



## NPN Silicon High-Frequency Transistor

*Qualified per MIL-PRF-19500/398*

*Qualified Levels:  
JAN, JANTX, JANTXV  
and JANS*

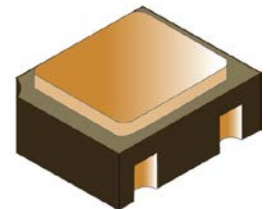
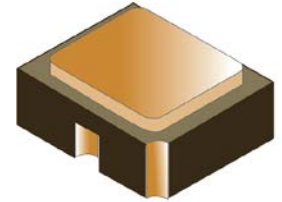
### DESCRIPTION

This 2N3866(A) silicon VHF-UHF amplifier transistor is military qualified up to the JANS level for high-reliability applications. It is also available in a top hat leaded TO-205AD package.

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

### FEATURES

- JEDEC registered 2N3866 number
- JAN, JANTX, JANTXV and JANS qualifications also available per MIL-PRF-19500/398
- RoHS compliant



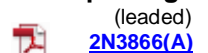
**UB Package**

### APPLICATIONS / BENEFITS

- Ceramic UB package
- Lightweight
- Military and other high-reliability applications

Also available in:

**TO-205AD (TO-39)  
package**



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

Parameters / Test Conditions	Symbol	Value	Unit
Junction & Storage Temperature	T <sub>J</sub> , T <sub>stg</sub>	-65 to +200	°C
Thermal Resistance Junction-to-Case	R <sub>θJC</sub>	60	°C/W
Thermal Resistance Junction-to-Ambient	R <sub>θJA</sub>	325	°C/W
Collector – Emitter Voltage	V <sub>CEO</sub>	30	V
Collector – Base Voltage	V <sub>CBO</sub>	60	V
Emitter - Base Voltage	V <sub>EBO</sub>	3.5	V
Total Power Dissipation <sup>(1)</sup> @ T <sub>A</sub> = +25 °C <sup>(1)</sup>	P <sub>T</sub>	0.5	W
Collector Current	I <sub>C</sub>	0.4	A

**Notes:** 1. Derated linearly 3.08 mW/°C for T<sub>A</sub> > +25 °C

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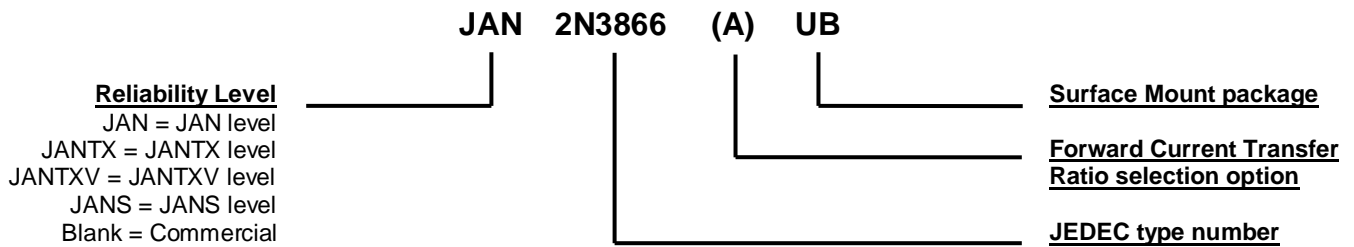
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**MECHANICAL and PACKAGING**

- CASE: Ceramic.
- TERMINALS: Gold plating over nickel under plate.
- MARKING: Part number, date code, manufacturer's ID.
- TAPE & REEL option: Standard per EIA-418D. Consult factory for quantities.
- WEIGHT: Less than 0.04 grams.
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

Symbol	Definition
$I_B$	Base current: The value of the dc current into the base terminal.
$I_C$	Collector current: The value of the dc current into the collector terminal.
$V_{BE}$	Base-emitter voltage: The dc voltage between the base and the emitter.
$V_{CB}$	Collector-base voltage: The dc voltage between the collector and the base.
$V_{CBO}$	Collector-base voltage, base open: The voltage between the collector and base terminals when the emitter terminal is open-circuited.
$V_{CE}$	Collector-emitter voltage: The dc voltage between the collector and the emitter.
$V_{CEO}$	Collector-emitter voltage, base open: The voltage between the collector and the emitter terminals when the base terminal is open-circuited.
$V_{CC}$	Collector-supply voltage: The supply voltage applied to a circuit connected to the collector.
$V_{EBO}$	Emitter-base voltage, collector open: The voltage between the emitter and base terminals with the collector terminal open-circuited.

