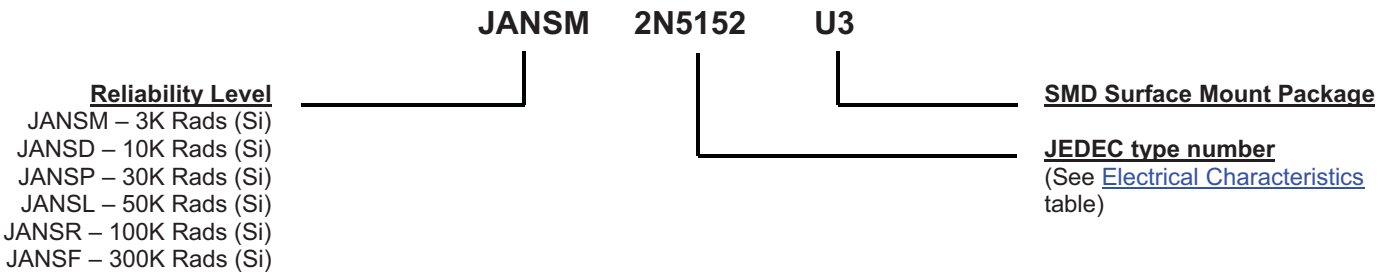
MECHANICAL and PACKAGING

- CASE: Ceramic and gold over nickel plated steel.
- TERMINALS: Gold over nickel plated tungsten/copper.
- MARKING: Part number, date code, A = anode.
- POLARITY: See schematic on last page.
- WEIGHT: 0.9 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 ºC unless otherwise noted.

OFF CHARACTERISTICS

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

ON CHARACTERISTICS

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
Forward-Current Transfer Ratio					
I_C = 50 mA, V_{CE} = 5 V	2N5152U3		20	--	
	2N5154U3		50	--	
I_C = 2.5 A, V_{CE} = 5 V	2N5152U3	h_{FE}	30	90	
	2N5154U3		70	200	
I_C = 5A, V_{CE} = 5V	2N5152U3		20	--	
	2N5154U3		40	--	
Collector-Emitter Saturation Voltage I_C = 2.5 A, I_B = 250 mA I_C = 5.0 A, I_B = 500 mA		$V_{CE(sat)}$		0.75 1.5	V
Base-Emitter Voltage Non-Saturation I_C = 2.5 A, V_{CE} = 5 V		V_{BE}		1.45	V
Base-Emitter Saturation Voltage I_C = 2.5 A, I_B = 250 mA I_C = 5.0 A, I_B = 500 mA		$V_{BE(sat)}$		1.45 2.2	V

DYNAMIC CHARACTERISTICS

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio I_C = 500 mA, V_{CE} = 5 V, f = 10 MHz	2N5152U3 2N5154U3	$\|h_{fe}\|$	6 7		
Small-signal short Circuit Forward-Current Transfer Ratio I_C = 100 mA, V_{CE} = 5 V, f = 1 KHz	2N5152U3 2N5154U3	h_{fe}	20 50		
Output Capacitance V_{CB} = 10 V, I_E = 0, f = 1.0 MHz		C_{obo}		250	pF

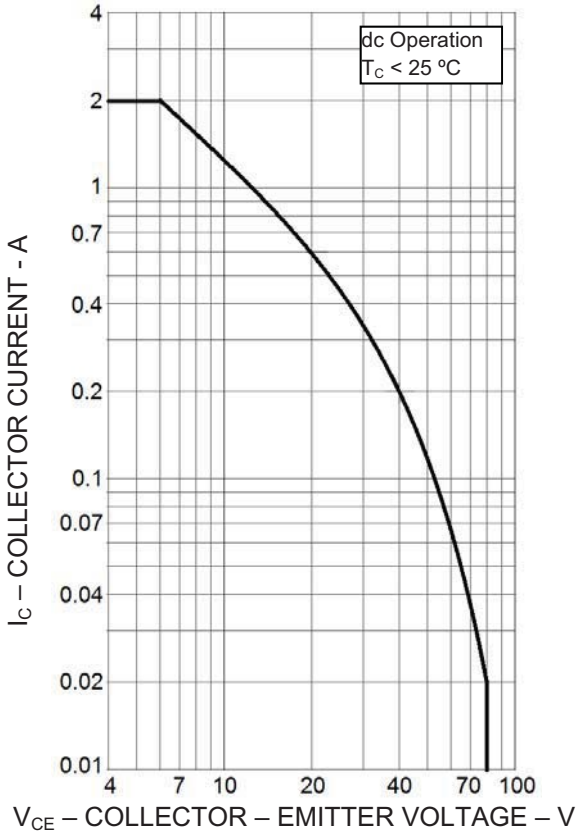
ELECTRICAL CHARACTERISTICS @ T_A = +25 °C unless otherwise noted. (continued)

