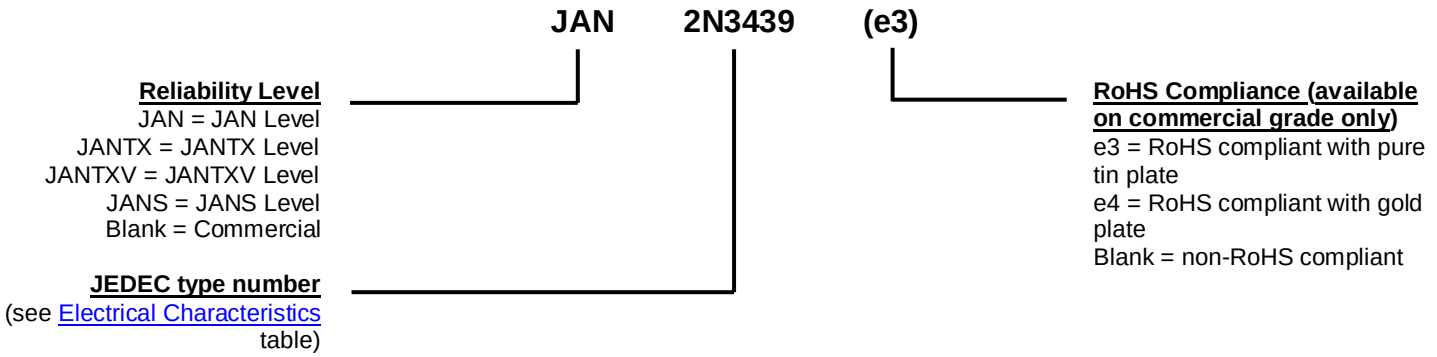
MECHANICAL and PACKAGING

- CASE: Hermetically sealed, kovar base, nickel cap.
- TERMINALS: Tin/lead solder dip or RoHS compliant pure tin (commercial grade only) plate over gold.
- MARKING: Part number, date code, manufacturer's ID.
- POLARITY: NPN (see package outline).
- WEIGHT: Approximately 1.064 grams.
- See Package Dimensions on last page.

PART NOMENCLATURE



SYMBOLS & DEFINITIONS

Symbol	Definition
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_{CEO}	Collector-emitter voltage, base open.
V_{CBO}	Collector-emitter voltage, emitter open.
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	2N3439 2N3440	$V_{(BR)CEO}$	350 250		V
Collector-Emitter Cutoff Current V_{CE} = 300 V V_{CE} = 200 V	2N3439 2N3440	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	2N3439 2N3440	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	2N3439 2N3440 2N3439 2N3440	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} = 10 V, 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%.

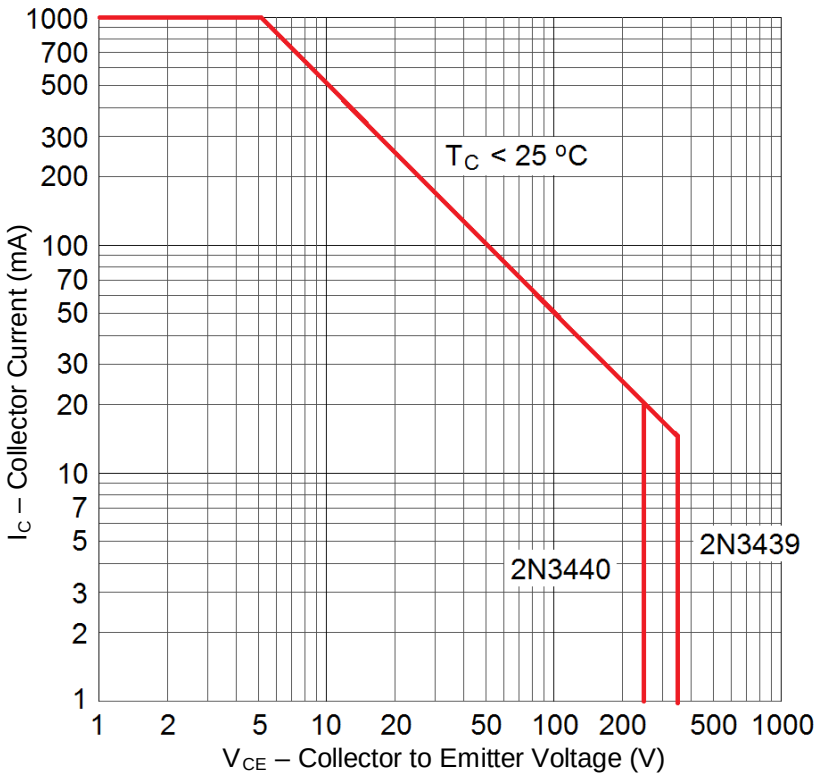
ELECTRICAL CHARACTERISTICS (T_A = +25°C, unless otherwise noted) continued

