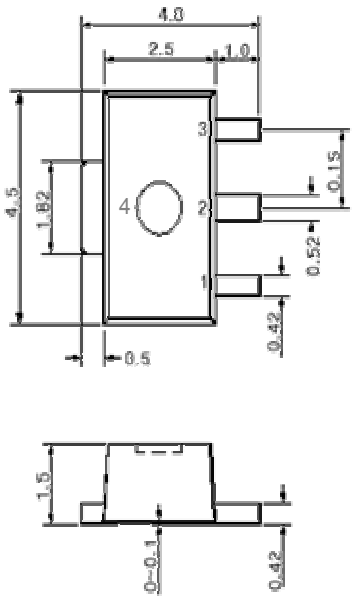
NPN SiGe RF TRANSISTOR

SOT - 89



The DRF1402F is a low cost, NPN medium power SiGe HBT(Hetero-Junction Bipolar Transistor) encapsulated in a plastic SOT-89 SMD package.

The DRF1402F can be used as a driver device or an output device, depending on the specific application

☐ FEATURES

- o 4.8 Volt operation
- o P1dB 28 dBm @f=465MHz
- o Power gain 10 dB @f=465MHz

☐ APPLICATIONS

- o Hand-held radio equipment in common emitter class-AB operation in 450 MHz communication band.

PIN CONFIGURATION

PIN NO	SYMBOL	DESCRIPTION
1	B	base
2	C	collector
3	E	emitter
4	C	collector

☐ MAXIMUM RATINGS

SYMBOL	PARAMETER	CONDITION	VALUE	Unit
V_{CBO}	Collector-Base Voltage	Open Emitter	20	V
V_{CEO}	Collector-Emitter Voltage	Open Base	8	V
V_{EBO}	Emitter-Base Voltage	Open Collector	4	V
Ic	Collector Current (DC)		350	mA
P_T	Total Power Dissipation	Ts = 60℃ ; note 1	1	W
T_{STG}	Storage Temperature		-65 ~ 150	℃
T_J	Operating Junction Temperature		150	℃

☐ THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITION	VALUE	Unit
Rth j-s	thermal resistance from junction to soldering point	P_T=1W; Ts=60℃;note1	55	K/W

* Note 1. Ts is temperature at the soldering point of the collector pin.

☐ QUICK REFERENCE DATA

RF performance at Ts ≤ 60 ℃ in common emitter test circuit (see Fig 8.)

Mode of Operation	f [MHz]	V_{CE} [V]	P_L [mW]	G_P [dB]	η_C [%]
CW, class-AB	465	4.8	630	≥10	≥ 60

☐ DC CHARACTERISTICS

Tj=25 ℃ unless otherwise specified

SYMBOL	PARAMETER	CONDITION	MIN.	MAX.	UNIT
BV_{CBO}	collector-base breakdown voltage	open emitter	20		V
BV_{CEO}	collector-emitter breakdown voltage	open base	8		V
BV_{EBO}	emitter-base breakdown voltage	open collector	3		V
Is	Collector leakage current		0.1		mA
h_{FE}	DC current gain		60		
Cc	Collector capacitance			4.5	pF

