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Microsemi LAWRENCE

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TECHNICAL DATA SHEET

PNP POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/545

DEVICES

2N5151 **2N5153**
2N5151L **2N5153L**
2N5151U3 **2N5153U3**

LEVELS

JAN
JANTX
JANTXV
JANS

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

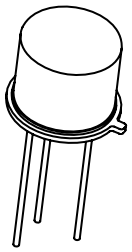
Parameters / Test Conditions	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	80	Vdc
Collector-Base Voltage	V_{CBO}	100	Vdc
Emitter-Base Voltage	V_{EBO}	5.5	Vdc
Collector Current	I_C	2.0	Adc
Total Power Dissipation 2N5151, 2N5153, L @ T_A = +25°C (1) 2N5151, 2N5153, L @ T_C = +25°C (2) 2N5151U3, 2N5153U3 @ T_A = +25°C (3) 2N5151U3, 2N5153U3 @ T_C = +25°C (4)	P_T	 1.0 10 1.16 100	W
Operating & Storage Junction Temperature Range	T_J , T_{stg}	-65 to +200	°C
Thermal Resistance, Junction-to Case	$R_{\theta JC}$	10 1.75 (U3)	°C/W

Note:

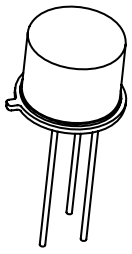
1) Derate linearly 5.7mW/°C for T_A > +25°
2) Derate linearly 66.7mW/°C for T_A > +25°
3) Derate linearly 6.63mW/°C for T_A > +25°
4) Derate linearly 571mW/°C for T_A > +25°

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

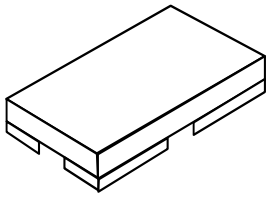
Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERTICS				
Collector-Emitter Breakdown Voltage I_C = 100mAdc, I_B = 0	$V_{(BR)CEO}$	80		Vdc
Emitter-Base Cutoff Current V_{EB} = 4.0Vdc, I_C = 0 V_{EB} = 5.5Vdc, I_C = 0	I_{EBO}		1.0 1.0	µAdc mAdc
Collector-Emitter Cutoff Current V_{CE} = 60Vdc, V_{BE} = 0 V_{CE} = 100Vdc, V_{BE} = 0	I_{CES}		1.0 1.0	µAdc mAdc
Collector-Base Cutoff Current V_{CE} = 40Vdc, I_B = 0	I_{CEO}		50	µAdc



TO-5
2N5151L, 2N5153L
(See Figure 1)



TO-39 (TO-205AD)
2N5151, 2N5153



U-3
2N5151U3, 2N5153U3

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ELECTRICAL CHARACTERISTICS

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
ON CHARACTERTICS					
Forward-Current Transfer Ratio					
I_C = 50mAdc, V_{CE} = 5Vdc	2N5151	h_{FE}	20		
	2N5153		50		
I_C = 2.5Adc, V_{CE} = 5Vdc	2N5151		30	90	
	2N5153		70	200	
I_C = 5Adc, V_{CE} = 5Vdc	2N5151		20		
	2N5153		40		
Collector-Emitter Saturation Voltage					
I_C = 2.5Adc, I_B = 250mAdc		$V_{CE(sat)}$		0.75	Vdc
I_C = 5.0Adc, I_B = 500mAdc				1.5	
Base-Emitter Voltage Non-Saturation					
I_C = 2.5Adc, V_{CE} = 5Vdc		V_{BE}		1.45	Vdc
Base-Emitter Saturation Voltage					
I_C = 2.5Adc, I_B = 250mAdc		$V_{BE(sat)}$		1.45	Vdc
I_C = 5.0Adc, I_B = 500mAdc				2.2	

DYNAMIC CHARACTERISTICS

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio					
I_C = 500mAdc, V_{CE} = 5Vdc, f = 10MHz	2N5151	$\|h_{fe}\|$	6		
	2N5153		7		
Common-Emitter Small-Signal Short-Circuit. Forward-Current Transfer Ratio					
I_C = 100mAdc, V_{CE} = 5Vdc, f = 1kHz	2N5151	h_{fe}	20		
	2N5153		50		
Output Capacitance					
V_{CB} = 10Vdc, I_E = 0, f = 1.0MHz		C_{obo}		250	pF

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time I_C = 5Adc, I_{B1} = 500mAdc I_{B2} = -500mAdc R_L = 6Ω $V_{BE(OFF)}$ = 3.7Vdc	t_{on}		0.5	µs
Turn-Off Time I_C = 5Adc, I_{B1} = 500mAdc I_{B2} = -500mAdc R_L = 6Ω $V_{BE(OFF)}$ = 3.7Vdc	t_{off}		1.5	µs

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SWITCHING CHARACTERISTICS (cont.)