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 also reference test method 3053 of MIL-STD-750.)

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	2N3439
Test 3	
V_{CE} = 250 V, I_C = 20 mA	2N3440



Maximum Safe Operating graph (continuous dc)

GRAPHS

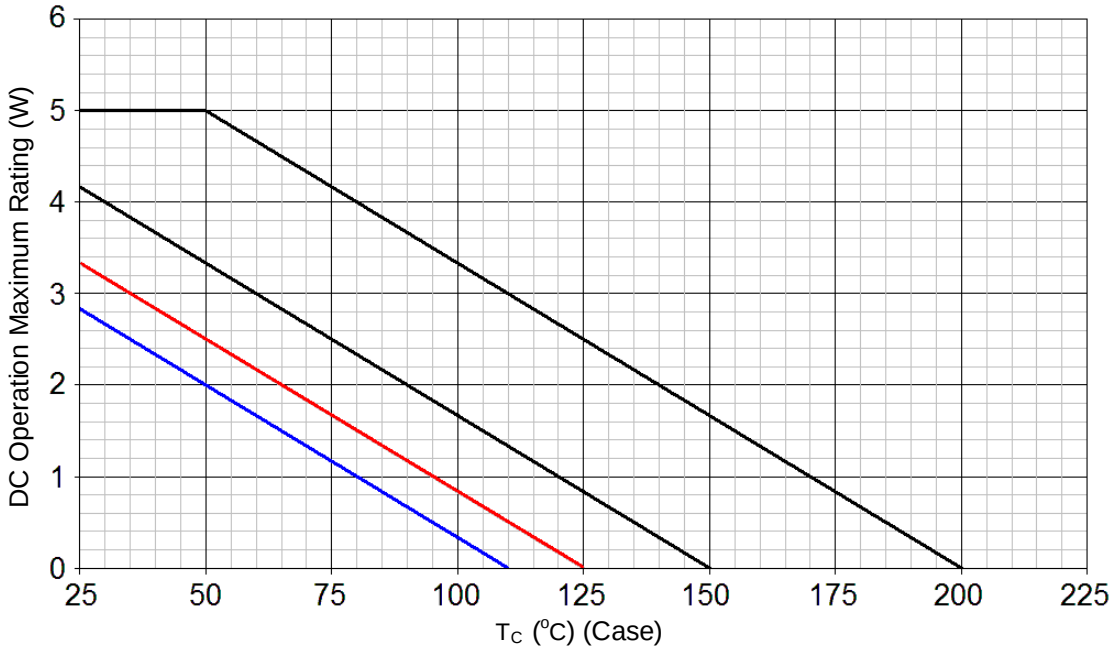


FIGURE 1

Temperature-Power Derating Curve

NOTES: Thermal Resistance Junction to Case = 30.0 °C/W
Max Finish-Alloy Temp = 175.0 °C

