



## NPN/PNP Silicon Complementary Small Signal Dual Transistor Qualified per MIL-PRF-19500/421

*Qualified Levels:  
JAN, JANTX, and  
JANTXV*

### DESCRIPTION

This 2N4854 device in a 6-pin TO-78 package is military qualified up to a JANTXV level for high-reliability 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 2N4854.
- JAN, JANTX, and JANTXV qualifications also available per MIL-PRF-19500/421.
- RoHS compliant versions available (commercial grade only).



**TO-78 Package**

### APPLICATIONS / BENEFITS

- Compact package design.
- Lightweight.

Also available in:

 **6-Pin U package**  
[2N4854U](#)

 **6-Pin Flatpack package**  
[2N3838](#)

### MAXIMUM RATINGS

Parameters/Test Conditions	Symbol	Value per		Unit
		Each Transistor	Total Package	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	175	87	$^{\circ}C/W$
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	350	290	$^{\circ}C/W$
Total Power Dissipation @ $T_A = +25^{\circ}C$ <sup>(1)</sup>	$P_T$	0.30	0.60	W
Total Power Dissipation @ $T_C = +25^{\circ}C$ <sup>(2)</sup>	$P_T$	1.0	2.0	W
Junction and Storage Temperature	$T_J$ and $T_{STG}$	-65 to +200		$^{\circ}C$
Collector-Base Voltage, Emitter Open	$V_{CB0}$	60		V
Emitter-Base Voltage, Collector Open	$V_{EB0}$	5		V
Collector-Emitter Voltage, Base Open	$V_{CEO}$	40		V
Collector Current, dc	$I_C$	600		mA
Lead to Case Voltage		+/- 120		V
Solder Temperature @ 10 s	$T_{SP}$	260		$^{\circ}C$

**Notes:** 1. For  $T_A > +25^{\circ}C$ , derate linearly 1.71 mW/ $^{\circ}C$  one transistor, 3.43 mW/ $^{\circ}C$  both transistors.  
2. For  $T_C > +25^{\circ}C$ , derate linearly 5.71 mW/ $^{\circ}C$  one transistor, 11.43 mW/ $^{\circ}C$  both transistors.

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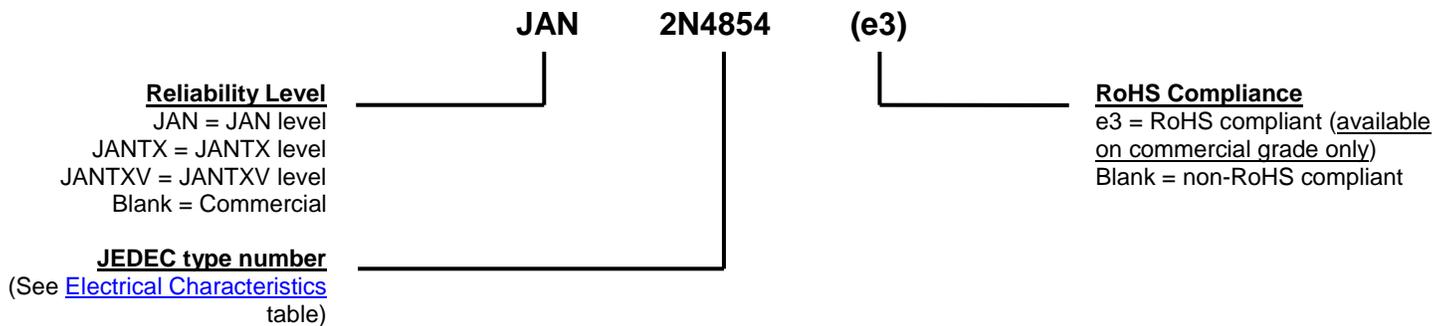
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**MECHANICAL and PACKAGING**

- CASE: Au over Ni plated kovar, pure nickel cap.
- TERMINALS: Au over Ni plated kovar.
- MARKING: Manufacturer's ID, part number, date code.
- POLARITY: See case outline.
- WEIGHT: 0.856 grams.
- See [Package Dimensions](#) on last page.

