RoHS Compliant

NPN LOW POWER SILICON TRANSISTOR

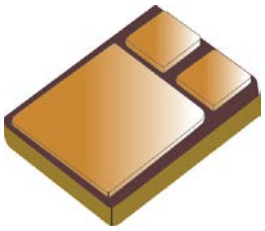
Qualified per MIL-PRF-19500/368

Qualified Levels:
*JAN, JANTX, JANTXV and JANS**
*(*2N3440U4 only)*

DESCRIPTION

This family of 2N3439U4 through 2N3440U4 high-frequency, epitaxial planar transistors feature low saturation voltage. The U4 package is hermetically sealed and provides a low profile for minimizing board height. These devices are also available in UA, TO-5 and TO-39 packaging. Microsemi also offers numerous other transistor products to meet higher and lower power ratings with various switching speed requirements in both through-hole and surface-mount packages.

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



U4 Package

FEATURES

- JEDEC registered 2N3439U4 through 2N3440U4 series.
- RoHS compliant by design.
- Vce(sat) = 0.5 V @ Ic = 50 mA.
- Turn-On time t_{on} = 1.0 µs max @ I_C = 20 mA, I_{B1} = 2.0 mA.
- Turn-Off time t_{off} = 10 µs max @ I_C = 20 mA, I_{B1} = -I_{B2} = 2.0 mA.

APPLICATIONS / BENEFITS

- General purpose transistors for medium power applications requiring high frequency switching and low package profile.
- Military and other high-reliability applications.

MAXIMUM RATINGS @ T_C = +25°C unless otherwise noted.

Parameters / Test Conditions	Symbol	2N3439U4	2N3440U4	Unit
Collector-Emitter Voltage	V_{CEO}	350	250	V
Collector-Base Voltage	V_{CBO}	450	300	V
Emitter-Base Voltage	V_{EBO}	7.0		V
Collector Current	I_C	1.0		A
Total Power Dissipation @ T_A = +25 °C (1) @ T_C = +25 °C (2)	P_D	0.8 5.0		W
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		°C

Notes: 1. Derate linearly @ 4.57 mW/°C for T_A > +25 °C.
2. Derate linearly @ 28.5 mW/°C for T_C > +25 °C.

Also available in:

UA package
(surface mount)
2N3439UA – 2N3440UA

TO-5 package
(long leaded)
2N3439L – 2N3440L

TO-39 package
(leaded)
2N3439 – 2N3440

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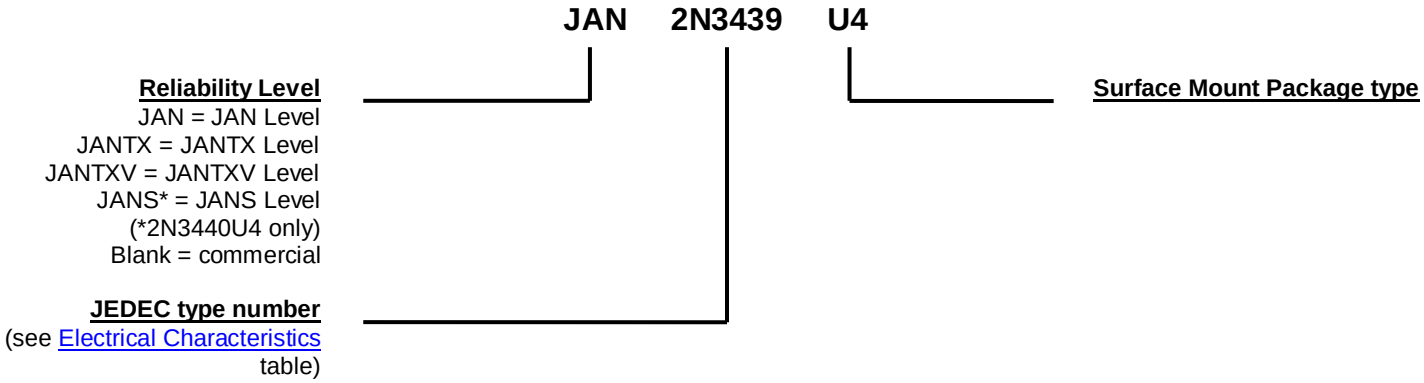
www.microsemi.com

MECHANICAL and PACKAGING

- CASE: Hermetically sealed, aluminum nitride (AIN) ceramic body with gold over nickel plated kovar lid.
- TERMINALS: Gold over nickel plated surface mount terminations.
- MARKING: Part number, date code, manufacturer's ID.
- POLARITY: See package dimensions.
- TAPE & REEL option: Standard per EIA-481D. Consult factory for quantities.
- WEIGHT: 0.125 grams (125 milligrams).
- See Package Dimensions on last page.

