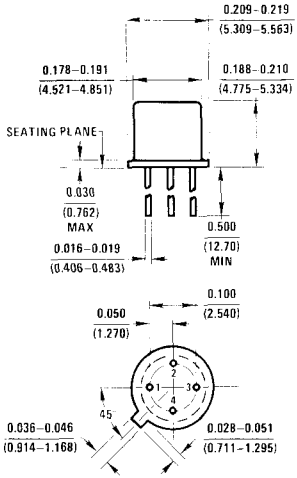
DISCRETE
DATABOOK

NATIONAL
SEMICONDUCTOR

TO-72, (23, 25, 28, 29)

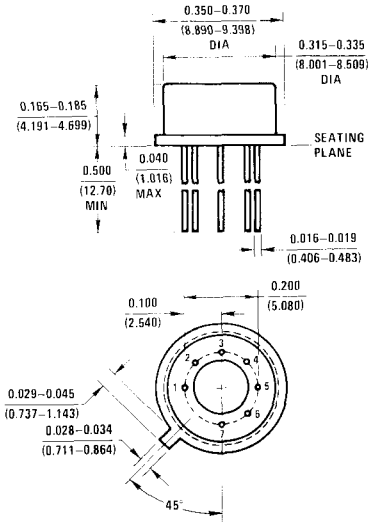
PIN	T (25)	FET N (25, 29)
1	E	S
2	B	D
3	C	G
4	GND	CASE

PIN	T (28)	FET P (23)
1	B	S
2	E	G
3	C	D
4	GND	CASE



TO-78 (24, 27)

PIN	T (27)	FET (24)
1	C	S1
2	B	D1
3	E	G1
5	E	S2
6	B	D2
7	C	G2



TO-92 (71, 72, 74, 76, 77, 78)

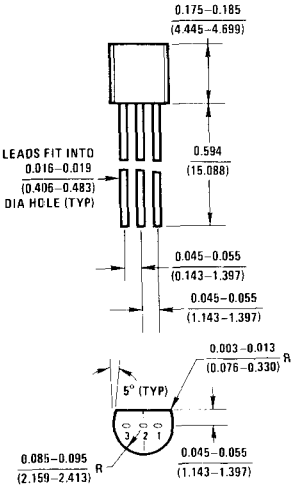
PIN	75/72 (Std)	
	T	FET
1	C	G
2	B	S
3	E	D

PIN	76/71	
	T	FET
1	C	G
2	E	D
3	B	S

PIN	74	
	T	FET
1	B	S
2	C	G
3	E	D

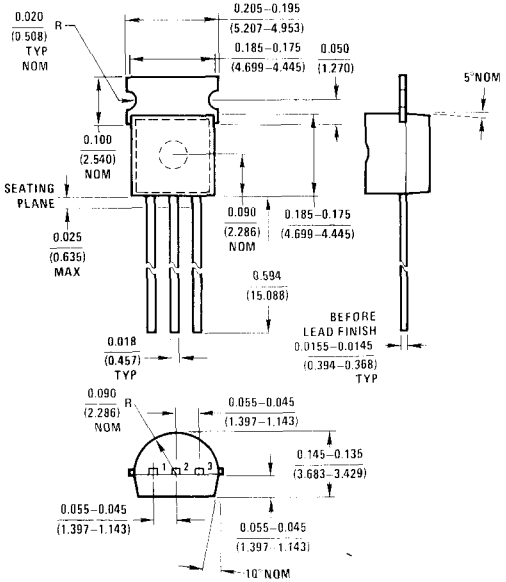
PIN	77	
	T	FET
1	E	D
2	B	S
3	C	G

PIN	78
	T
1	B
2	E
3	C



92-PLUS (90, 91)

