RoHS
Available on commercial versions

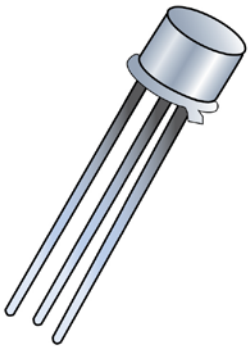
NPN SILICON TRANSISTOR
Qualified per MIL-PRF-19500/366

Qualified Levels:
JAN, JANTX, JANTXV and JANS

DESCRIPTION

This family of 2N3498 thru 2N3501 epitaxial planar transistors are military qualified up to a JANS level for high-reliability applications. These devices are also available in TO-5 and low profile U4 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.



TO-39 (TO-205AD) Package

FEATURES

- JEDEC registered 2N3498 through 2N3501 series.
- JAN, JANTX, JANTXV, and JANS qualifications are available per MIL-PRF-19500/366. (See part nomenclature for all available options.)
- RoHS compliant versions available (commercial grade only).

Also available in:

TO-5 package
(long-leaded)
2N3498L – 2N3501L

U4 package
(surface mount)
2N3498U4 – 2N3501U4

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

Parameters / Test Conditions	Symbol	2N3498 2N3499	2N3500 2N3501	Unit
Collector-Emitter Voltage	V_{CEO}	100	150	V
Collector-Base Voltage	V_{CBO}	100	150	V
Emitter-Base Voltage	V_{EBO}	6.0	6.0	V
Collector Current	I_C	500	300	mA
Thermal Resistance Junction-to-Ambient	$R_{\Theta JA}$	175		°C/W
Thermal Resistance Junction-to-Case	$R_{\Theta JC}$	30		°C/W
Total Power Dissipation @ T_A = +25 °C (1) @ T_C = +25 °C (2)	P_T	1.0 5.0		W
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		°C

Notes: 1. See figure 1.
2. See figure 2.

MSC – Lawrence
6 Lake Street,
Lawrence, MA 01841
Tel: 1-800-446-1158 or
(978) 620-2600
Fax: (978) 689-0803

MSC – Ireland
Gort Road Business Park,
Ennis, Co. Clare, Ireland
Tel: +353 (0) 65 6840044
Fax: +353 (0) 65 6822298

Website:
www.microsemi.com

MECHANICAL and PACKAGING

- CASE: Hermetically sealed, kovar base, nickel cap.
- TERMINALS: Leads are kovar, nickel plated, and finish is solder dip (Sn63/Pb37). Can be RoHS compliant with pure matte-tin (commercial grade only).
- MARKING: Part number, date code, manufacturer's ID.
- WEIGHT: Approximately 1.064 grams.
- See Package Dimensions on last page.

PART NOMENCLATURE

JAN 2N3498 (e3)

Reliability Level
JAN = JAN Level
JANTX = JANTX Level
JANTXV = JANTXV Level
JANS = JANS level
Blank = Commercial

JEDEC type number
(see Electrical Characteristics table)

RoHS Compliance
e3 = RoHS compliant (available on commercial grade only)
Blank = non-RoHS compliant

