



## RF and MICROWAVE DISCRETE LOW POWER TRANSISTORS

Qualified per MIL-PRF-19500/343

Qualified Levels:  
JAN, JANTX,  
and JANTXV

### DESCRIPTION

The 2N2857 is a military qualified silicon NPN transistor (also available in commercial version), designed for UHF equipment and other high-reliability applications. Common applications include low noise amplifier; oscillator, and mixer applications. Microsemi also offers numerous other products to meet higher and lower power voltage regulation applications.

**Important:** For the latest information, visit our website <http://www.microsemi.com>.

### FEATURES

- JEDEC registered 2N2857.
- Silicon NPN, TO-72 packaged UHF transistor.
- Maximum unilateral gain = 13 dB (typ) @ 500 MHz.
- JAN, JANTX, and JANTXV military qualified versions available per MIL-PRF-19500/343.
- RoHS compliant version available (commercial grade only).

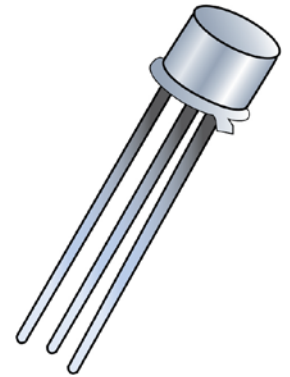
### APPLICATIONS / BENEFITS

- Low-power, ultra-high frequency transistor.
- Leaded metal TO-72 package.

### MAXIMUM RATINGS @ T<sub>A</sub> = +25 °C


Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T <sub>J</sub> and T <sub>STG</sub>	-65 to +200	°C
Collector-Emitter Voltage	V <sub>CEO</sub>	15	V
Collector-Base Voltage	V <sub>CBO</sub>	30	V
Emitter-Base Voltage	V <sub>EBO</sub>	3	V
Thermal Resistance Junction-to-Ambient	R <sub>θJA</sub>	400	°C/W
Steady-State Power Dissipation <sup>(1)</sup>	P <sub>D</sub>	200	mW
Collector Current	I <sub>C</sub>	40	mA

**Notes:** 1. Derate linearly 1.14 mW/°C for T<sub>A</sub> > +25 °C.



### TO-72 Package

Also available in:

 **UB Package**  
(surface mount)  
[2N2857UB](#)

#### **MSC – Lawrence**

6 Lake Street,  
Lawrence, MA 01841  
Tel: 1-800-446-1158 or  
(978) 620-2600  
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#### **MSC – Ireland**

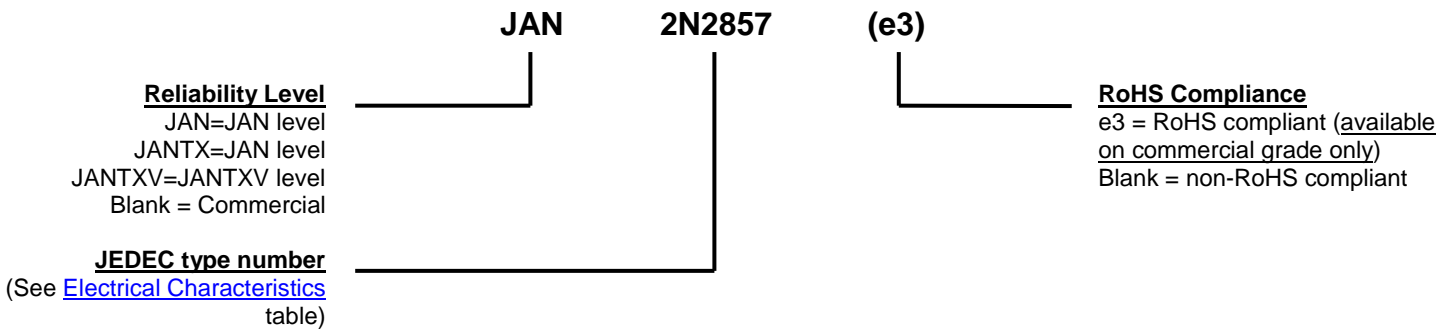
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**Website:**

