

To all our customers

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

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Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.

Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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# 2SC2735

Silicon NPN Epitaxial

# RENESAS

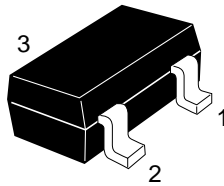
ADE-208-1075 (Z)  
1st. Edition  
Mar. 2001

## Application

UHF/VHF Local oscillator, frequency converter

## Outline

MPAK



1. Emitter
2. Base
3. Collector

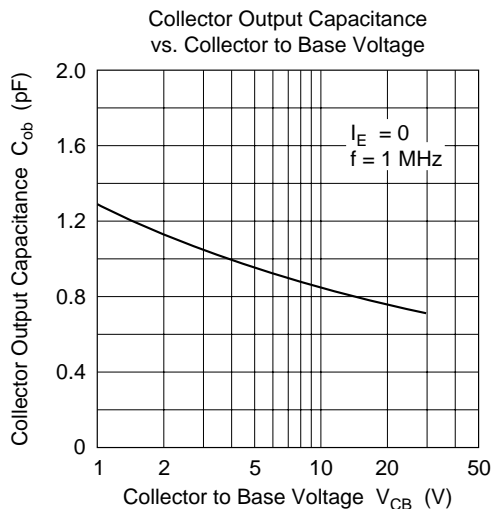
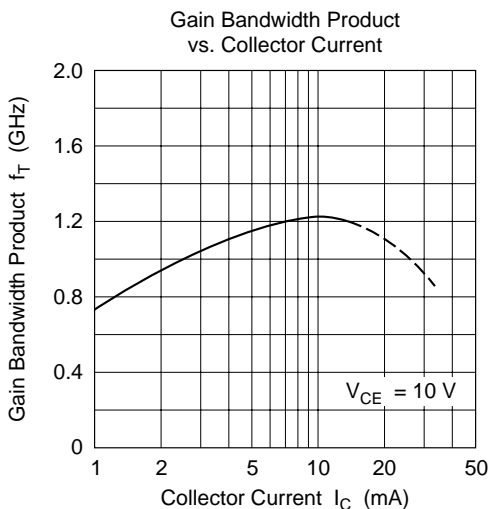
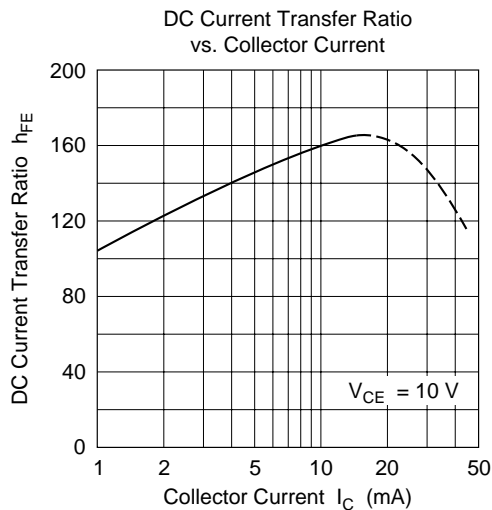
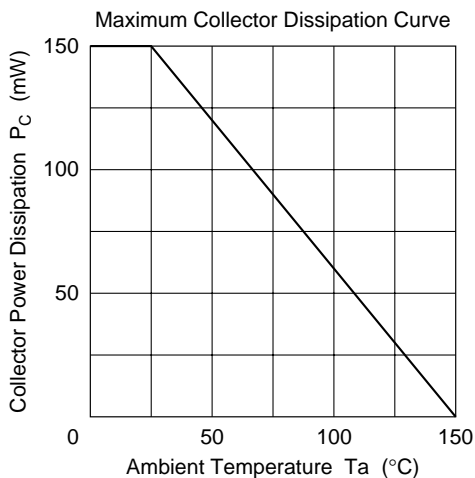
Note: Marking is "JC".