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time I_C = 5 A, I_{B1} = 500 mA	t_{on}		0.5	µs
Turn-Off Time R_L = 6Ω	t_{off}		1.5	µs
Storage Time I_{B2} = -500 mA	t_S		1.4	µs
Fall Time $V_{BE(OFF)}$ = 3.7 V	t_f		0.5	µs

SAFE OPERATING AREA (See SOA graph below and MIL-STD-750, method 3053)

DC Tests
T_C = +25 °C, t_P = 1.0 s, 1 Cycle
Test 1
V_{CE} = 5.0 V, I_C = 2.0 A
Test 2
V_{CE} = 32 V, I_C = 310 mA
Test 3
V_{CE} = 80 V, I_C = 12.5 mA



Maximum Safe Operating Area

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

POST RADIATION ELECTRICAL CHARACTERISTICS

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
Collector to Emitter Cutoff Current V_{CE} = 40 V		I_{CEO}		100	µA
Emitter to Base Cutoff Current V_{EB} = 4 V		I_{EBO}		2.0	µA
Breakdown Voltage, Collector to Emitter I_C = 100 mA		$V_{(BR)CEO}$	80		V
Collector to Emitter Cutoff Current V_{CE} = 60 V		I_{CES}		2.0	µA
Emitter to Base Cutoff Current V_{EB} = 5.5 V		I_{EBO}		2.0	mA
Forward-Current Transfer Ratio (1) I_C = 50 mA, V_{CE} = 5 V	2N5152U3	$[h_{FE}]$	[10]		
	2N5154U3		[25]		
I_C = 2.5 A, V_{CE} = 5 V	2N5152U3		[15]	90	
	2N5154U3		[35]	200	
I_C = 5 A pulsed, V_{CE} = 5 V	2N5152U3		[10]		
	2N5154U3		[20]		
Base to Emitter voltage (non-saturated) V_{CE} = 5 V, I_C = 2.5 A, pulsed		V_{BE}		1.45	V
Collector-Emitter Saturation Voltage I_C = 2.5 mA, I_B = 250 mA, pulsed I_C = 500 mA, I_B = 500 mA, pulsed		$V_{CE(sat)}$		0.86 1.73	V
Base-Emitter Saturation Voltage I_C = 2.5 A, I_B = 250 mA, pulsed I_C = 5 A, I_B = 500 mA, pulsed		$V_{BE(sat)}$		1.67 2.53	V

(1) See method 1019 of MIL-STD-750 for how to determine $[h_{FE}]$ by first calculating the delta $(1/h_{FE})$ from the pre- and post-radiation h_{FE}. Notice the $[h_{FE}]$ is not the same as h_{FE} and cannot be measured directly. The $[h_{FE}]$ value can never exceed the pre-radiation minimum h_{FE} that it is based upon.