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

Characteristic		Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage					
I_C = 10 mA, pulsed	2N3498, 2N3499	$V_{(BR)CEO}$	100		V
	2N3500, 2N3501		150		
Collector-Base Cutoff Current					
V_{CB} = 50 V	2N3498, 2N3499	I_{CBO}		50	nA
V_{CB} = 75 V	2N3500, 2N3501			50	nA
V_{CB} = 100 V	2N3498, 2N3499			10	µA
V_{CB} = 150 V	2N3500, 2N3501			10	µA
Emitter-Base Cutoff Current					
V_{EB} = 4.0 V		I_{EBO}		25	nA
V_{EB} = 6.0 V				10	µA
ON CHARACTERISTICS (1)					
Forward-Current Transfer Ratio					
I_C = 0.1 mA, V_{CE} = 10 V	2N3498, 2N3500	h_{FE}	20		
	2N3499, 2N3501		35		
I_C = 1.0 mA, V_{CE} = 10 V	2N3498, 2N3500		25		
	2N3499, 2N3501		50		
I_C = 10 mA, V_{CE} = 10 V	2N3498, 2N3500		35		
	2N3499, 2N3501		75		
I_C = 150 mA, V_{CE} = 10 V	2N3498, 2N3500		40	120	
	2N3499, 2N3501		100	300	
I_C = 300 mA, V_{CE} = 10 V	2N3500		15		
	2N3501		20		
I_C = 500 mA, V_{CE} = 10 V	2N3498		15		
	2N3499		20		
Collector-Emitter Saturation Voltage					
I_C = 10 mA, I_B = 1.0 mA	All Types	$V_{CE(sat)}$		0.2	V
I_C = 300 mA, I_B = 30 mA	2N3498, 2N3499			0.6	
I_C = 150 mA, I_B = 15 mA	2N3500, 2N3501			0.4	
Base-Emitter Saturation Voltage					
I_C = 10 mA, I_B = 1.0 mA	All Types	$V_{BE(sat)}$		0.8	V
I_C = 300 mA, I_B = 30 mA	2N3498, 2N3499			1.4	
I_C = 150 mA, I_B = 15 mA	2N3500, 2N3501			1.2	
DYNAMIC CHARACTERISTICS					
Forward Current Transfer Ratio, Magnitude					
I_C = 20 mA, V_{CE} = 20 V, f = 100 MHz		$\|h_{fe}\|$	1.5	8.0	
Output Capacitance					
V_{CB} = 10 V, I_E = 0,	2N3498, 2N3499	C_{obo}		10	pF
100 kHz ≤ f ≤ 1.0 MHz	2N3500, 2N3501			8.0	
Input Capacitance					
V_{EB} = 0.5 V, I_C = 0, 100 kHz ≤ f ≤ 1.0 MHz		C_{ibo}		80	pF

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

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

SWITCHING CHARACTERISTICS

Characteristic	Symbol	Min.	Max.	Unit
Turn-On Time V_{EB} = 5 V; I_C = 150 mA; I_{B1} = 15 mA	t_{on}		115	ns
Turn-Off Time I_C = 150 mA; I_{B1} = I_{B2} = -15 mA	t_{off}		1150	ns

SAFE OPERATING AREA (See SOA figure and reference MIL-STD-750 method 3053)