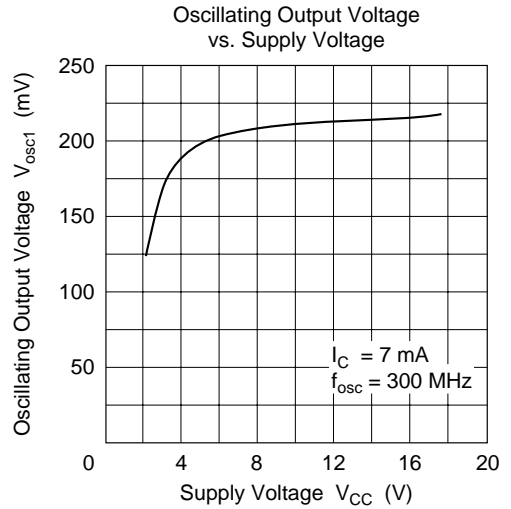
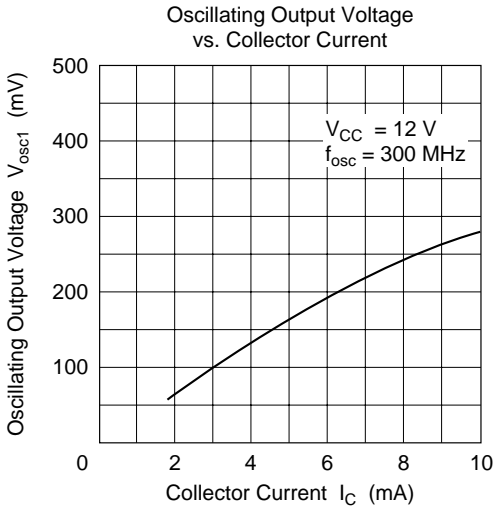
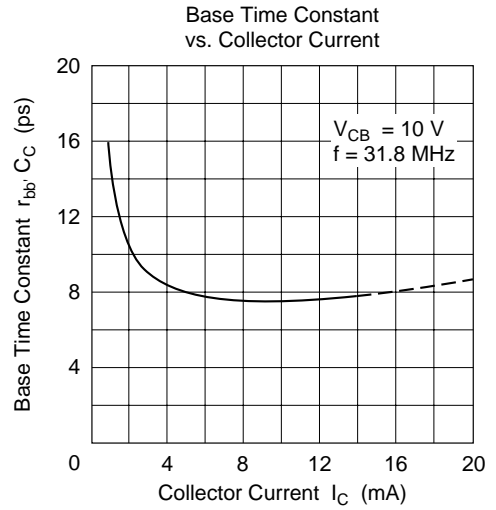
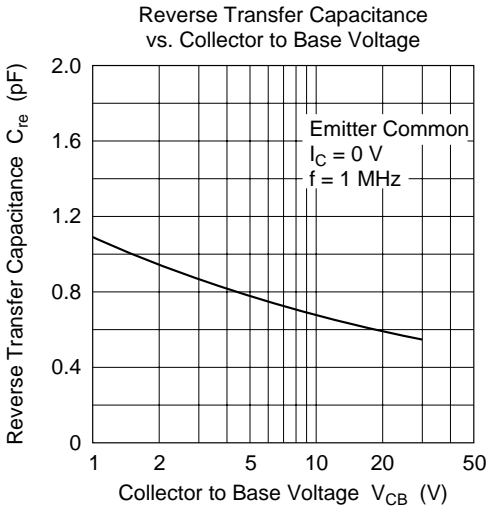
## Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Collector to base voltage	$V_{CBO}$	30	V
Collector to emitter voltage	$V_{CEO}$	20	V
Emitter to base voltage	$V_{EBO}$	3	V
Collector current	$I_C$	50	mA
Collector power dissipation	$P_C$	150	mW
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{stg}$	-55 to +150	°C