PART NOMENCLATURE



SYMBOLS & DEFINITIONS

Symbol	Definition
C_{ibo}	Common-base open-circuit input capacitance.
C_{obo}	Common-base open-circuit output capacitance.
I_{CEO}	Collector cutoff current, base open.
I_{CEX}	Collector cutoff current, circuit between base and emitter.
I_{EBO}	Emitter cutoff current, collector open.
h_{FE}	Common-emitter static forward current transfer ratio.
V_{BE}	Base-emitter voltage, dc.
V_{CE}	Collector-emitter voltage, dc.
V_{CEO}	Collector-emitter voltage, base open.
V_{CBO}	Collector-emitter voltage, emitter open.
V_{EB}	Emitter-base voltage, dc.
V_{EBO}	Emitter-base voltage, collector open.

ELECTRICAL CHARACTERISTICS @ T_A = +25°C, unless otherwise noted.

OFF CHARACTERISTICS

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
Collector-Emitter Breakdown Voltage I_C = 10 mA R_{BB1} = 470 Ω; V_{BB1} = 6 V L = 25 mH (min); f = 30 – 60 Hz	2N3439U4 2N3440U4	$V_{(BR)CEO}$	350 250		V
Collector-Emitter Cutoff Current V_{CE} = 300 V V_{CE} = 200 V	2N3439U4 2N3440U4	I_{CEO}		2.0 2.0	µA
Emitter-Base Cutoff Current V_{EB} = 7.0 V		I_{EBO}		10	µA
Collector-Emitter Cutoff Current V_{CE} = 450 V, V_{BE} = -1.5 V V_{CE} = 300 V, V_{BE} = -1.5 V	2N3439U4 2N3440U4	I_{CEX}		5.0 5.0	µA
Collector-Base Cutoff Current V_{CB} = 360 V V_{CB} = 250 V V_{CB} = 450 V V_{CB} = 300 V	2N3439U4 2N3440U4 2N3439U4 2N3440U4	I_{CBO}		2.0 2.0 5.0 5.0	µA

ON CHARACTERISTICS (1)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Forward-Current Transfer Ratio I_C = 20 mA, V_{CE} = 10 V I_C = 2.0 mA, V_{CE} = 10 V I_C = 0.2 mA, V_{CE} = 10 V	h_{FE}	40 30 10	160	
Collector-Emitter Saturation Voltage I_C = 50 mA, I_B = 4.0 mA	$V_{CE(sat)}$		0.5	V
Base-Emitter Saturation Voltage I_C = 50 mA, I_B = 4.0 mA	$V_{BE(sat)}$		1.3	V

DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio I_C = 10 mA, V_{CE} = 10 V, f = 5.0 MHz	$\|h_{fe}\|$	3.0	15	
Forward Current Transfer Ratio I_C = 5.0 mA, V_{CE} = 10V, f = 1.0 kHz	h_{fe}	25		
Output Capacitance V_{CB} = 10 V, I_E = 0, 100 kHz ≤ f ≤ 1.0 MHz	C_{obo}		10	pF
Input Capacitance V_{CB} = 5.0 V, I_E = 0, 100 kHz ≤ f ≤ 1.0 MHz	C_{ibo}		75	pF

(1) Pulse Test: Pulse Width = 300 µs, duty cycle ≤ 2.0%.

ELECTRICAL CHARACTERISTICS @ T_A = +25°C, unless otherwise noted. (continued)

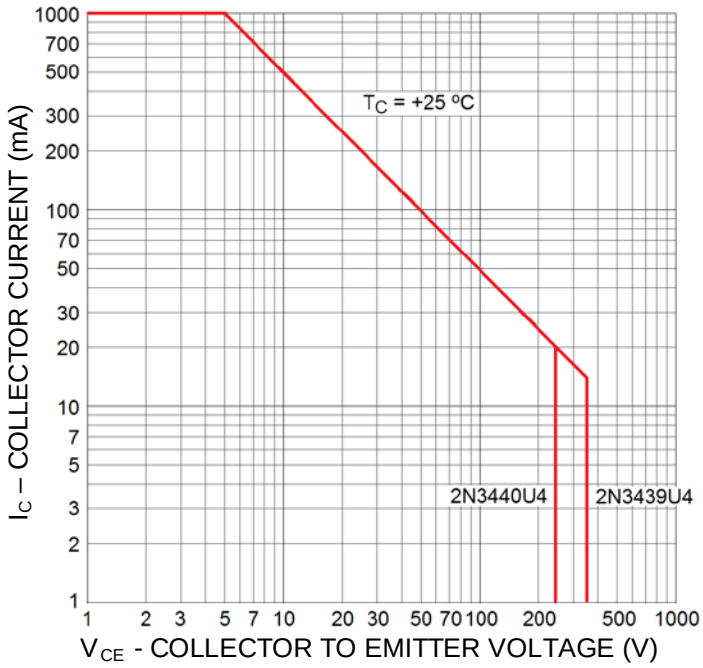
SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time V_{CC} = 200 V; I_C = 20 mA, I_{B1} = 2.0 mA	t_{on}		1.0	µs
Turn-Off Time V_{CC} = 200 V; I_C = 20 mA, I_{B1} = -I_{B2} = 2.0 mA	t_{off}		10	µs