DC Tests

T_C = +25 °C, $t_r \geq$ 10 ns; 1 Cycle, t = 1.0 s

Test 1

V_{CE} = 10 V, I_C = 500 mA	2N3498, 2N3499
V_{CE} = 16.67 V, I_C = 300 mA	2N3500, 2N3501

Test 2

V_{CE} = 50 V, I_C = 100 mA	All Types

Test 3

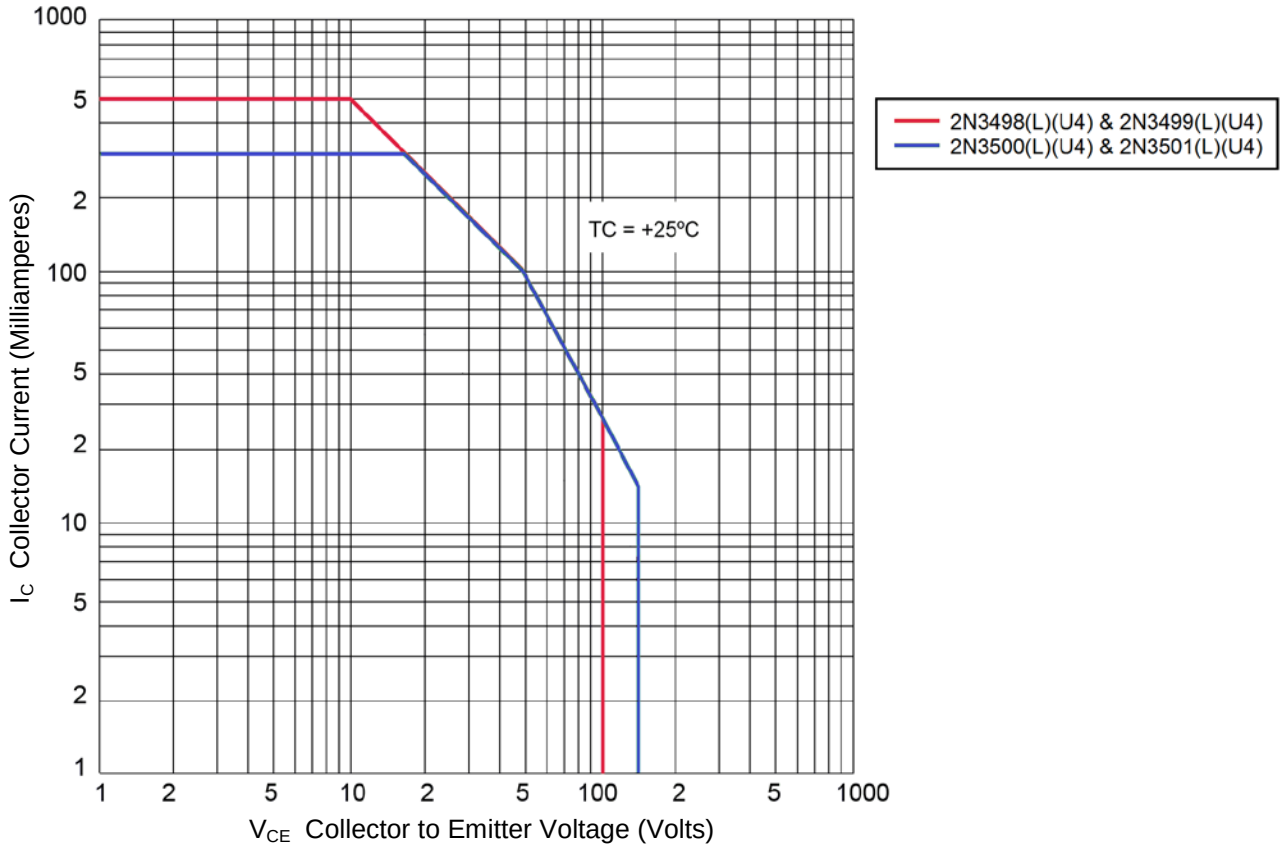
V_{CE} = 80 V, I_C = 40 mA	All Types

Clamped Switching

T_A = +25 °C

Test 1

I_B = 85 mA, I_C = 500 mA	2N3498, 2N3499
I_B = 50 mA, I_C = 300 mA	2N3500, 2N3501



Maximum Safe Operating Area

GRAPHS

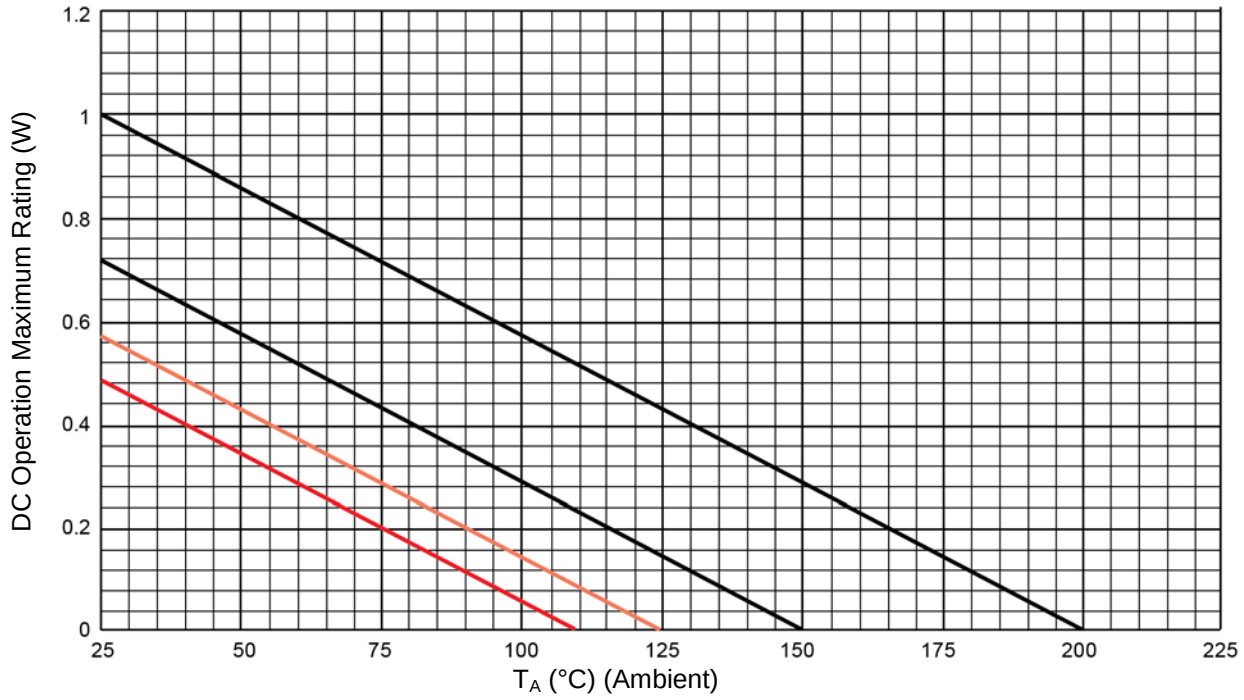


FIGURE 1

Derating for all devices ($R_{\theta JA}$)