PIN	PACKAGE 90	PACKAGE 91
1	Base	Collector
2	Collector	Base
3	Emitter	Emitter



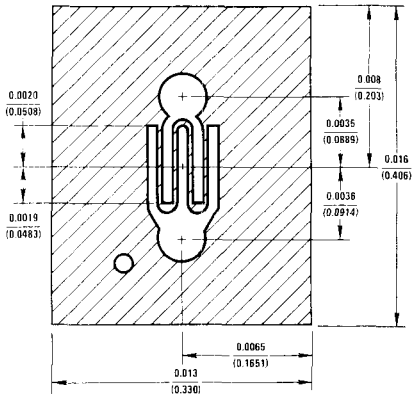
Type No.	Case Style	V_{CES}* V_{CBO} (V) Min	V_{CEO} (V) Min	V_{EBO} (V) Min	I_{CES}* I_{CBO} (nA) @ V_{CB} (V) Max	H_{FE} h_{fe} 1 kHz* @ I_C (mA) & V_{CE} (V) Min Max	$V_{CE(SAT)}$ (V) & $V_{BE(SAT)}$ $V_{BE(ON)}$* (V) @ I_C (mA) Max Min Max	C_{ob} (pF) Max	f_T (MHz) @ I_C (mA) Min Max	t_{off} (ns) Max	NF (dB) Max	Test Condition	Process No.
BF195	TO-92 (76)	Same as BF255, see below for explanation											46
BF196	TO-92 (78)	Same as BF198, see below for explanation											45
BF197	TO-92 (78)	Same as BF199, see below for explanation											47
BF198	TO-92 (78)	40	30	4	100 40	26 4 10 6 12 7	0.85* 4						45
BF199	TO-92 (78)	40	25	4	100 40	38 7 10 6 12 7			1100 typ 7				47
BF200	TO-72 (25)	30	20	3	100 40	15 3 10 6 12 7							41
BF233-2	TO-92 (71)	30	30	4	100 10	40 70 1 10 6 12 7	0.65 0.74* 1	1.0	150 1				49
BF233-3	TO-92 (71)	30	30	4	100 10	60 100 1 10 6 12 7	0.65 0.74* 1	1.0	150 1				49
BF233-4	TO-92 (71)	30	30	4	100 10	90 150 1 10 6 12 7	0.65 0.74* 1	1.0	150 1				49
BF233-5	TO-92 (71)	30	30	4	100 10	140 220 1 10 6 12 7	0.65 0.74* 1	1.0	150 1				49
BF240	TO-92 (78)	40	40	4	100 20	67 222 1 10 6 12 7	0.65 0.74* 1	0.34	1		3.5	7	47
BF241	TO-92 (78)	40	40	4	100 20	36 125 1 10 6 12 7	0.65 0.74* 1	0.34	1		3.5	7	47
BF254	TO-92 (78)	30	20	5	100 20	67 220 1 10 6 12 7	0.65 0.74* 1	0.34	1		3.5	7	46
BF255	TO-92 (78)	30	20	5	100 20	35 125 1 10 6 12 7	0.65 0.74* 1	0.34	1		3.5	7	46
BF257	TO-39	160	160	5	50 100	25 30 10 6 12 7	1.0 0.65 0.74* 30	0.34	1		3.5	7	48
BF258	TO-39	250	250	5	50 200	25 30 10 6 12 7	1.0 0.65 0.74* 30	0.34	1		3.5	7	48

TEST CONDITIONS:

(1) I_C = 200 μA, V_{CE} = 5V, f = 1kHz. (2) I_C = 100mA, V_{CC} = 20V, $I_B{}^1 = I_B{}^2$ = 5mA. (3) I_C = 200 μA, V_{CE} = 2V, f = 1kHz. (4) I_C = 100mA, V_{CC} = 10V, $I_B{}^1 = I_B{}^2$ = 10mA. (5) I_C = 10mA, V_{CC} = 3V, $I_B{}^1 = I_B{}^2$ = 1mA. (6) I_C = 100 μA, V_{CE} = 5V, f = 1kHz. (7) I_C = 1mA, V_{CE} = 10V, f = 200kHz. (8) I_C = 1mA, V_{CE} = 5V, f = 1kHz. (9) I_C = 150mA, V_{CC} = 6V, $I_B{}^1 = I_B{}^2$ = 15mA. (10) I_C = 200 μA, V_{CE} = 5V, f = 1kHz. (11) I_C = 150mA, V_{CC} = 10V, $I_B{}^1 = I_B{}^2$ = 75mA. (12) I_C = 300mA, V_{CC} = 25V, $I_B{}^1 = I_B{}^2$ = 30mA. (13) I_C = 10 μA, V_{CE} = 5V, f = WB. (14) I_C = 500mA, V_{CC} = 25V, $I_B{}^1$ = 50mA, $I_B{}^2$ = 25mA. (15) I_C = 10mA, V_{BE} = 2V, $I_B{}^1$ = 3mA, $I_B{}^2$ = 1mA. (16) I_C = 100mA, $I_B{}^1$ = 40mA, $I_B{}^2$ = 20mA.