GRAPHS

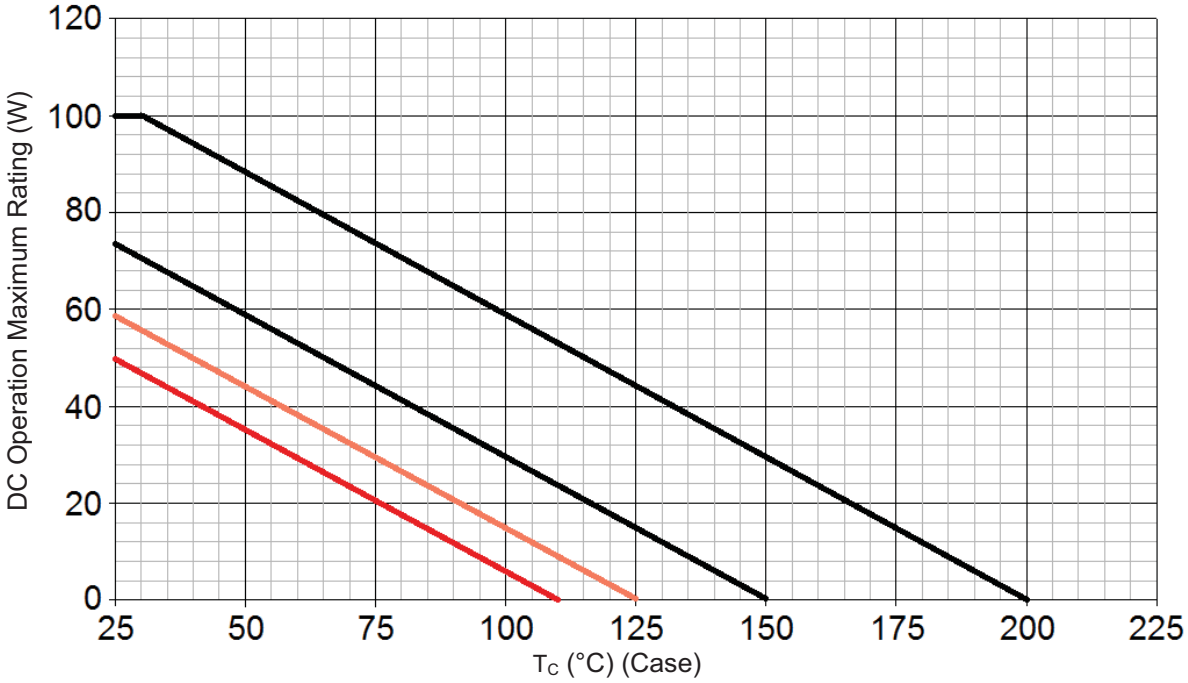


FIGURE 1
Temperature-Power Derating Curve

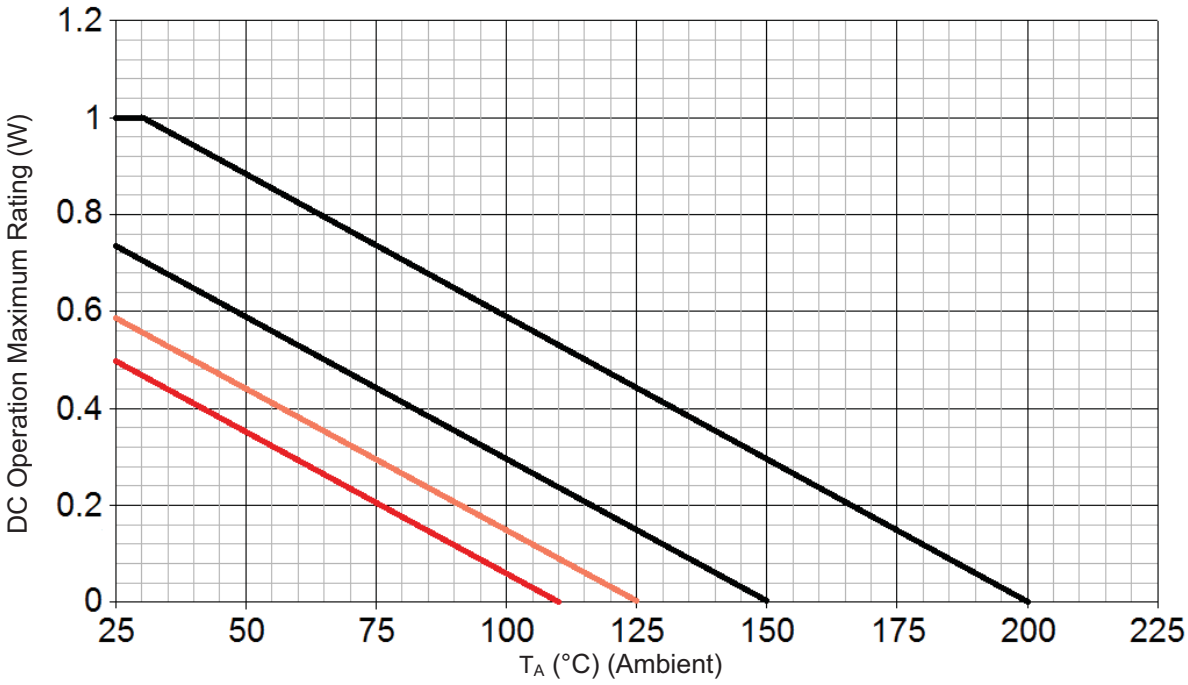


FIGURE 2
Temperature-Power Derating Curve

GRAPHS (continued)