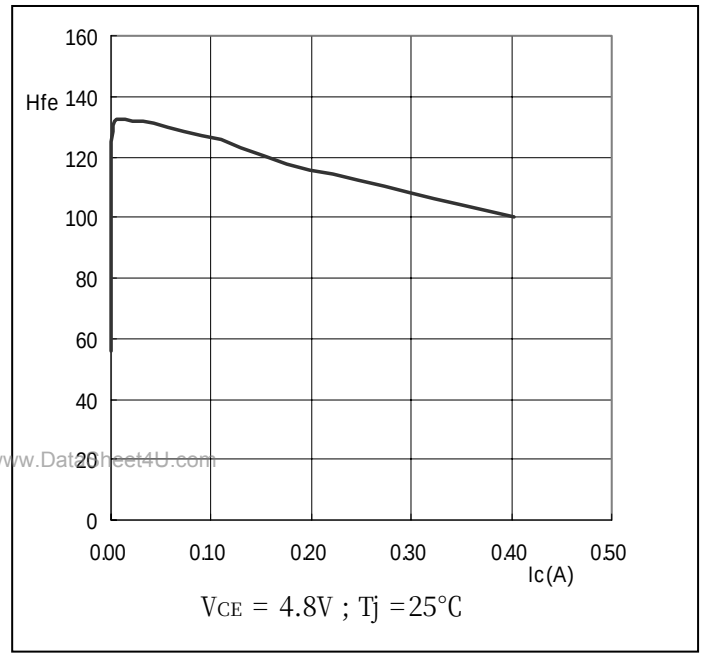


Fig 1. DC Current gain v.s Collector current

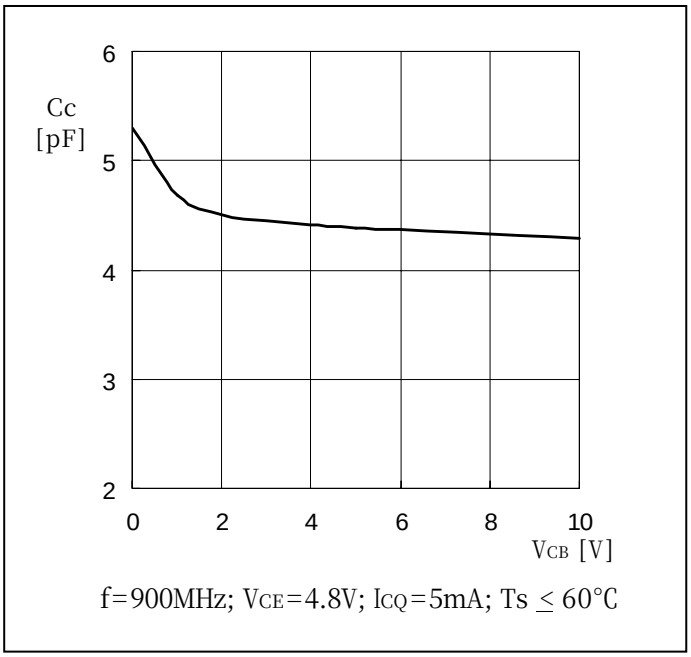


Fig 2. Collector-base capacitance v.s Collector-base voltage(DC)

☐ APPLICATION INFORMATION

RF performance at Ts ≤ 60 ℃ in common emitter configuration.

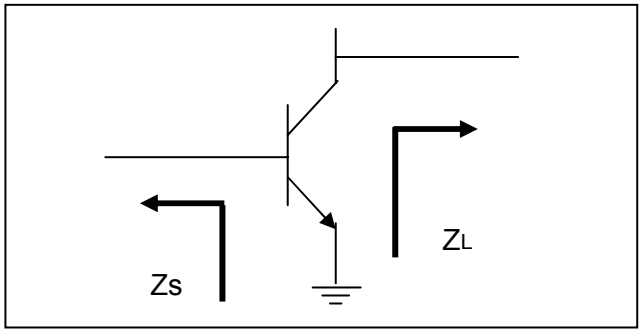
Mode of Operation	f [MHz]	V_{CE} [V]	P_L [mW]	G_P [dB]	η_C [%]
CW, class-AB	465	4.8	630	≥ 10	≥ 60

DRF1402F Source/Load Impedance as a frequency

V_{CE} = 4.8V, I_{CQ} = 5mA, Pout = 28dBm

Freq.	Z_S [Ω]		Z_L [Ω]	
[MHz]	Rs	Xs	R_L	X_L
440	17.34	6.91	22.21	-0.59
450	17.21	7.89	19.31	2.58
460	17.12	8.90	17.20	7.07
470	17.09	9.95	15.66	19.00