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

Characteristics	Symbol	Min	Max	Unit
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**OFF CHARACTERISTICS**

Collector-Emitter Breakdown Voltage $I_C = 5\text{ mA}$	$V_{(BR)CEO}$	30		V
Collector-Base Breakdown Voltage $I_C = 100\text{ }\mu\text{A}$	$V_{(BR)CBO}$	60		V
Emitter-Base Breakdown Voltage $I_E = 100\text{ }\mu\text{A}$	$V_{(BR)EBO}$	3.5		V
Collector-Emitter Cutoff Current $V_{CE} = 28\text{ V}$	$I_{CEO}$		20	$\mu\text{A}$
Collector-Emitter Cutoff Current $V_{CE} = 55\text{ V}$	$I_{CES1}$		100	$\mu\text{A}$

**ON CHARACTERISTICS <sup>(1)</sup>**

Forward-Current Transfer Ratio $I_C = 50\text{ mA}$ , $V_{CE} = 5.0\text{ V}$	2N3866UB 2N3866AUB	$h_{FE}$	15 25	200 200	
$I_C = 360\text{ mA}$ , $V_{CE} = 5.0\text{ V}$	2N3866UB 2N3866AUB		5 8		
Collector-Emitter Saturation Voltage $I_C = 100\text{ mA}$ , $I_B = 10\text{ mA}$		$V_{CE(sat)}$		1.0	V
Collector-Emitter Cutoff Current – High Temp Operation $V_{CE} = 55\text{ V}$ , $T_A = +150\text{ }^\circ\text{C}$		$I_{CES2}$		2.0	mA
Forward-Current Transfer Ratio – Low Temperature Operation $V_{CE} = 5.0\text{ V}$ , $I_C = 50\text{ mA}$ , $T_A = -55\text{ }^\circ\text{C}$	2N3866UB 2N3866AUB	$h_{FE3}$	7 12		

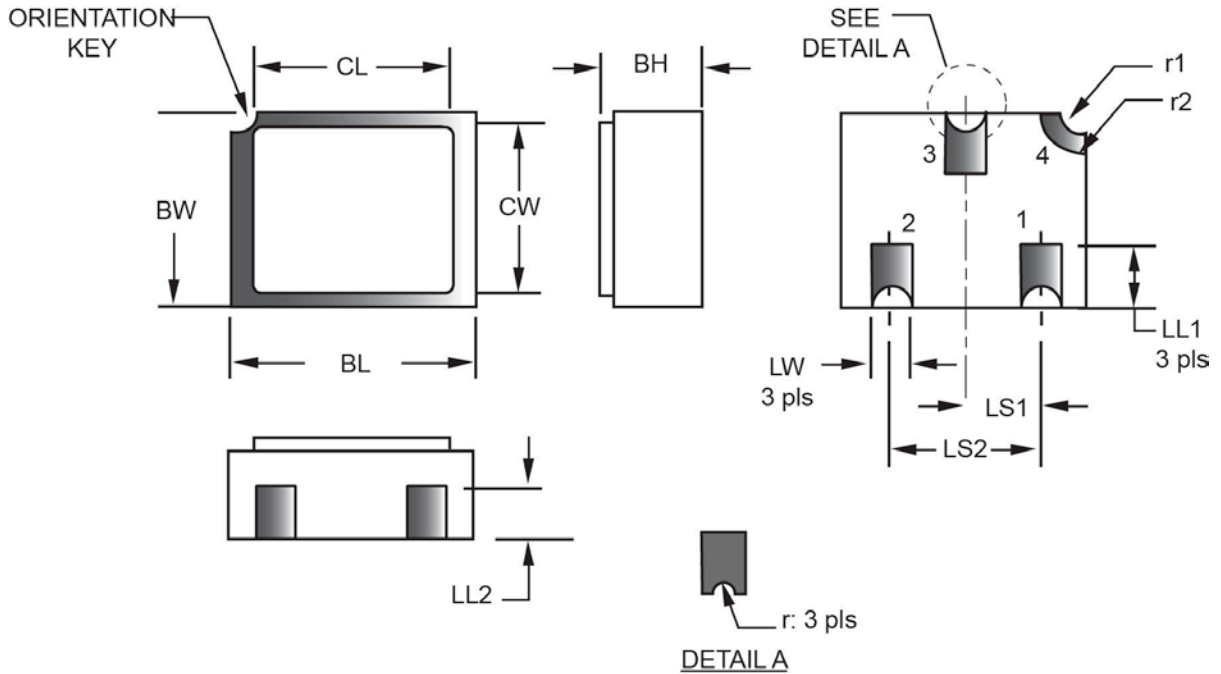
**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 50\text{ mA}$ , $V_{CE} = 15\text{ V}$ , $f = 200\text{ MHz}$	2N3866UB 2N3866AUB	$ h_{FE} $	2.5 4.0	8.0 7.5	
Output Capacitance $V_{CB} = 28\text{ V}$ , $I_E = 0$ , $100\text{ kHz} \leq f \leq 1.0\text{ MHz}$		$C_{obo}$		3.5	pF

