



# Silicon Bipolar Low Noise Microwave Transistors

**2N2857**

## Features

- High Gain (19dB Typical @ 450 MHz)
- Low Noise Figure At Low  $I_c$
- Gold Metalization
- Useful To 700 MHz
- Can be Screened to JANTX, JANTXV Equivalent Levels
- Excellent Reliability

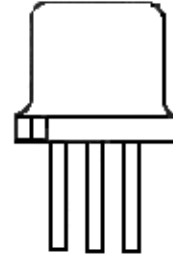
## Description

Designed especially for low cost, high reliability type applications, this NPN Silicon Planar Transistor offers low noise, high gain performance, which meets or exceeds all JAN specifications. These devices can be fully tested and screened in accordance with MIL-MRF-19500 procedures. A 1.8 GHz current gain-bandwidth product ( $f_T$ ) is typical for this device. The transistors are rugged and employ gold metalization for an unprecedented reliability.

## Applications

IF, VHF, UHF, TV and RF amplifiers.

## Case Style TO-72 CAN (509)



Specification Subject to Change Without Notice

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**Absolute Maximum Ratings****2N2857 Series**

Collector-Base Voltage	$V_{CBO}$	30 V
Collector-Emitter Voltage	$V_{CEO}$	15 V
Emitter-Base Voltage	$V_{EBO}$	1.5 V
Collector Current	$I_C$	50 mA
Junction Operating Temperature	$T_j$	200°C
Storage Temperature Chip or Ceramic Packages Plastic Packages		-65°C to +200°C -65°C to +125°C
Total Power Dissipation at 25°C  509 Case Style		450 mW

**Electrical Specifications @ 25°C****2N2857 Series**

Parameter of Test	Condition	Symbol	Units	2N2857 509 pkg
Gain Bandwidth Product	$V_{CE} = 10$ volts $I_C = 8$ mA	$f_T$	GHz	1.8 typ
Small Signal Power Gain	$V_{CE} = 6$ volts $I_C = 1.5$ mA $f = 450$ MHz	GPE	dB	12.5 – 21.0
Noise Figure 50 Ohms	$V_{CE} = 6$ volts $I_C = 1.5$ mA $f = 450$ MHz	NF	dB	4.5 Max.
Magnitude of small Signal short-circuit Transfer ratio	$V_{CE} = 6$ volts $I_C = 5$ mA $f = 100$ MHz	$ h_{fe} $		10 - 19
Low frequency small Signal current transfer ratio	$V_{CE} = 6$ volts $I_C = 2$ mA $f = 1$ KHz	$h_{fe}$		50 - 220
Collector to base Feedback capacitance	$V_{CE} = 6$ volts	$C_{CB}$	pf	1.0 Max.
Collector base time constant	$V_{CE} = 6$ volts $I_C = 2$ mA $f = 1$ KHz	$r_b' C_c$	psec	4 - 15

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Electrical Specifications @ 25°C

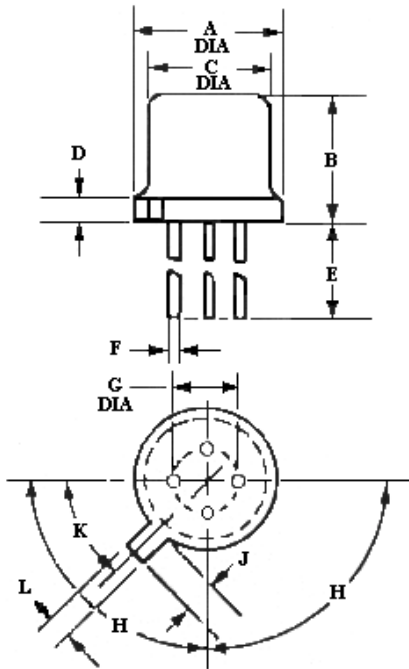
Parameter	Condition	Symbol	Min	Typical	Max	Units
Collector Cut-off Current	$V_{CB} = 15$ volts $I_E = 0$ $\mu$ A	$I_{CBO}$	—	—	10	nA
Collector-Emitter breakdown Voltage	$I_C = 30$ mA	$BV_{CEO}$	15	25	—	Volts
Collector-Base breakdown Voltage	$I_C = 1$ $\mu$ A	$BV_{CBO}$	30	47	—	Volts
Emitter-Base breakdown Voltage	$I_C = 1$ $\mu$ A	$BV_{EBO}$	3	5.5	—	Volts
Forward Current Gain	$V_{CE} = 1$ volts $I_C = 3$ mA	$h_{FE}$	30	100	150	—
Collector-Base Junction Capacitance	$V_{CB} = 10$ volts $f = 1$ MHz	$C_{CB}$	—	.6	1.0	pF (509)
Base-Emitter Voltage Saturated	$I_C = 10$ mA $I_B = 1$ mA	$V_{BE_{SAT}}$	—	.8	1.0	Volts
Collector-Emitter Voltage Saturated	$I_C = 10$ mA $I_B = 1$ mA	$V_{CE_{SAT}}$	—	.2	.4	Volts