DRF1402F Transister Impedance



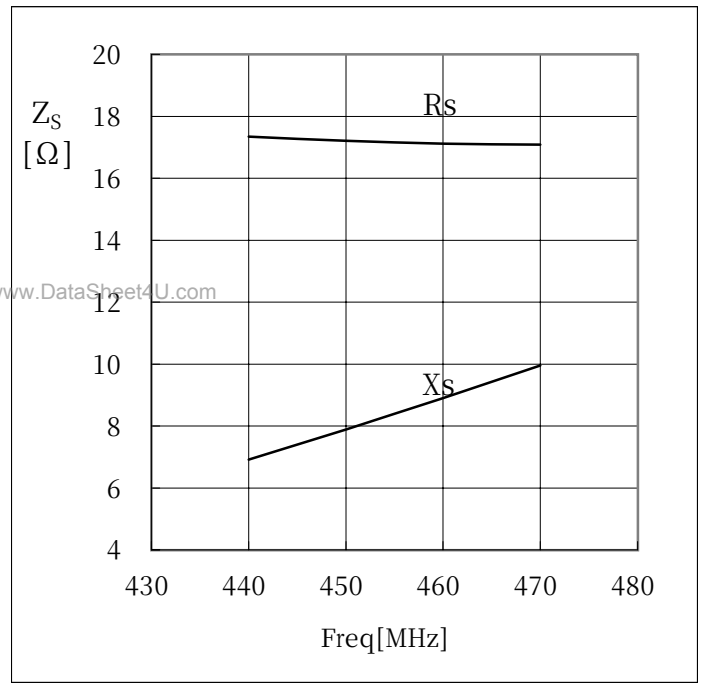


Fig 5. Source Impedance (series components) as a freq, typical values.

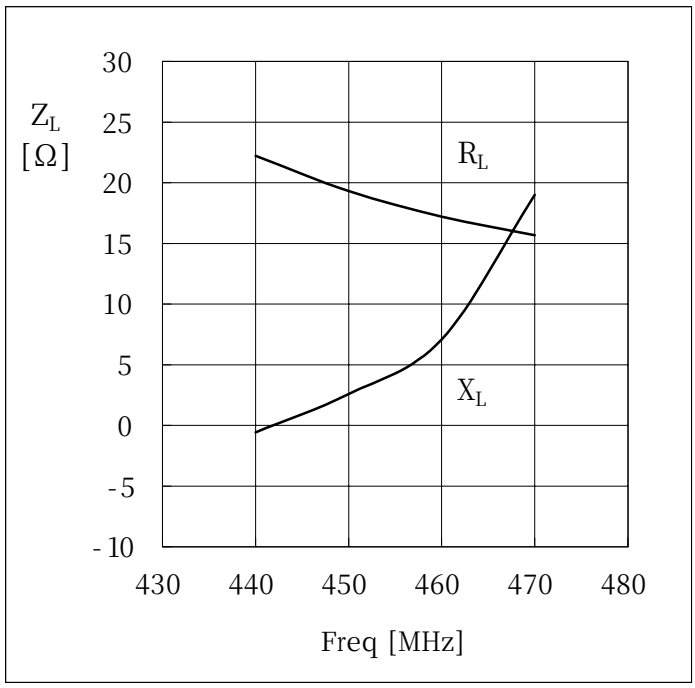
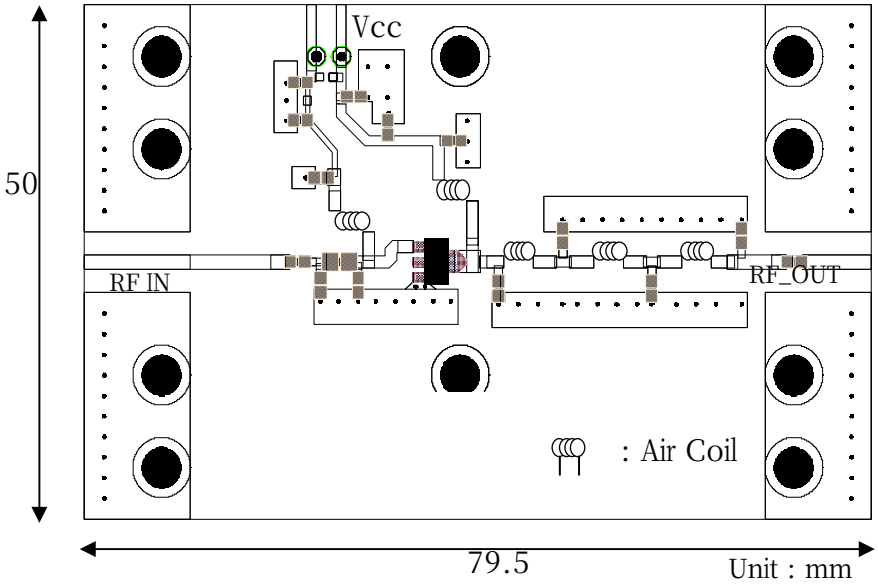