[www.microsemi.com](http://www.microsemi.com)

**MECHANICAL and PACKAGING**

- CASE: Ni plated kovar, Ni cap.
- TERMINALS: Au over Ni plated kovar leads, solder dipped.
- MARKING: Manufacturer's ID, date code, part number.
- POLARITY: See case outline on last page.
- WEIGHT: 0.322 grams.
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

Symbol	Definition
$I_C$	Collector current (dc).
$I_B$	Base current (dc).
$T_A$	Ambient or free air temperature.
$T_C$	Case temperature.
$V_{CB}$	Collector to base voltage (dc).
$V_{EB}$	Emitter to base voltage (dc).

**ELECTRICAL CHARACTERISTICS @  $T_C = +25^\circ\text{C}$** 
**OFF CHARACTERISTICS**

Test Conditions	Symbol	Value			Unit
		Min.	Typ.	Max.	
Collector-Emitter Breakdown Voltage ( $I_C = 3.0\text{ mA}$ , Bias condition D)	$V_{(BR)CEO}$	15	-	-	V
Collector to Emitter Cutoff Current ( $V_{CE} = 16\text{ V}$ , Bias condition C)	$I_{CES}$	-	-	100	nA
Emitter to Base Cutoff Current ( $V_{EB} = 3\text{ V}$ , Bias condition D)	$I_{EBO}$	-	-	10	$\mu\text{A}$
Collector to Base Cutoff Current ( $V_{CB} = 15\text{ V}$ , Bias condition D)	$I_{CBO}$	-	-	10	nA