Typical Scattering Parameters in the TO-72 Can Package

FREQUENCY (MHz)	COLLECTOR CURRENT (mA)	INPUT REFLECTION COEFFICIENT		FORWARD TRANSMISSION COEFFICIENT		REVERSE TRANSMISSION COEFFICIENT		OUTPUT REFLECTION COEFFICIENT	
		MAG	ANGLE	MAG	ANGLE	MAG	ANGLE	MAG	ANGLE
100	1.0	.91	-26°	3.2	152°	.04	73°	.96	-11°
	1.5	.88	-39°	3.9	149°	.04	71°	.95	-12°
	3.0	.75	-48°	6.5	136°	.04	70°	.89	-15°
	5.0	.67	-53°	8.2	128°	.03	69°	.84	-16°
200	1.0	.82	-43°	3.0	138°	.06	65°	.92	-16°
	1.5	.77	-48°	3.6	135°	.06	65°	.92	-16°
	3.0	.61	-65°	5.4	122°	.05	61°	.82	-18°
	5.0	.49	-77°	6.4	114°	.04	60°	.78	-18°
300	1.0	.69	-64°	2.5	120°	.08	54°	.89	-21°
	1.5	.63	-70°	3.0	117°	.07	52°	.84	-23°
	3.0	.45	-89°	4.0	105°	.06	55°	.76	-22°
	5.0	.37	-100°	4.5	99°	.06	58°	.72	-21°
400	1.0	.62	-76°	2.3	110°	.09	51°	.84	-25°
	1.5	.56	-81°	2.6	108°	.09	50°	.81	-26°
	3.0	.39	-100°	3.9	97°	.07	56°	.79	-24°
	5.0	.32	-111°	3.7	91°	.06	60°	.71	-23°
450	1.0	.56	-80°	2.1	107°	.09	49°	.84	-26°
	1.5	.55	-86°	2.2	102°	.08	51°	.80	-26°
	3.0	.39	-104°	2.8	92°	.07	55°	.74	-25°
	5.0	.32	-117°	3.4	87°	.06	60°	.72	-23°
500	1.0	.54	-87°	2.0	101°	.10	49°	.82	-28°
	1.5	.49	-93°	2.2	97°	.09	50°	.78	-28°
	3.0	.34	-112°	2.8	87°	.08	56°	.73	-26°
	5.0	.29	-123°	3.0	83°	.07	61°	.70	-24°
600	1.0	.46	-102°	1.7	91°	.11	47°	.77	-31°
	1.5	.41	-108°	1.9	88°	.10	49°	.74	-31°
	3.0	.30	-126°	2.3	79°	.09	57°	.70	-28°
	5.0	.26	-138°	2.5	76°	.09	63°	.68	-26°
700	1.0	.44	-111°	1.6	85°	.11	47°	.72	-34°
	1.5	.38	-117°	1.8	83°	.11	50°	.72	-33°
	3.0	.29	-135°	2.1	75°	.10	60°	.68	-30°
	5.0	.25	-145°	2.2	79°	.09	64°	.67	-28°

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DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.350	0.370	8,89	9,40
B	0.240	0.260	6,11	6,60
C	0.315	0.335	8,00	8,51
D		0.040		1,02
E	0.500		12,70	
F	0.016	0.021	0,41	0,53
G	0.190	0.210	4,83	5,33
H	89 DEG	91 DEG	89 DEG	91 DEG
J	0.029	0.043	0,74	1,09
K	43 DEG	47 DEG	43 DEG	47 DEG
L	0.028	0.034	0,71	0,86



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