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
Storage Time	I_C = 5Adc, I_{B1} = 500mAdc I_{B2} = -500mAdc	t_s		1.4	µs
Fall Time	R_L = 6Ω $V_{BE(OFF)}$ = 3.7Vdc	t_f		0.5	µs

SAFE OPERATING AREA

DC Tests

T_C = +25°C, 1 Cycle, t_P = 1.0s

Test 1

V_{CE} = 5.0Vdc, I_C = 2.0Adc

Test 2

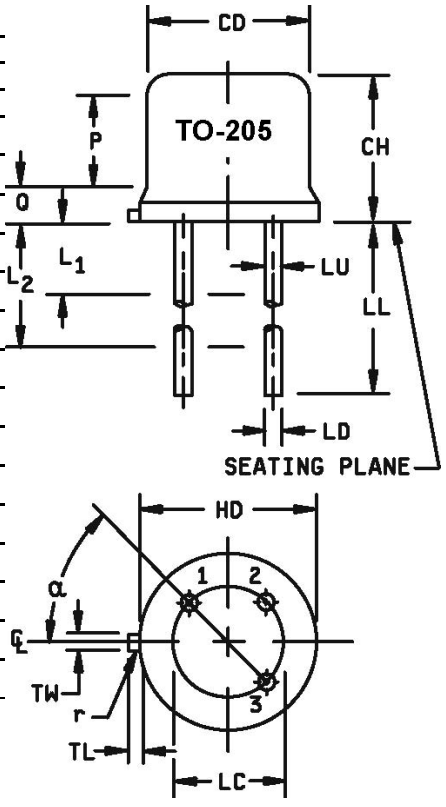
V_{CE} = 32Vdc, I_C = 310mAdc

Test 3

V_{CE} = 80Vdc, I_C = 14.5mAdc

FIGURE 1 (TO-5, TO-39)
PACKAGE DIMENSIONS

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
CD	.305	.335	7.75	8.51
CH	.240	.260	6.10	6.60
HD	.335	.370	8.51	9.40
LC	.200 TP		5.08 TP	
LD	.016	.021	0.41	0.53
LL	See notes 8, 9, 12, 13			
LU	.016	.019	0.41	0.48
L_1		.050		1.27
L_2	.250		6.35	
Q		.050		1.27
TL	.029	.045	0.74	1.14
TW	.028	.034	0.71	0.86
r		.010		0.25
α	45° TP		45° TP	
P	.100		2.54	



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TECHNICAL DATA SHEET

PNP POWER SILICON TRANSISTOR

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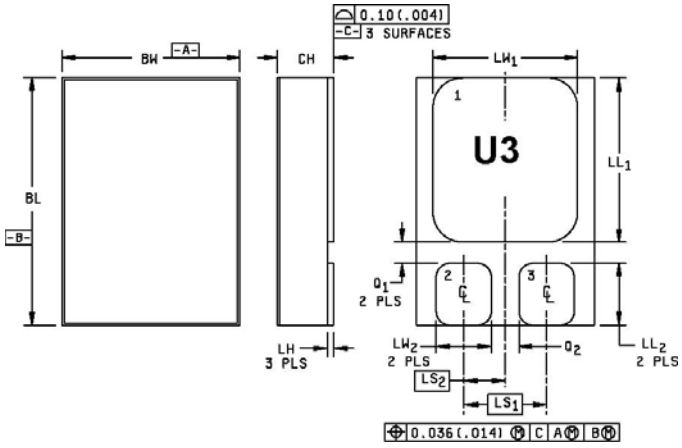
NOTES:

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 inch (0.28 mm).
4 TL measured from maximum HD.
5 Outline in this zone is not controlled.
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.
8 LU applied between L1 and L2. LD applies between L2 and LL minimum. Diameter is uncontrolled in L1 and beyond LL minimum.
9 All three leads.
10 The collector shall be electrically and mechanically connected to the case.
11 r (radius) applies to both inside corners of tab.
12 In accordance with ASME Y14.5M, diameters are equivalent to φx symbology.
13 For transistor types 2N5151 and 2N5153, LL is .5 inch (13 mm) minimum, and .75 inch (19 mm) maximum.
14 For transistor types 2N5151L and 2N5153L, LL is 1.5 inch (38 mm) minimum and 1.75 inch (44.4 mm) maximum.
15 Lead designation, depending on device type, shall be as follows: lead numbering; lead 1 = emitter, lead 2 = base, and lead 3 = collector.

FIGURE 2 (U3)
PACKAGE DIMMENSIONS

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.395	.405	10.04	10.28
BW	.291	.301	7.40	7.64
CH	.1085	.1205	2.76	3.06
LH	.010	.020	0.25	0.51
LL1	.220	.230	5.59	5.84
LL2	.115	.125	2.93	3.17
LS1	.150 BSC		3.81 BSC	
LS2	.075 BSC		1.91 BSC	
LW1	.281	.291	7.14	7.39
LW2	.090	.100	2.29	2.54
Q1	.030		0.762	
Q2	.030		0.762	



NOTES:

1 Dimensions are in inches.
2 Millimeters are given for general information only.
3 Terminal 1 - collector, terminal 2 - base, terminal 3 - emitter