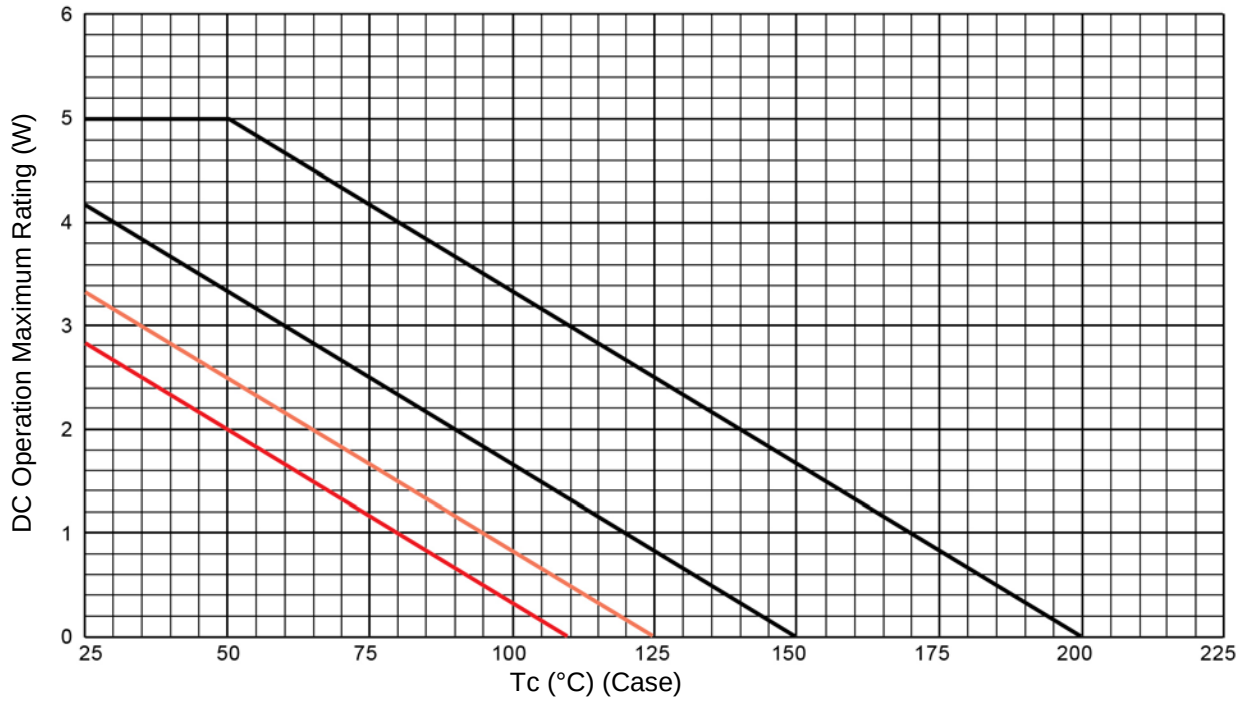


FIGURE 2

Derating for all devices ($R_{\theta JC}$)