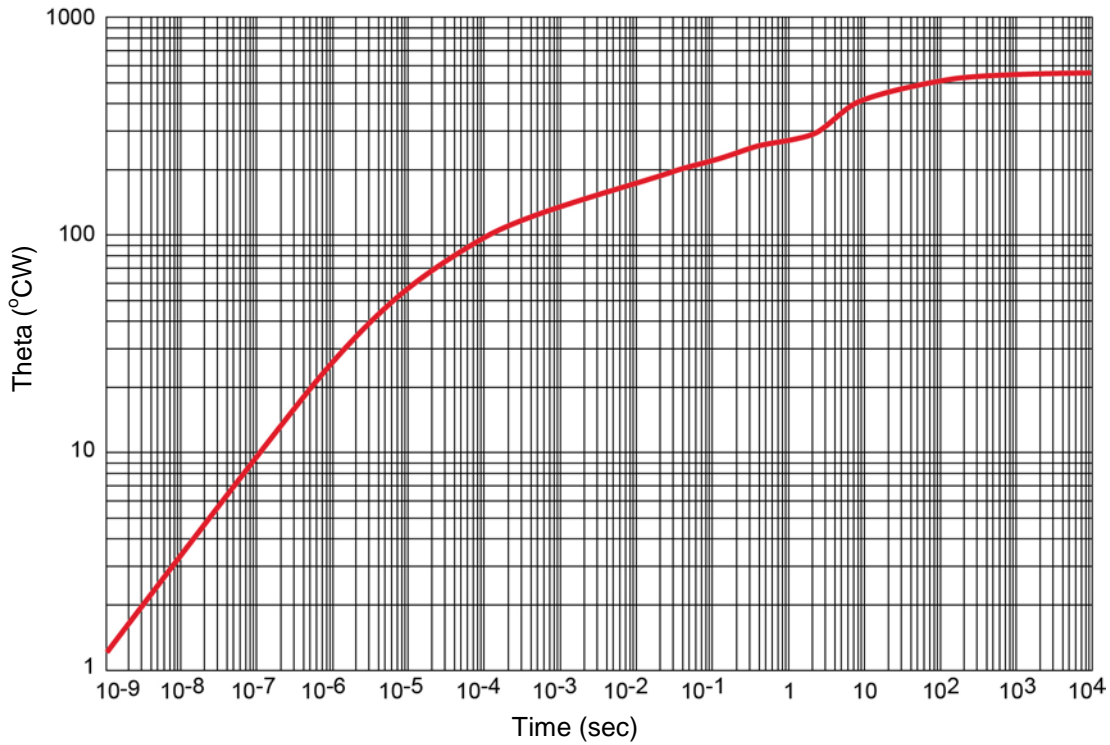
**ON CHARACTERISTICS**

Test Conditions	Symbol	Value			Unit
		Min.	Typ.	Max.	
Forward Current transfer ratio ( $I_C = 3.0\text{ mA}$ , $V_{CE} = 1.0\text{ V}$ )	$h_{FE}$	30	-	150	
Collector-Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 1\text{ mA}$ )	$V_{CE(sat)}$		-	0.4	V
Base-Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 1\text{ mA}$ )	$V_{BE(sat)}$		-	1.0	V