National Semiconductor

Process 46 NPN RF-IF Amp



DESCRIPTION

Process 46 is an overlay double diffused, silicon epitaxial device.

APPLICATION

This device was designed for linear RF amplifier applications up to 100 MHz with collector current in the 1 mA to 30 mA range.

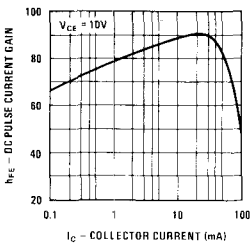
PRINCIPAL DEVICE TYPES

TO-92 ST5025

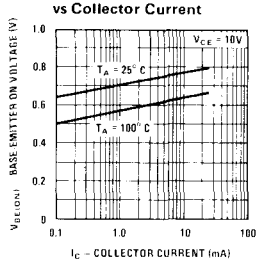
PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
G_{pe}	f = 45 MHz, V_{CE} = 10V, I_C = 10 mA	25	28		dB	
C_{cb}	V_{CB} = 10V		0.8	1.0	pF	TO-92
g_{oe}	f = 45 MHz, V_{CE} = 10V, I_C = 10 mA			200	μmho	
h_{fe}	I_C = 10 mA, V_{CE} = 10V, f = 100 MHz	3.0	4.50			
h_{FE}	I_C = 10 mA, V_{CE} = 10V	30	100	250		
$V_{CE(SAT)}$	I_C = 20 mA, I_B = 1 mA		0.2	0.6	V	
BV_{CEO}	I_C = 1 mA	30	55		V	
BV_{CBO}	I_C = 100 μA	35			V	
BV_{EBO}	I_C = 10 μA	4.0			V	
I_{CBO}	V_{CB} = 30V			50	nA	
I_{EBO}	V_{EB} = 3V			50	nA	

Process 46

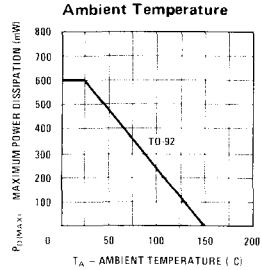
DC Pulse Current Gain vs Collector Current



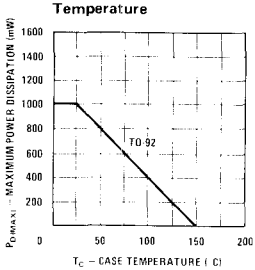
Base-Emitter On Voltage vs Collector Current



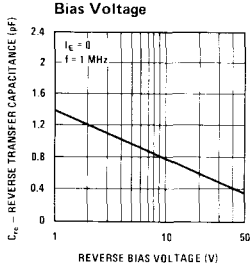
Maximum Power Dissipation vs Ambient Temperature



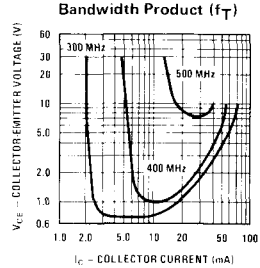
Maximum Power Dissipation vs Case Temperature



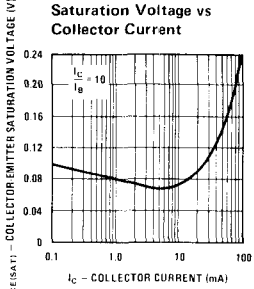
Reverse Transfer Capacitance vs Reverse Bias Voltage