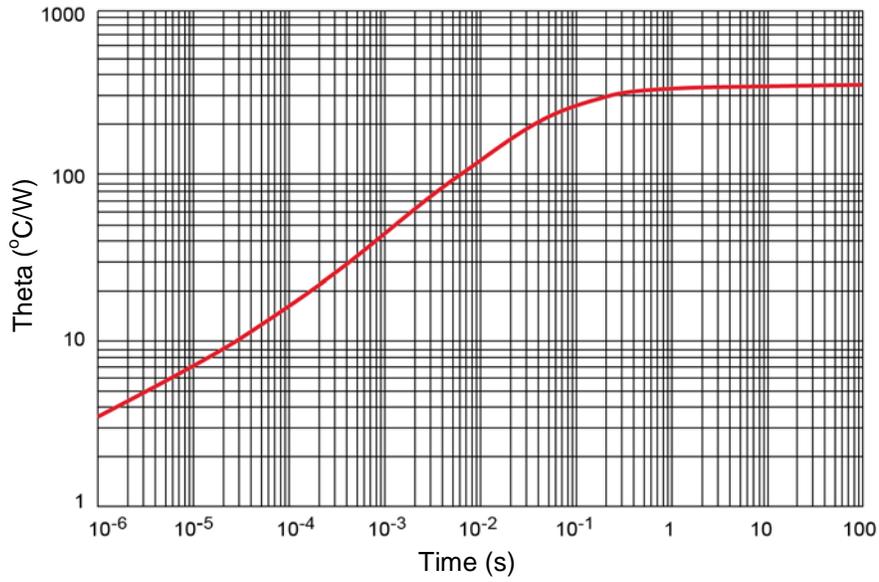
**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

Symbol	Definition
$I_B$	Base Current, dc.
$I_C$	Collector Current, dc.
$I_E$	Emitter Current, dc.
$I_O$	Average Rectified Output Current: The Output Current averaged over a full cycle with a 50 Hz or 60 Hz sine-wave input and a 180 degree conduction angle.
$V_{CB}$	Collector-Base Voltage (dc).
$V_{CE}$	Collector-Emitter Voltage, dc.
$V_{EB}$	Emitter-Base Voltage (dc).

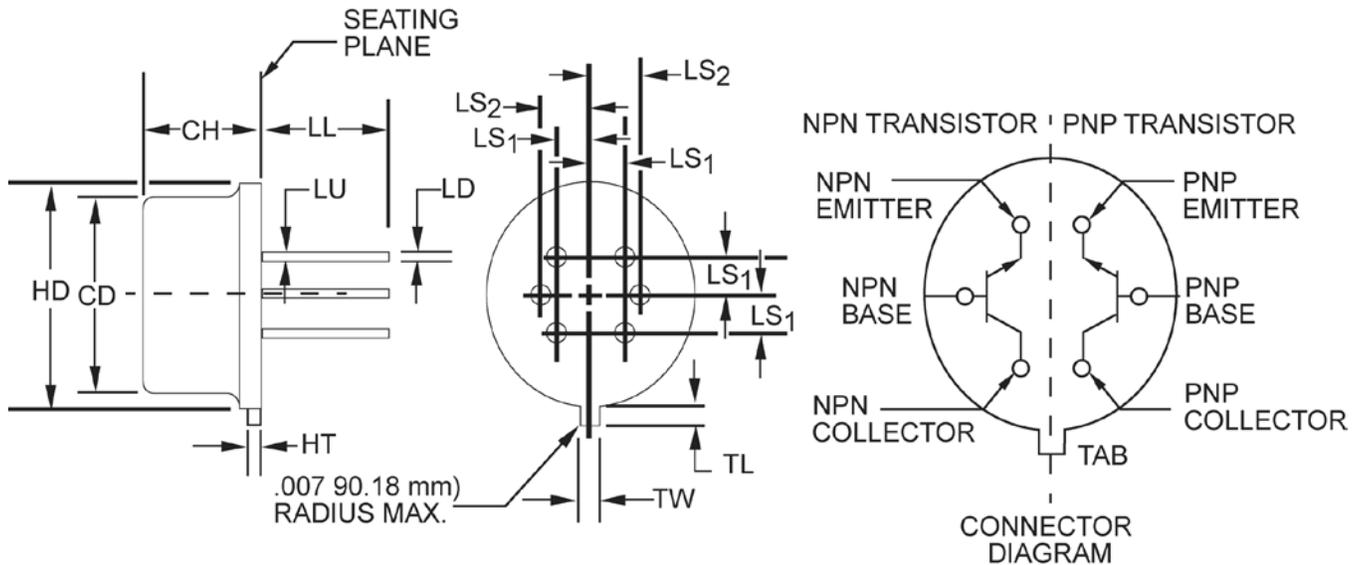
**ELECTRICAL CHARACTERISTICS @  $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted.**