GRAPHS

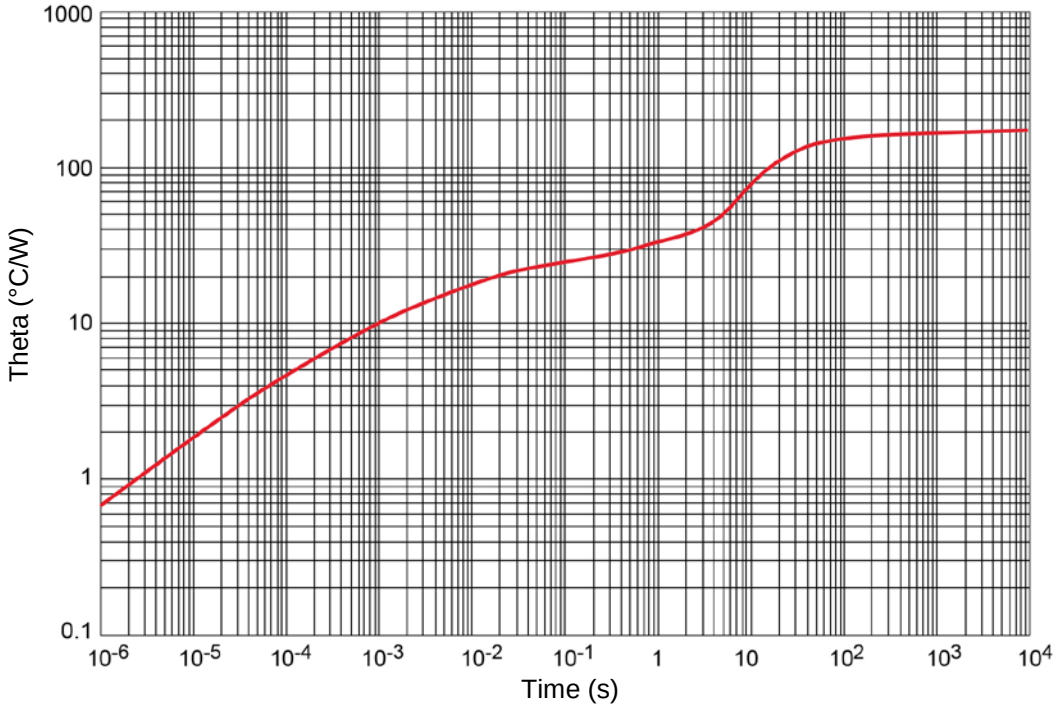


FIGURE 3

Thermal Impedance Graph ($R_{\theta JA}$)

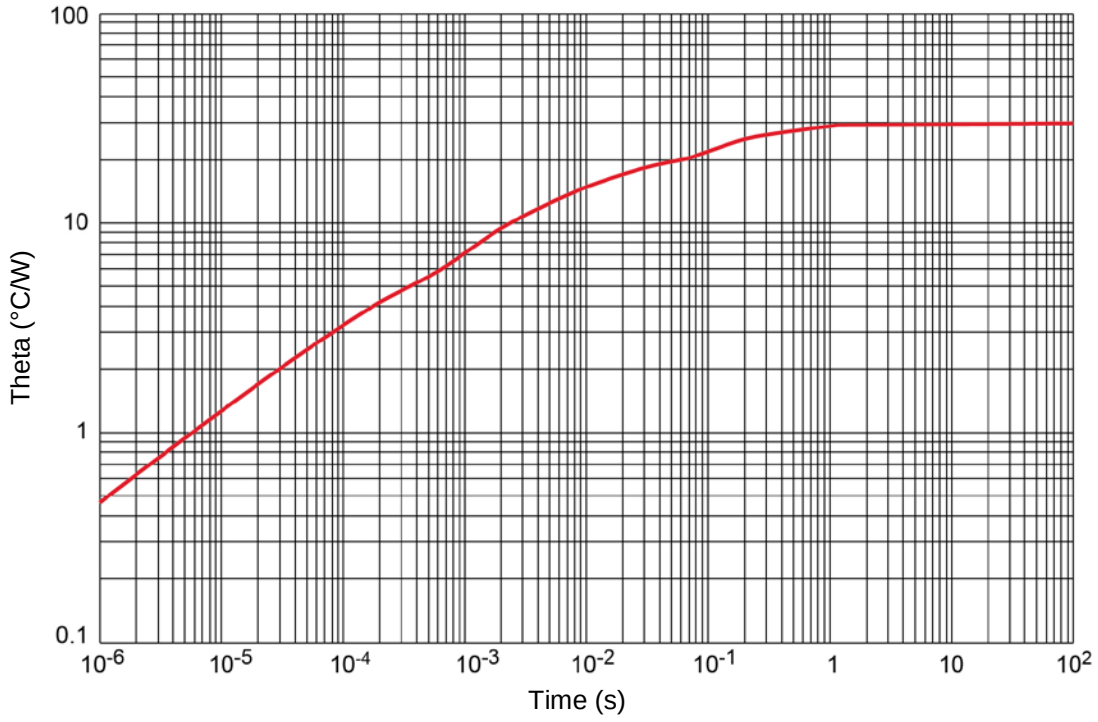


FIGURE 4

Thermal Impedance Graph ($R_{\theta JC}$)