6 Lake Street, Lawrence, MA 01841
1-800-446-1158 / (978) 620-2600 / Fax: (978) 689-0803
Website: http: //www.microsemi.com

TECHNICAL DATA SHEET

RADIATION HARDENED
NPN SILICON SWITCHING TRANSISTOR
Qualified per MIL-PRF-19500/366

DEVICES

2N3498	**2N3499**	**2N3500**	**2N3501**
2N3498L	**2N3499L**	**2N3500L**	**2N3501L**
			2N3501UB

LEVELS

JANSM – 3K Rads (Si)
JANSD – 10K Rads (Si)
JANSP – 30K Rads (Si)
JANSL – 50K Rads (Si)
JANSR – 100K Rads (Si)

ABSOLUTE MAXIMUM RATINGS ***(T_C = +25°C unless otherwise noted)***

Parameters / Test Conditions	Symbol	2N3498* 2N3499*	2N3501* 2N3501*	Unit
Collector-Emitter Voltage	V_{CEO}	100	150	Vdc
Collector-Base Voltage	V_{CBO}	100	150	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	6.0	Vdc
Collector Current	I_C	500	300	mAdc
Total Power Dissipation @ T_A = +25°C @ T_C = +25°C	P_T	1.0 5.0		W W
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		°C

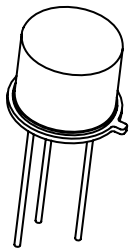
THERMAL CHARACTERISTICS

Parameters / Test Conditions	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	30	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	175	°C/W

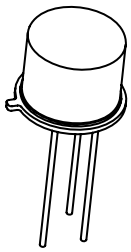
* Electrical characteristics for "L" suffix devices are identical to the "non L" corresponding devices.
1. Derate linearly 5.71 W/°C for T_A > 25°C
2. Derate linearly 28.6 W/°C for T_C > 25°C

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

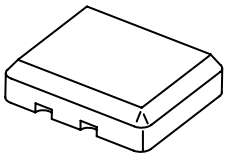
Parameters / Test Conditions		Symbol	Min.	Max.	Unit
OFF CHARACTERTICS					
Collector-Emitter Breakdown Voltage I_C = 10mAdc	2N3498, 2N3499 2N3500, 2N3501	$V_{(BR)CEO}$	100 150		Vdc
Collector-Base Cutoff Current V_{CB} = 50Vdc V_{CB} = 75Vdc V_{CB} = 100Vdc V_{CB} = 150Vdc	 2N3498, 2N3499 2N3500, 2N3501 2N3498, 2N3499 2N3500, 2N3501	 I_{CBO}		 50 50 10 10	 ηAdc ηAdc μAdc μAdc



TO-5*
2N3498L, 2N3499L
2N2500L, 2N3501L



TO-39* (TO-205AD)
2N3498, 2N3499
2N3500, 2N3501



3 PIN
2N3501UB

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

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS					
Emitter-Base Cutoff Current					
V_{EB} = 4.0Vdc		I_{EBO}		25	ηAdc
V_{EB} = 6.0Vdc				10	μAdc
ON CHARACTERISTICS (3)					
Forward-Current Transfer Ratio					
I_C = 0.1mAdc, V_{CE} = 10Vdc	2N3498, 2N3500		20		
	2N3499, 2N3501		35		
I_C = 1.0mAdc, V_{CE} = 10Vdc	2N3498, 2N3500		25		
	2N3499, 2N3501		50		
I_C = 10mAdc, V_{CE} = 10Vdc	2N3498, 2N3500		35		
	2N3499, 2N3501	h_{FE}	75		
I_C = 150mAdc, V_{CE} = 10Vdc	2N3498, 2N3500		40	120	
	2N3499, 2N3501		100	300	
I_C = 300mAdc, V_{CE} = 10Vdc	2N3500		15		
	2N3501		20		
I_C = 500mAdc, V_{CE} = 10Vdc	2N3498		15		
	2N3499		20		
Collector-Emitter Saturation Voltage					
I_C = 10mAdc, I_B = 1.0mAdc	All Types	$V_{CE(sat)}$		0.2	Vdc
I_C = 300mAdc, I_B = 30mAdc	2N3498, 3N3499			0.6	
I_C = 150mAdc, I_B = 15mAdc	2N3500, 2N3501			0.4	
Base-Emitter Saturation Voltage					
I_C = 10mAdc, I_B = 1.0mAdc	All Types	$V_{BE(sat)}$		0.8	Vdc
I_C = 300mAdc, I_B = 30mAdc	2N3498, 3N3499			1.4	
I_C = 150mAdc, I_B = 15mAdc	2N3500, 2N3501			1.2	

DYNAMIC CHARACTERISTICS

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
Magnitude, Forward Current Transfer Ratio					
I_C = 20mAdc, V_{CE} = 20Vdc, f = 100MHz		$\|h_{fe}\|$	1.5	8.0	
Output Capacitance					
V_{CB} = 10Vdc, I_E = 0, 100kHz ≤ f ≤ 1.0MHz	2N3498, 2N3499	C_{obo}		10	pF
	2N3500, 2N3501			8.0	
Input Capacitance					
V_{EB} = 0.5Vdc, I_C = 0, 100kHz ≤ f ≤ 1.0MHz		C_{ibo}		80	pF

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SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time V_{EB} = 5Vdc; I_C = 150mAdc; I_{B1} = 15mAdc	t_{on}		115	ηs
Turn-Off Time I_C = 150mAdc; I_{B1} = I_{B2} = 15mAdc	t_{off}		1150	ηs

SAFE OPERATING AREA

DC Tests

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

Test 1

V_{CE} = 10Vdc, I_C = 500mAdc	2N3498, 2N3499
V_{CE} = 16.67Vdc, I_C = 300mAdc	2N3500, 2N3501
V_{CE} = 10Vdc, I_C = 113mAdc	2N3501UB

Test 2

V_{CE} = 50Vdc, I_C = 100mAdc	All Types
V_{CE} = 50Vdc, I_C = 23mAdc	2N3501UB

Test 3

V_{CE} = 80Vdc, I_C = 40mAdc	All Types
V_{CE} = 80Vdc, I_C = 14mAdc	2N3501UB

Clamped Switching

T_A = +25°C

Test 1

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

(3) Pulse Test: Pulse Width = 300μs, Duty Cycle ≤ 2.0%