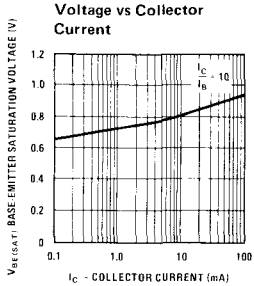
Contours of Constant Gain Bandwidth Product (f_T)



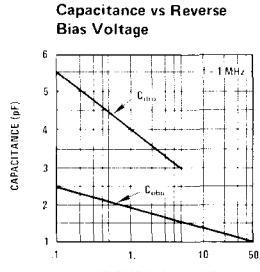
Collector-Emitter Saturation Voltage vs Collector Current



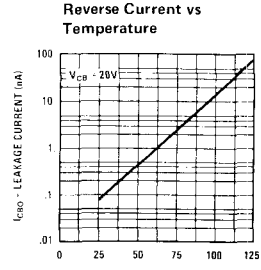
Base-Emitter Saturation Voltage vs Collector Current



Capacitance vs Reverse Bias Voltage

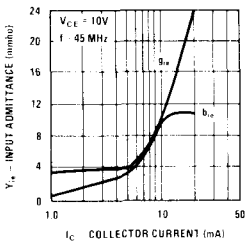


Collector-Base Diode Reverse Current vs Temperature

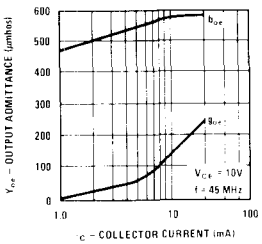


Process 46

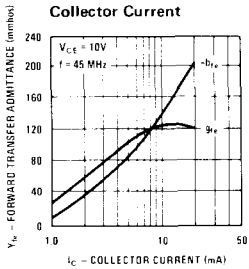
Input Admittance vs Collector Current



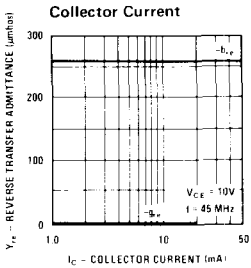
Output Admittance vs Collector Current



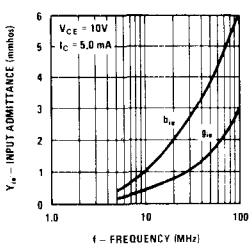
Forward Transfer Admittance vs Collector Current



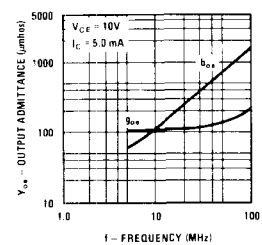
Reverse Transfer Admittance vs Collector Current



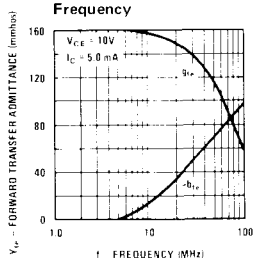
Input Admittance vs Frequency



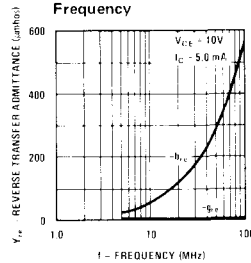
Output Admittance vs Frequency



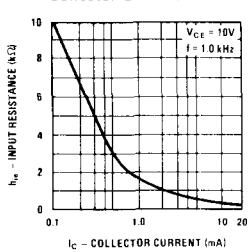
Forward Transfer Admittance vs Frequency



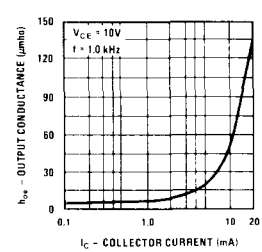
Reverse Transfer Admittance vs Frequency



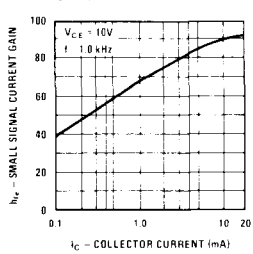
Small Signal Input Resistance vs Collector Current