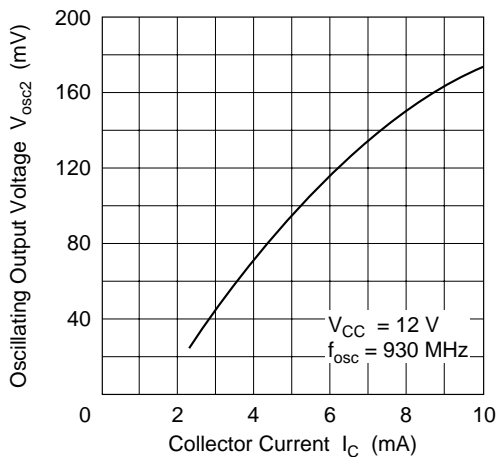
## Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	30	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector to emitter breakdown voltage	$V_{(BR)CEO}$	20	—	—	V	$I_C = 1 \text{ mA}, R_{BE} =$
Emitter to base breakdown voltage	$V_{(BR)EBO}$	3	—	—	V	$I_E = 10 \mu A, I_C = 0$
Collector cutoff current	$I_{CBO}$	—	—	0.5	$\mu A$	$V_{CB} = 10 \text{ V}, I_C = 0$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	—	1.0	V	$I_C = 20 \text{ mA}, I_B = 4 \text{ mA}$
DC current transfer ratio	$h_{FE}$	40	—	—		$V_{CE} = 10 \text{ V}, I_C = 10 \text{ mA}$
Collector output capacitance	$C_{ob}$	—	0.85	1.5	pF	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$
Gain bandwidth product	$f_T$	600	1200	—	MHz	$V_{CE} = 10 \text{ V}, I_C = 10 \text{ mA}$
Oscillating output voltage	$V_{OSC1}$	—	210	—	mV	$V_{CC} = 12 \text{ V}, I_C = 7 \text{ mA},$ $f_{OSC} = 300 \text{ MHz}$
	$V_{OSC2}$	—	130	—	mV	$V_{CC} = 12 \text{ V}, I_C = 7 \text{ mA},$ $f_{OSC} = 930 \text{ MHz}$
Conversion gain	CG	—	21	—	dB	$V_{CC} = 12 \text{ V}, I_C = 2 \text{ mA},$ $f = 200 \text{ MHz},$ $f_{OSC} = 230 \text{ MHz (0dBm)}$
Noise figure	NF	—	6.5	—	dB	$V_{CC} = 12 \text{ V}, I_C = 2 \text{ mA},$ $f = 200 \text{ MHz},$ $f_{OSC} = 230 \text{ MHz (0dBm)}$

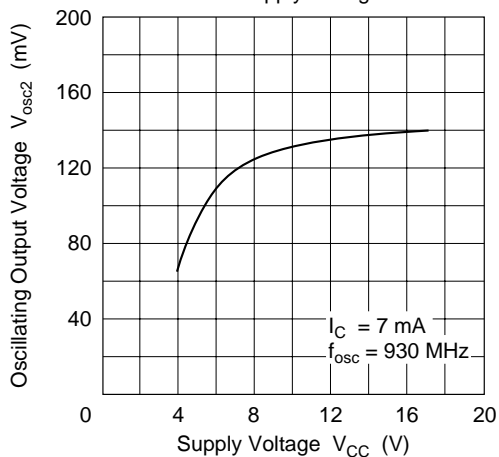




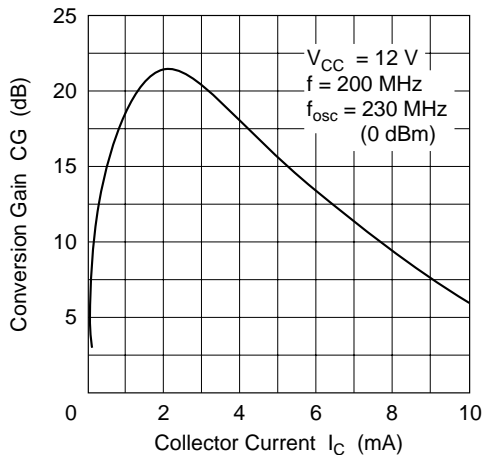
Oscillating Output Voltage vs. Collector Current