**POWER OUTPUT CHARACTERISTICS**

Power Output $V_{CC} = 28\text{ V}$ ; $P_{in} = 0.15\text{ W}$ ; $f = 400\text{ MHz}$ * $V_{CC} = 28\text{ V}$ ; $P_{in} = 0.075\text{ W}$ ; $f = 400\text{ MHz}$ * * See Figure 4 on MIL-PRF-19500/398		$P_{1out}$ $P_{2out}$	1.0 0.5	2.0	W
Collector Efficiency $V_{CC} = 28\text{ V}$ ; $P_{in} = 0.15\text{ W}$ ; $f = 400\text{ MHz}$ $V_{CC} = 28\text{ V}$ ; $P_{in} = 0.075\text{ W}$ ; $f = 400\text{ MHz}$		n1 n2	45 40		%
Clamp Inductive Collector-Emitter Breakdown Voltage $V_{BE} = -1.5\text{ V}$ , $I_C = 40\text{ mA}$		$V_{(BR)CEX}$	55		Vdc

(1) Pulse Test: pulse width = 300  $\mu\text{s}$ , duty cycle  $\leq 2.0\%$

**PACKAGE DIMENSIONS**


Symbol	Dimensions				Note	Symbol	Dimensions				Note
	inch		millimeters				inch		millimeters		
	Min	Max	Min	Max			Min	Max	Min	Max	
<b>BH</b>	0.046	0.056	1.17	1.42		<b>LS1</b>	0.035	0.040	0.89	1.02	
<b>BL</b>	0.115	0.128	2.92	3.25		<b>LS2</b>	0.071	0.079	1.80	2.01	
<b>BW</b>	0.085	0.108	2.16	2.74		<b>LW</b>	0.016	0.024	0.41	0.61	
<b>CL</b>	-	0.128	-	3.25		<b>r</b>	-	0.008	-	0.20	
<b>CW</b>	-	0.108	-	2.74		<b>r1</b>	-	0.012	-	0.31	
<b>LL1</b>	0.022	0.038	0.56	0.96		<b>r2</b>	-	0.022	-	0.56	
<b>LL2</b>	0.017	0.035	0.43	0.89							

**NOTES:**

1. Dimensions are in inches. Millimeters are given for information only.
2. Hatched areas on package denote metallized areas.
3. Lid material: Kovar.
4. Pad 1 = Base, Pad 2 = Emitter, Pad 3 = Collector, Pad 4 = Shielding connected to the lid.
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.