SAFE OPERATING AREA (See graph below and reference MIL-STD-750, method 3053)

DC Tests
T_C = +25 °C, 1 Cycle, t = 1.0 s

Test 1	
V_{CE} = 5.0 V, I_C = 1.0 A	Both Types
Test 2	
V_{CE} = 350 V, I_C = 14 mA	2N3439U4
Test 3	
V_{CE} = 250 V, I_C = 20 mA	2N3440U4



Maximum Safe Operating Area (continuous dc)

GRAPHS

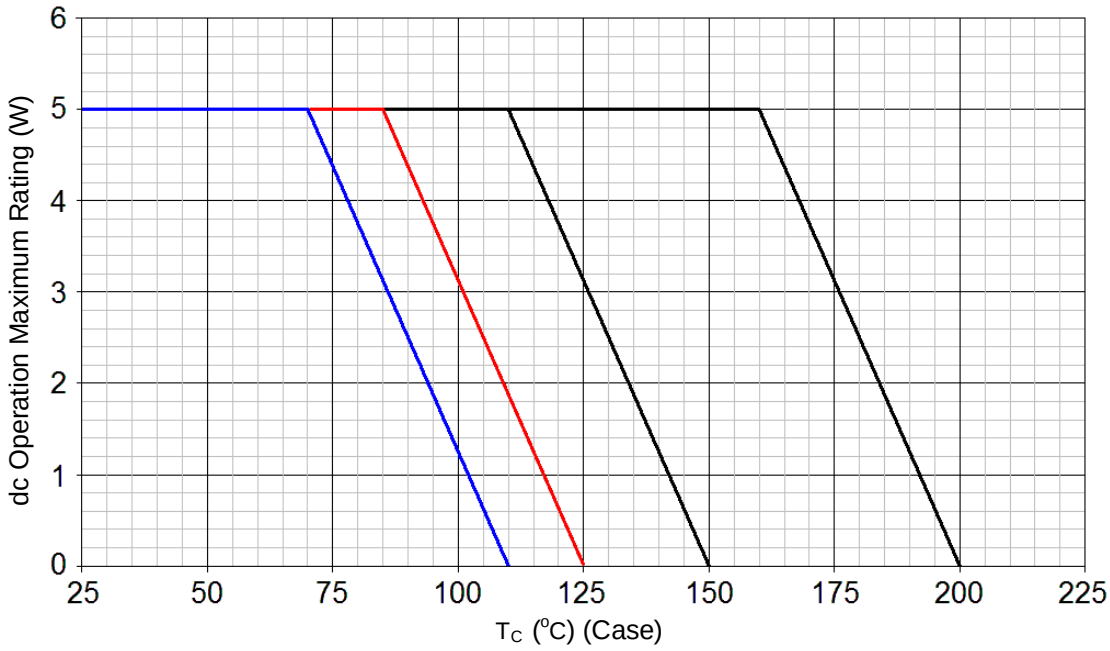


FIGURE 1
Temperature-Power Derating Curve
NOTES: Thermal Resistance Junction to Case = 8.0 °C/W
Max Finish-Alloy Temp = 175 °C