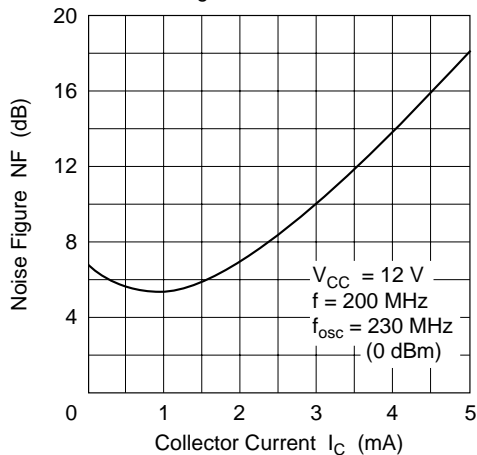
Oscillating Output Voltage vs. Supply Voltage



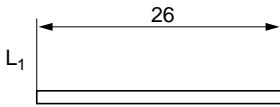
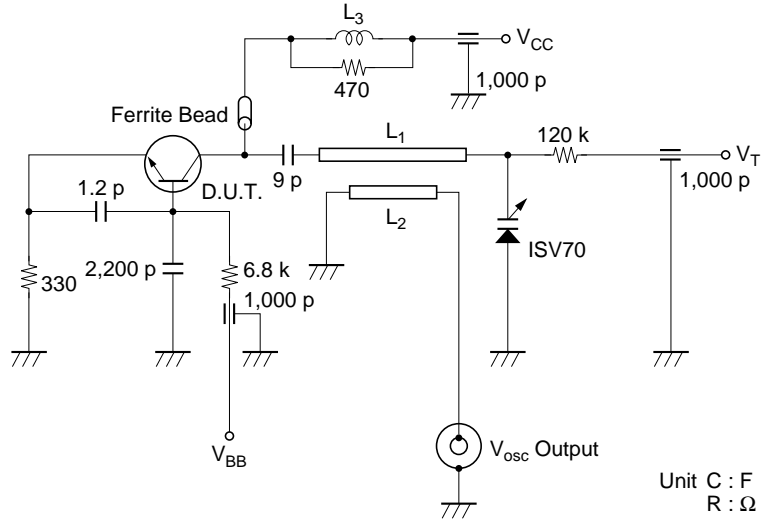
Conversion Gain vs. Collector Current



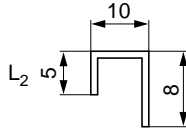
Noise Figure vs. Collector Current



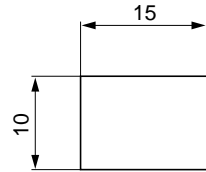
$V_{osc2}$  UHF Oscillating Output Voltage Test Circuit



(Dimensions in mm)



Dimensions of Cavity



(Dimensions in mm)

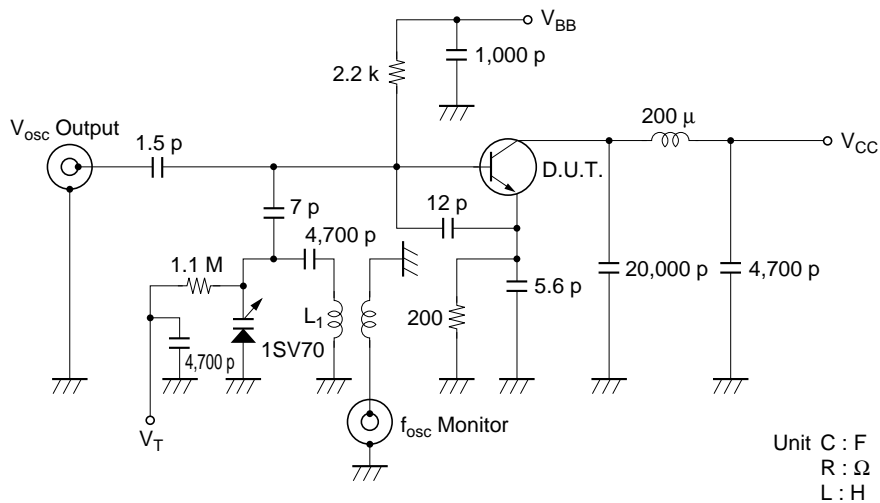
$L_1$  : Polyurethane Coated Copper Wire  $\phi$ 1.0 mm

$L_2$  : Polyurethane Coated Copper Wire  $\phi$ 0.8 mm

$L_3$  :  $\phi$ 0.3 mm Enameled Copper wire, 10 Turns with 470  $\Omega$  (1/4W)Resistor.