Fig 6. Load Impedance (series components) as a freq, typical values.



Part List	
C1, C7,C10,C11	470pF
C3,C4	6pF
C2	8pF
C5	7pF
C6	12pF
C9,C12	1nF
C8,C13	100nF
L1(Chip L : 1608)	8.2nH
L2,L3,L4 (Air Coil)	3turn
L5,L6 (Air Coil)	8turn
Air Coil Diameter	2 mm

Fig 7. DRF1402F Test Circuit Board Layout @ f = 465MHz

Test board : FR4 glass epoxy board, dielectric constant = 4.5, thickness = 0.8 mm

Test condition : CW test, V_{CC} = 4.8 V, I_{CQ} = 5 mA, frequency = 465 MHz.

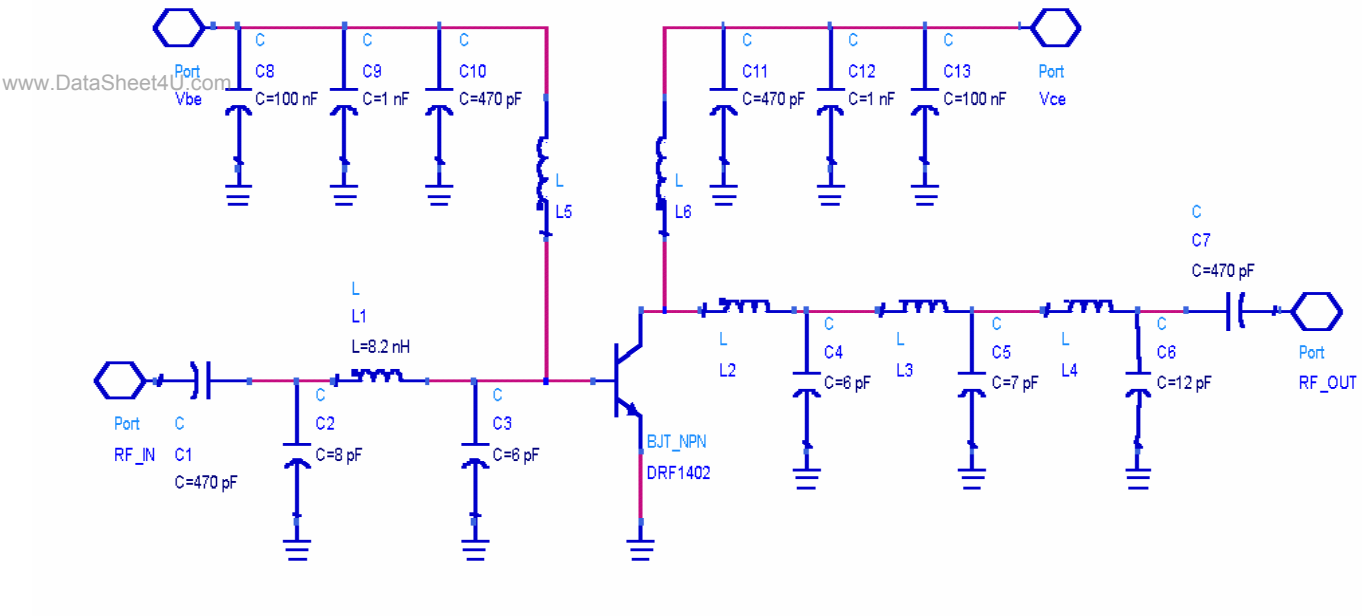


Fig 8. Test Circuit Schematic Diagram @f = 465MHz

☐ PACKAGE DIMENSION

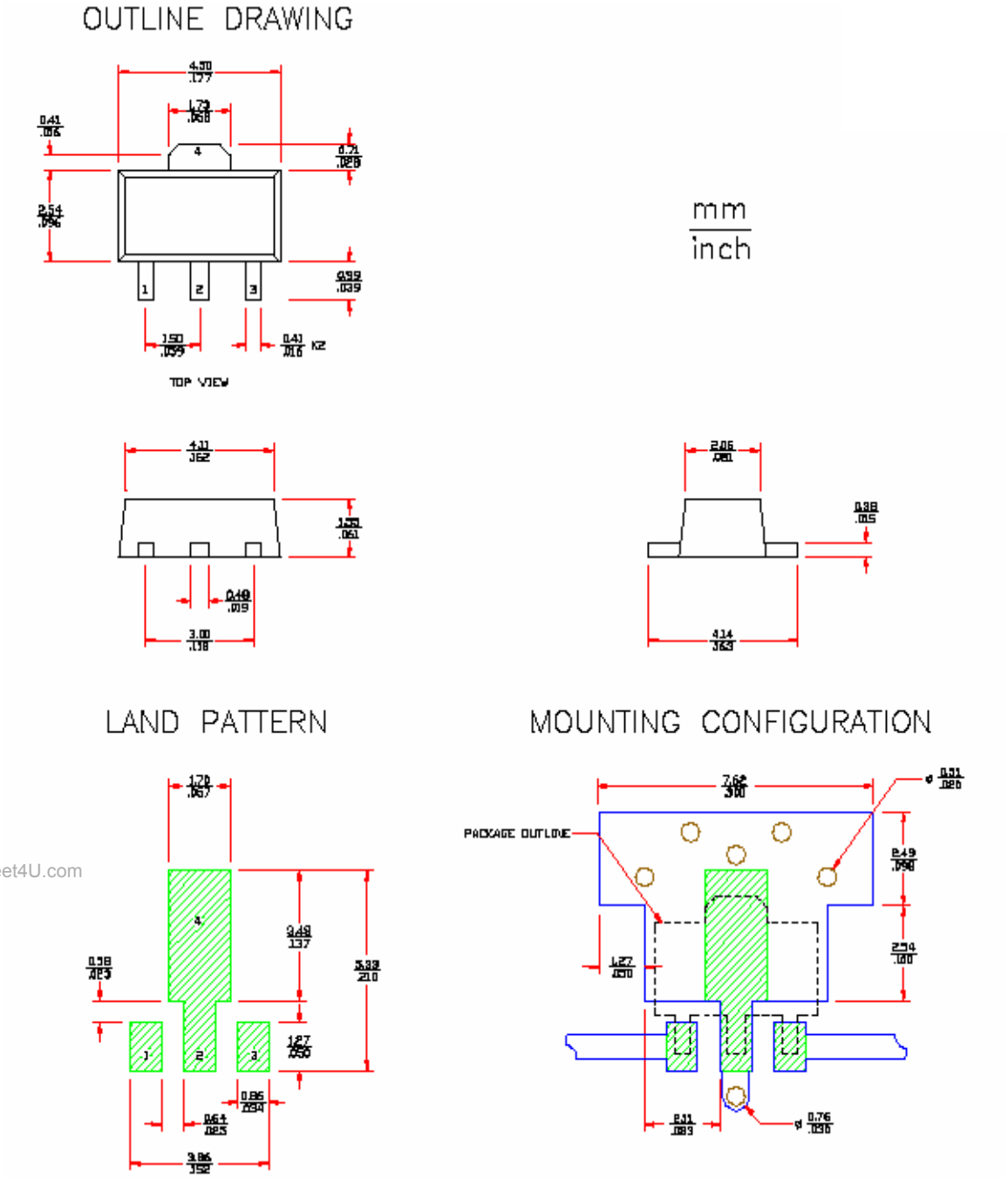


Fig 9. SOT-89 Package dimension