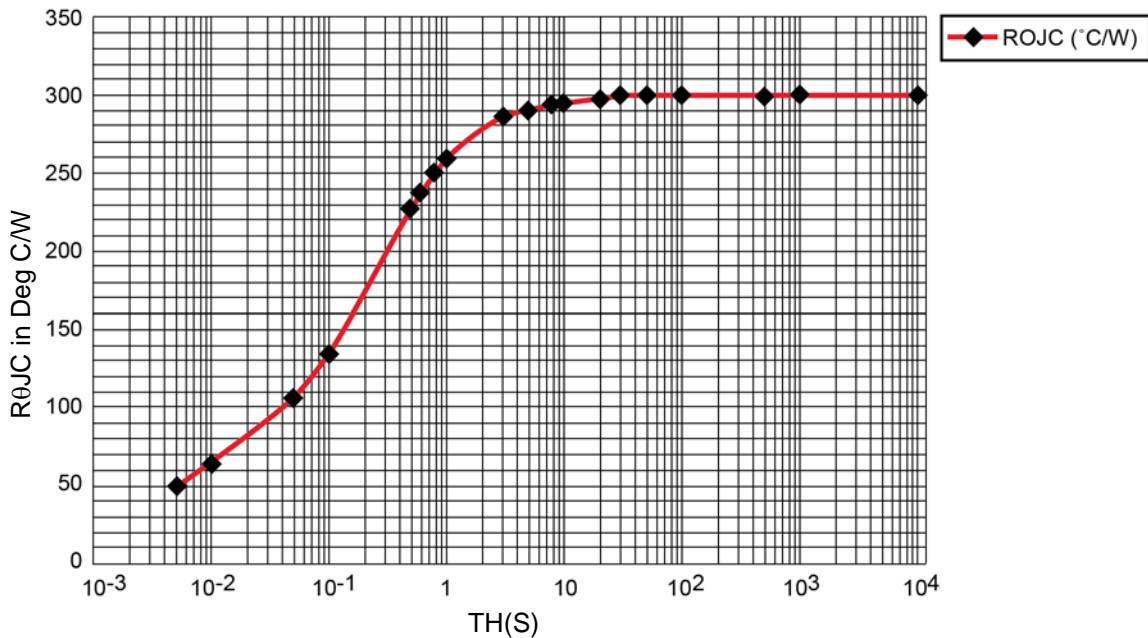
**DYNAMIC CHARACTERISTICS**

Test Conditions	Symbol	Value			Unit
		Min.	Typ.	Max.	
Magnitude of common emitter small signal short circuit forward current transfer ratio ( $V_{CE} = 6\text{ V}$ , $I_C = 5\text{ mA}$ , $f = 100\text{ MHz}$ )	$ h_{fe} $	10	-	21	
Collector-base time constant ( $I_E = 2.0\text{ mA}$ , $V_{CB} = 6.0\text{ V}$ , $f = 31.9\text{ MHz}$ )	$r_b'C_c$	4	-	15	pF
Collector to Base – feedback capacitance ( $I_E = 0\text{ mA}$ , $V_{CB} = 10\text{ V}$ , $100\text{ kHz} \leq f \leq 1\text{ MHz}$ )	$C_{cb}$			1.0	pF
Noise Figure (50 Ohms) ( $I_C = 1.5\text{ mA}$ , $V_{CE} = 6\text{ V}$ , $f = 450\text{ MHz}$ , $R_g = 50\ \Omega$ )	F		4.5		dB
Small Signal Power Gain (common emitter) ( $I_E = 1.5\text{ mA}$ , $V_{CE} = 6\text{ V}$ , $f = 450\text{ MHz}$ )	$G_{pe}$	12.5		21	dB

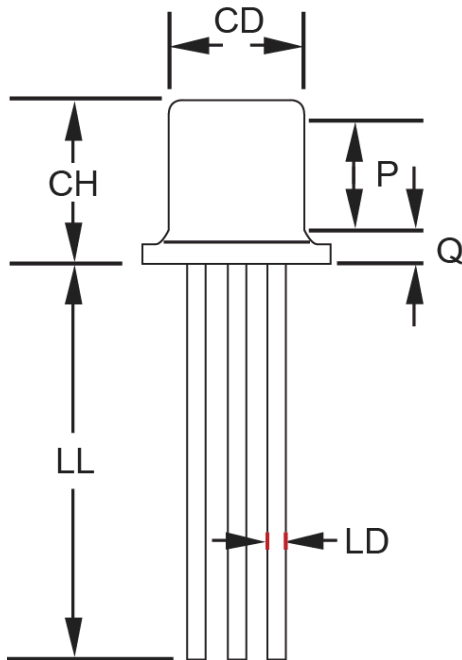
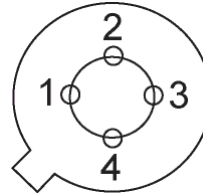
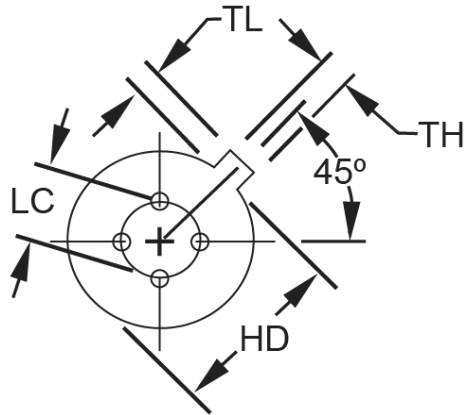
GRAPHS



**FIGURE 1**  
Maximum Thermal Impedance ( $R_{\theta JA}$ )



**FIGURE 2**  
Thermal impedance graph ( $R_{\theta JC}$ )

**PACKAGE DIMENSIONS**


Ltr	Dimensions				Notes
	Inch		Millimeters		
	Min	Max	Min	Max	
TL	.028	.048	.071	1.22	
TH	.036	.046	.091	1.17	
HD	.209	.230	5.31	5.84	5
CD	.178	.195	4.52	4.95	5
LD	.016	.021	.410	.533	7, 8
LC	.100 TP		2.54 TP		7, 8
CH	.170	.210	4.32	5.33	
LL	.500	.750	12.70	19.05	7, 8
P	.100		2.54		
Q		.040		1.02	5
1	Emitter				
2	Base				
3	Collector				
4	Case				

**NOTES:**

1. Dimension are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TH shall be held for a minimum length of .011 (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Body contour optional within zone defined by HD, CD, and Q.
6. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods or by the gauge and gauging procedure shown in figure 2.
7. Dimension LU applies between L1 and L2. Dimension LD applies between L2 and LL minimum. Diameter is uncontrolled in L1 and beyond LL minimum.
8. All four leads.
9. Dimension r (radius) applies to both inside corners of tab.
10. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.
11. Lead 1 = emitter, lead 2 = base, lead 3 = collector, lead 4 = case (electrically connected).



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