

**RADIATION HARDENED
 NPN LOW POWER SILICON TRANSISTOR**
Qualified per MIL-PRF-19500/368

DEVICES

2N3439	2N3440
2N3439L	2N3440L
2N3439UA	2N3440UA

LEVELS

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

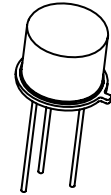
ABSOLUTE MAXIMUM RATINGS ($T_C = +25^\circ\text{C}$ unless otherwise noted)

Parameters / Test Conditions	Symbol	2N3439	2N3440	Unit
Collector-Emitter Voltage	V_{CEO}	350	250	Vdc
Collector-Base Voltage	V_{CBO}	450	300	Vdc
Emitter-Base Voltage	V_{EBO}	7.0		Vdc
Collector Current	I_C	1.0		A dc
Total Power Dissipation	P_T	@ $T_A = +25^\circ\text{C}$ ⁽¹⁾	0.8	W
UA		@ $T_C = +25^\circ\text{C}$ ⁽²⁾	5.0	
		@ $T_{SP} = +25^\circ\text{C}$ ⁽³⁾	2.0	
Operating & Storage Temperature Range	T_{op}, T_{stg}	-65 to +200		$^\circ\text{C}$

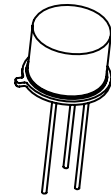
- 1) Derate linearly @ 4.57mW/ $^\circ\text{C}$ for $T_A > +25^\circ\text{C}$
- 2) Derate linearly @ 28.5mW/ $^\circ\text{C}$ for $T_C > +25^\circ\text{C}$
- 3) Derate linearly @ 14mW/ $^\circ\text{C}$ for $T_{SP} > +25^\circ\text{C}$

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

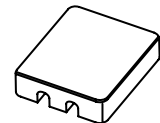
Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage $I_C = 10\text{mA dc}$ $R_{BB1} = 470\Omega; V_{BB1} = 6\text{V}$ $L = 25\text{mH (min)}; f = 30 - 60\text{Hz}$	$V_{(BR)CEO}$	2N3439 350	2N3440 250	Vdc
Collector-Emitter Cutoff Current $V_{CE} = 300\text{Vdc}$ $V_{CE} = 200\text{Vdc}$		I_{CEO}	2N3439 2.0	2N3440 2.0
Emitter-Base Cutoff Current $V_{EB} = 7.0\text{Vdc}$	I_{EBO}			10
Collector-Emitter Cutoff Current $V_{CE} = 450\text{Vdc}, V_{BE} = -1.5\text{Vdc}$ $V_{CE} = 300\text{Vdc}, V_{BE} = -1.5\text{Vdc}$	I_{CEX}	2N3439 5.0	2N3440 5.0	$\mu\text{A dc}$
Collector-Base Cutoff Current $V_{CB} = 360\text{Vdc}$ $V_{CB} = 250\text{Vdc}$ $V_{CB} = 450\text{Vdc}$ $V_{CB} = 300\text{Vdc}$		I_{CBO}	2N3439 2.0	2N3440 2.0
	2N3439 5.0		2N3440 5.0	
	2N3439 5.0		2N3440 5.0	
	2N3439 5.0		2N3440 5.0	



TO-5 *
2N3439L, 2N3440L



TO-39 * (TO-205AD)
2N3439, 2N3440



UA
2N3439UA, 2N3440UA

* See Appendix A for Package Outline

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ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise noted) (CONT.)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS ⁽³⁾				
Forward-Current Transfer Ratio $I_C = 20\text{mA}$, $V_{CE} = 10\text{Vdc}$ $I_C = 2.0\text{mA}$, $V_{CE} = 10\text{Vdc}$ $I_C = 0.2\text{mA}$, $V_{CE} = 10\text{Vdc}$	h_{FE}	40 30 10	160	
Collector-Emitter Saturation Voltage $I_C = 50\text{mA}$, $I_B = 4.0\text{mA}$	$V_{CE(sat)}$		0.5	Vdc
Base-Emitter Saturation Voltage $I_C = 50\text{mA}$, $I_B = 4.0\text{mA}$	$V_{BE(sat)}$		1.3	Vdc

DYNAMIC CHARACTERISTICS

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

SWITCHING CHARACTERISTICS

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

SAFE OPERATING AREA

DC Tests	
$T_C = +25^\circ\text{C}$, 1 Cycle, $t = 1.0\text{s}$	
Test 1	
$V_{CE} = 5.0\text{Vdc}$, $I_C = 1.0\text{A}$	Both Types
Test 2	
$V_{CE} = 350\text{Vdc}$, $I_C = 14\text{mA}$	2N3439
Test 3	
$V_{CE} = 250\text{Vdc}$, $I_C = 20\text{mA}$	2N3440

(3) Pulse Test: Pulse Width = $300\mu\text{s}$, Duty Cycle $\leq 2.0\%$