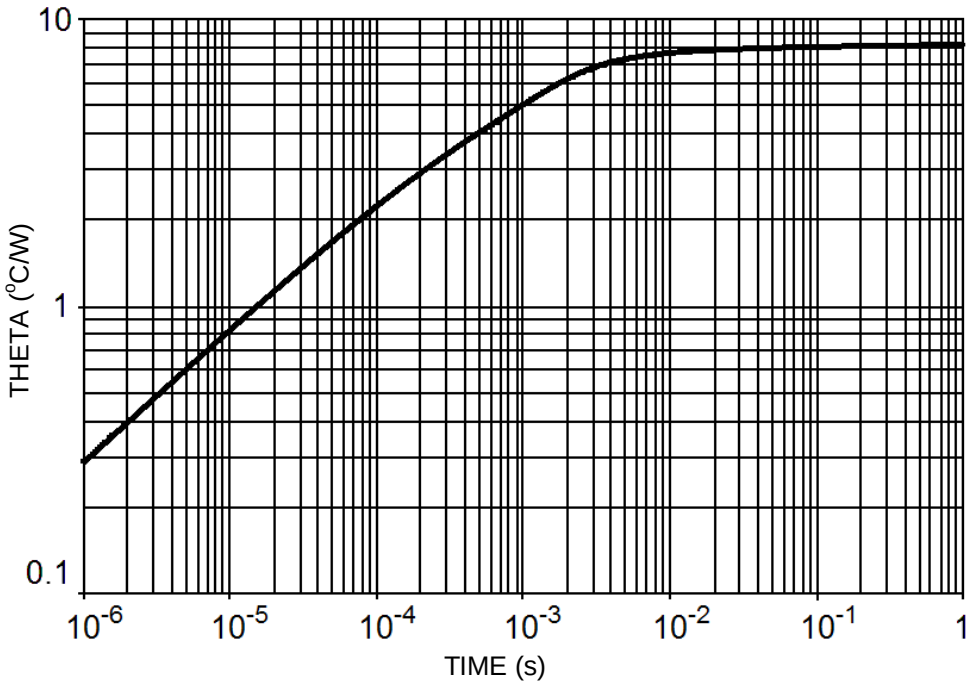
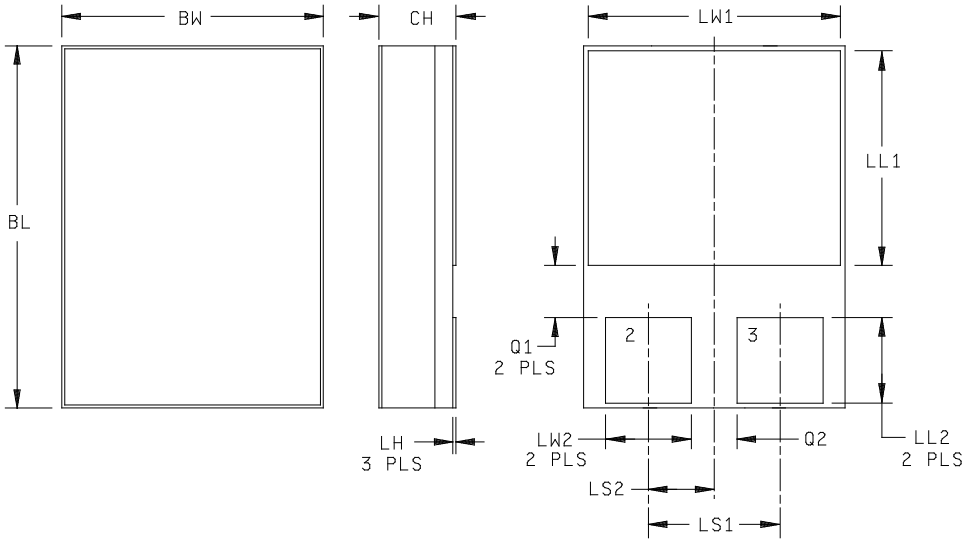
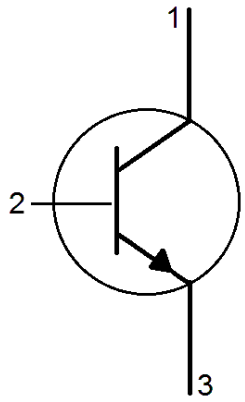


FIGURE 2
Maximum Thermal Impedance
NOTE: T_C = +25 °C, Thermal Resistance $R_{\theta JC}$ = 8.0 °C/W

PACKAGE DIMENSIONS





NOTES:

1. Dimensions are in inches.
2. Millimeter equivalents are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	0.215	0.225	5.46	5.72
BW	0.145	0.155	3.68	3.94
CH	0.049	0.075	1.24	1.91
LH		0.020		0.51
LW1	0.135	0.145	3.43	3.68
LW2	0.047	0.057	1.19	1.45
LL1	0.085	0.125	2.16	3.17
LL2	0.045	0.075	1.14	1.90
LS1	0.070	0.095	1.78	2.41
LS2	0.035	0.048	0.89	1.21
Q1	0.030	0.070	0.76	1.78
Q2	0.020	0.035	0.51	0.89
TERMINAL				
1	COLLECTOR			
2	BASE			
3	EMITTER			

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2N3439UA 2N3439U4 2N3440U4 2N3439UA/TR

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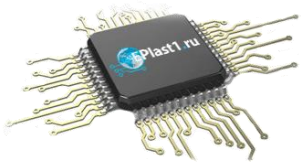
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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