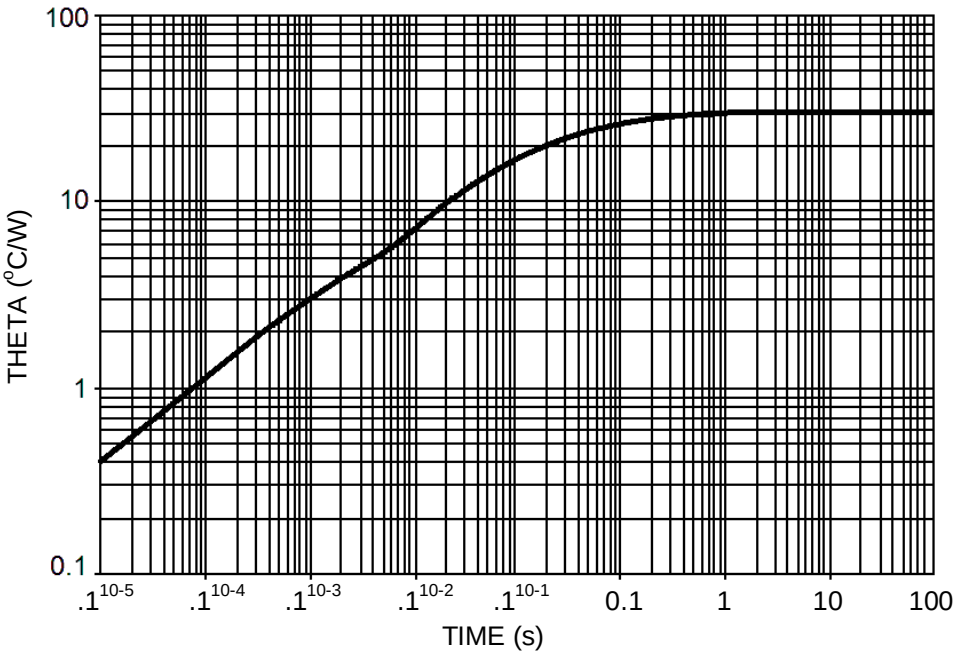
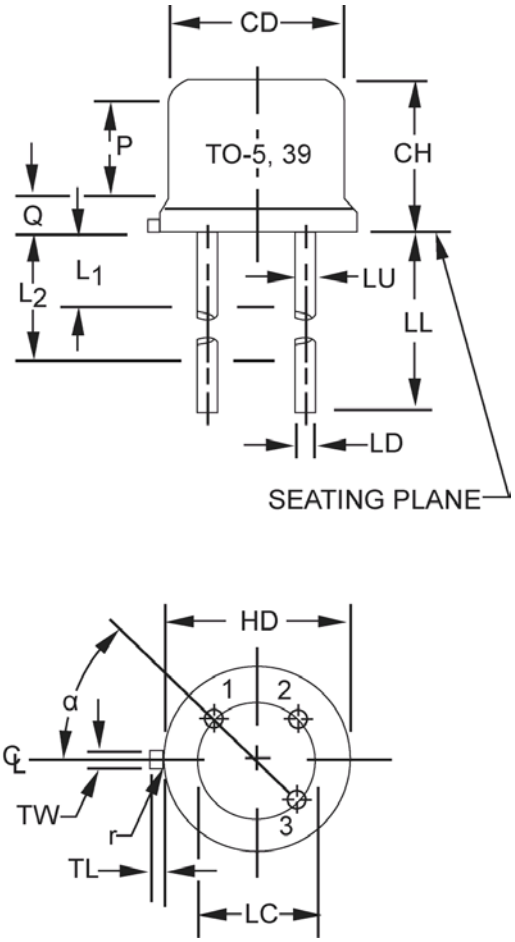


FIGURE 2

Maximum Thermal Impedance

NOTE: T_C = +25 °C, P_T = 5.0 W, thermal resistance $R_{\theta JC}$ = 30 °C/W, steel.

PACKAGE DIMENSIONS



Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	6
CH	.240	.260	6.10	6.60	
HD	.335	.370	8.51	9.40	
LC	.200 TP		5.08 TP		7
LD	.016	.019	0.41	0.48	8,9
LL	See note 14				
LU	.016	.019	0.41	0.48	8,9
L1		.050		1.27	8,9
L2	.250		6.35		8,9
P	.100		2.54		7
Q		.030		0.76	5
TL	.029	.045	0.74	1.14	3,4
TW	.028	.034	0.71	0.86	3
r		.010		0.25	10
α	45° TP		45° TP		7

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TW 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. CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
7. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) 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 gauging procedure.
8. Dimension LU applies between L1 and L2. Dimension LD applies between L2 and LL minimum. Diameter is uncontrolled in and beyond LL minimum.
9. All three leads.
10. The collector shall be internally connected to the case.
11. Dimension r (radius) applies to both inside corners of tab.
12. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.
13. Lead 1 = emitter, lead 2 = base, lead 3 = collector.
14. For transistor types 2N3439 and 2N3440 (TO-39), dimension LL = .5 inch (12.70 mm) min. and .750 inch (19.05 mm) max.