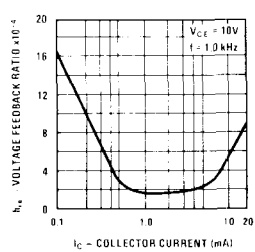
Small Signal Output Conductance vs Collector Current



Small Signal Current Gain vs Collector Current



Small Signal Voltage Feedback Ratio vs Collector Current



National Semiconductor Corporation
2900 Semiconductor Drive
Santa Clara, California 95051
Tel. (408) 737-5000
Telex (910) 339-9240

National Semiconductor GmbH
Eisenheimerstr. 61/2
8000 München 21
West Germany
Tel. (089) 576091
Telex 522772

Ferdinandsplatz 11
6380 Bad Homburg
Tel. (06172) 23011
Telex 415887

Hohenheimer Str. 11
7022 Leinfelden-Stuttgart
Tel. (0711) 751057
Telex 7255746

Dockenhudener Str. 29
2000 Hamburg 55
Tel. (040) 868457
Telex 211039

NS International Inc., Japan
Miyake Building
1-9 Yotsuya, Shinjuku-ku 160
Tokyo, Japan
Tel. (03) 355-3711
Telex 232-2015 NSCJ-J

NS Electronics (Hong Kong) Ltd.
8th Floor
Cheung Kong Electronic Bldg.
4 Hing Yip Street
Kwun Tong
Kowloon, Hong Kong
Tel. 3-411241-8
Telex 73866 NSEHK HX
Cable NATSEMI

NS Electronics Do Brasil
Avda Brigadeiro Faria Lima 844
11 Andar Conjunto 1104
Jardim Paulistano
São Paulo, Brasil
Telex 1121008 CABINE SAO PAULO

NS Electronics Pty. Ltd.
Cnr. Stud Rd. & Mtn. Highway
Bayswater, Victoria 3153
Australia
Tel. 03-729-6333
Telex 32096

National Semiconductor France
Expansion 10000
28, rue de la Redoute
92260 Fontenay-aux-Roses
France
Tel. 660.81.40
Telex NSF 25956F+

National Semiconductor
789 Ave. Houba de Strooper
1020 Bruxelles
Benelux
Tel. (02) 478.34.00
Telex 61007

National Semiconductor SRL
Via Alberto Mario 26
20149 Milano
Italy
Tel. (02) 4692864/4692431
Telex 39835

Mexicana de Electronica
Industrial S.A.
Tlacoquemecatl No. 139-401
Esquina Adolfo Prieto
Mexico 12, D.F.
Tel. 575-78-68, 575-79-24

National Semiconductor (Pty.) Ltd.
No. 1100 Lower Delta Road
Singapore 3
Tel. 2700011
Telex NAT SEMI RS 21402

National Semiconductor Sweden
Algrytevägen 23
S-127 32 Skärholmen
Sweden
Tel. (8) 970835
Telex 10731

National Semiconductor Ltd.
Vodroffsvej 44
1900 Copenhagen V
Denmark
Tel. (01) 35 65 33
Telex 15179

NS Electronics (HK) Ltd.
Taiwan Liaison Office
Rm. B, 3rd Fl., Ching Lin Bldg
5-7, Ching Tao E. Road
P.O. Box 68-332 Taipei
Tel. 3917324-6
Telex 22837 NSTW
Cable NSTW TAIPEI

National Semiconductor (UK)
19 Goldington Road
Bedford, MK 403 LF
United Kingdom
Tel. (0234) 211262
Telex 826209

National Semiconductor
District Sales Office
345 Wilson Avenue, Suite 404
Downsview, Ontario M3H 5W1
Canada
Tel. (416) 635-7260

National Semiconductor
Korea Liaison Office
Rm. 607-615-619 Seoul Bldg.
8,2-KA Huehyua Dong
Jung-ku
Seoul, Korea
Tel. 23-2925

 Printed in West Germany