Test Frequency :  $f_{osc} = 930$  MHz

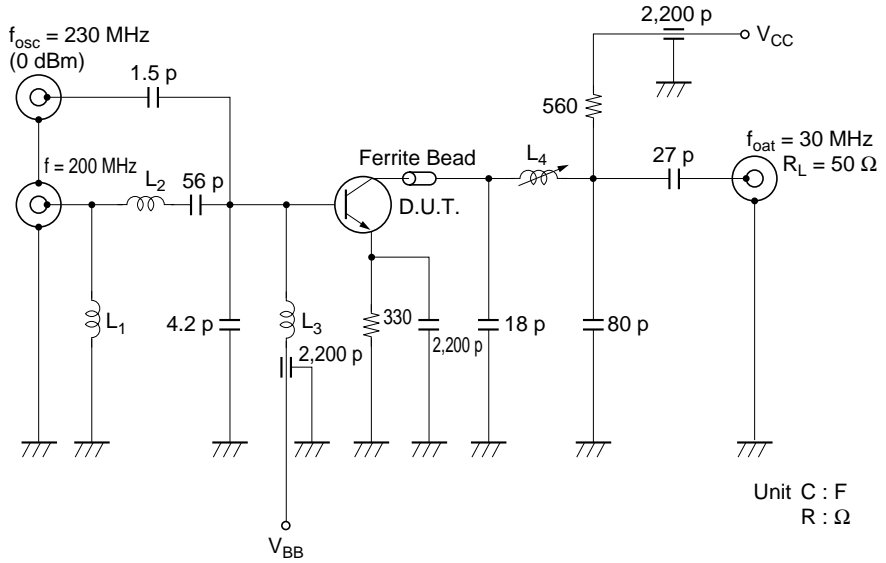
Test Equipment : YHP 4271A Vector Voltmeter

V<sub>OSC1</sub> VHF Oscillating Output Voltage Test Circuit

L<sub>1</sub> : Inside dia  $\phi 3$  mm,  $\phi 3$  mm Enameled Copper Wire 12 Turns

Test Frequency : f<sub>osc</sub> = 300 MHz

## VHF Conversion Gain : Noise Figure Test Circuit



$L_1$  : Inside dia  $\phi 5 \text{ mm}$ ,  $\phi 0.5 \text{ mm}$  Enameled Copper Wire 4 Turns

$L_2$  : Inside dia  $\phi 4 \text{ mm}$ ,  $\phi 0.5 \text{ mm}$  Enameled Copper Wire 4 Turns

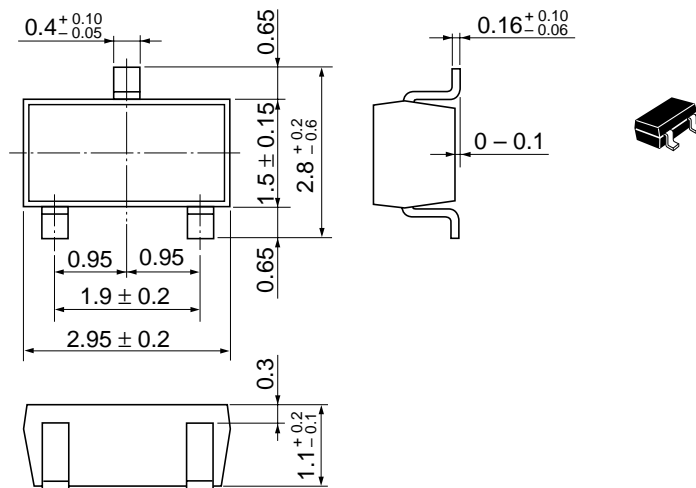
$L_3$  : Inside dia  $\phi 3 \text{ mm}$ ,  $\phi 0.2 \text{ mm}$  Enameled Copper Wire 6 Turns

$L_4$  : Outside dia  $\phi 5 \text{ mm}$  Bobbin,  $\phi 0.2 \text{ mm}$  Enameled Copper Wire 16 Turns, using Ferrite bead.

## Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	MPAAK
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.011 g

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