Characteristics	Symbol	Min.	Max.	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Current $I_C = 10\text{ mA}$ (pulsed)	$V_{(BR)CEO}$	40		V
Collector-Base Cutoff Current $V_{CB} = 60\text{ V}$	$I_{CBO(1)}$		10	$\mu\text{A}$
Collector-Base Cutoff Current $V_{CB} = 50\text{ V}$	$I_{CBO(2)}$		10	nA
Emitter-Base Cutoff Current $V_{EB} = 5.0\text{ V}$ $V_{EB} = 3.0\text{ V}$	$I_{EBO(1)}$ $I_{EBO(2)}$		10 10	$\mu\text{A}$ nA
<b>ON CHARACTERISTICS</b>				
Forward-Current Transfer Ratio $I_C = 150\text{ mA}$ , $V_{CE} = 1\text{ V}$ $I_C = 100\text{ }\mu\text{A}$ , $V_{CE} = 10\text{ V}$ $I_C = 1.0\text{ mA}$ , $V_{CE} = 10\text{ V}$ $I_C = 10\text{ mA}$ , $V_{CE} = 10\text{ V}$ $I_C = 150\text{ mA}$ , $V_{CE} = 10\text{ V}$ $I_C = 300\text{ mA}$ , $V_{CE} = 10\text{ V}$	$h_{FE}$	50 35 50 75 100 35	300	
Collector-Emitter Saturation Voltage $I_C = 150\text{ mA}$ , $I_B = 15\text{ mA}$	$V_{CE(sat)}$		0.40	V
Base-Emitter Saturation Voltage $I_C = 150\text{ mA}$ , $I_B = 15\text{ mA}$	$V_{BE(sat)}$	0.80	1.25	V
<b>DYNAMIC CHARACTERISTICS</b>				
Forward Current Transfer Ratio $I_C = 1.0\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 1.0\text{ kHz}$	$h_{fe}$	60	300	
Forward Current Transfer Ratio, Magnitude $I_C = 20\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 100\text{ MHz}$	$ h_{fe} $	2.0	10	
Small-Signal Common Emitter Input Impedance $I_C = 1.0\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 1.0\text{ kHz}$	$h_{ie}$	1.5	9.0	k $\Omega$
Small-Signal Common Emitter Output Admittance $I_C = 1.0\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 1.0\text{ kHz}$	$h_{oe}$		50	$\mu\text{hmo}$
Open Circuit Output Capacitance $V_{CB} = 10\text{ V}$ , $I_E = 0$ , $100\text{ kHz} \leq f \leq 1.0\text{ MHz}$	$C_{obo}$		8.0	pF
Noise Figure $I_C = 100\text{ }\mu\text{A}$ , $V_{CE} = 10\text{ V}$ , $f = 1.0\text{ kHz}$ , $R_G = 1.0\text{ k}\Omega$	NF		8.0	dB
<b>SWITCHING CHARACTERISTICS</b>				
Turn-On Time (Saturated) (Reference MIL-PRF-19500/421, figure 7)	$t_{on}$		45	ns
Turn-Off Time (Saturated) (Reference MIL-PRF-19500/421, figure 8)	$t_{off}$		300	ns
Pulse Response (Non-Saturated) (Reference MIL-PRF-19500/421, figure 9)	$t_{on} + t_{off}$		18	ns
Collector-Emitter Non-Latching Voltage	$V_{CEO}$	40		V

GRAPHS



**FIGURE 3**  
Thermal impedance graph ( $R_{\theta JA}$ )

**PACKAGE DIMENSIONS**


Ltr	Dimensions				Notes
	Inch		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	
CH	.140	.260	3.56	6.60	
HD	.335	.370	8.51	9.40	
HT	.009	.125	0.23	3.18	
LD	.016	.021	0.41	0.53	3,7
LL	.500	1.750	12.70	44.45	7

Ltr	Dimensions				Notes
	Inch		Millimeters		
	Min	Max	Min	Max	
LS1	.0707 Nom.		1.796 Nom.		5
LS2	.1000 Nom.		2.540 Nom.		5
LU	.016	.019	0.41	0.48	4, 7
TL	.029	.045	0.74	1.14	6
TW	.028	.034	0.71	0.86	

**NOTES:**

- Dimensions are in inches.
- Millimeters are given for general information only.
- Measured in the zone beyond .250 inch (6.35 mm) from the seating plane.
- Measured in the zone .050 inch (1.27 mm) and .250 inch (6.35 mm) from the seating plane.
- When measured in a gauging plane .054 +.001, -.000 inch (1.37 +0.03, -0.00 mm) below the seating plane of the transistor, maximum diameter leads shall be within .007 inch (0.18 mm) of their true location relative to a maximum width tab. Smaller diameter leads shall fall within the outline of the maximum diameter lead tolerance.
- Measured from the maximum diameter of the actual device.
- All six leads.
- In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi x$  symbology.