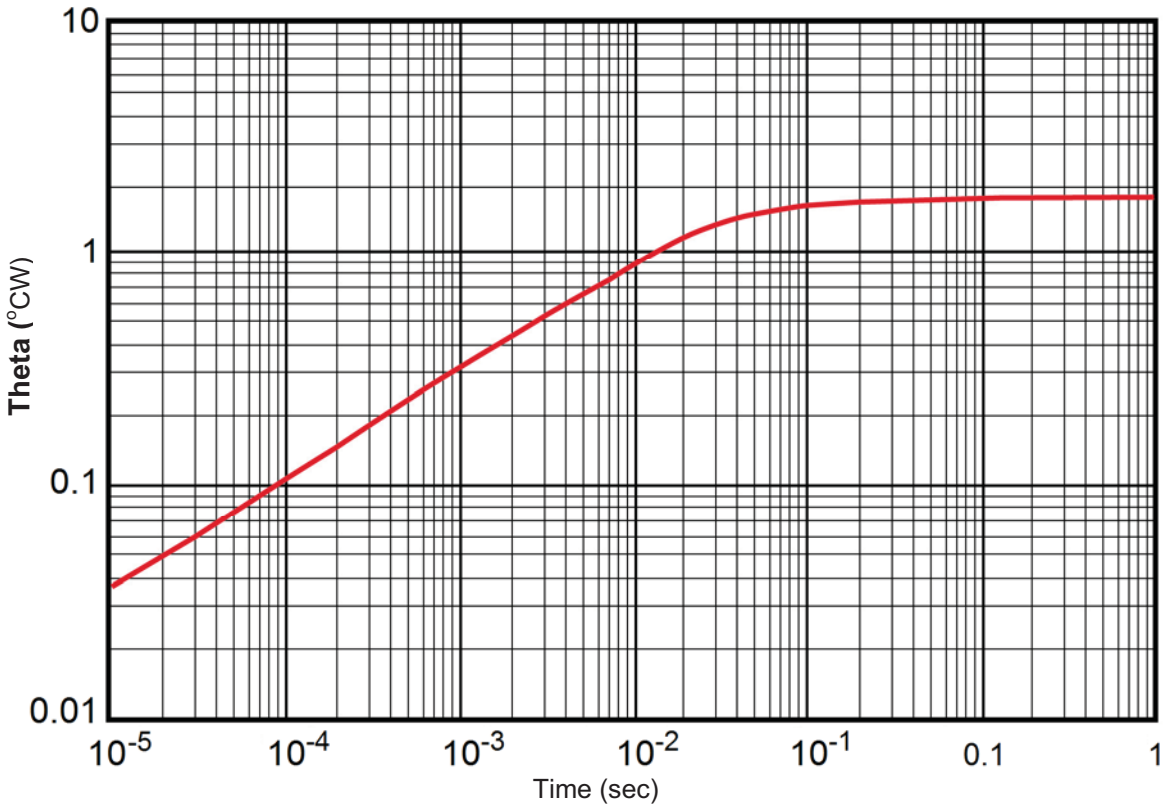
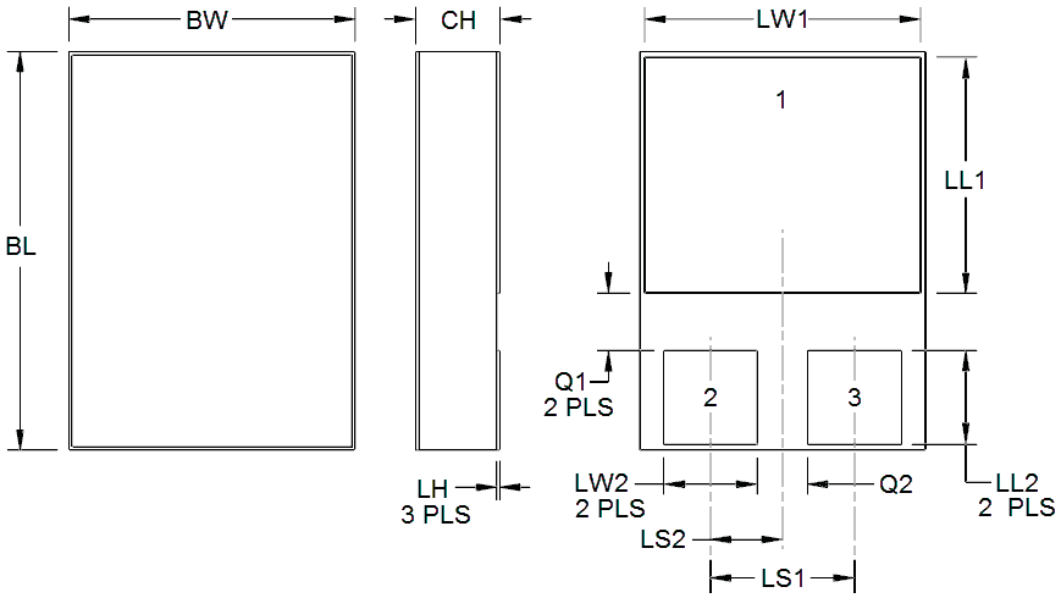
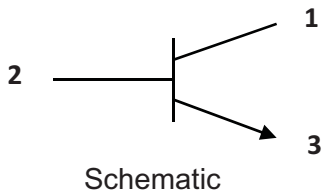


FIGURE 3
Maximum Thermal Impedance ($R_{\Theta JC}$)

PACKAGE DIMENSIONS



NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.



Schematic

Symbol	DIMENSIONS			
	INCH		MILLIMETERS	
	Min	Max	Min	Max
BL	.395	.405	10.03	10.29
BW	.291	.301	7.39	7.65
CH	.112	.124	2.84	3.15
LH	.010	.020	0.25	0.51
LL1	.220	.230	5.59	5.84
LL2	.115	.125	2.92	3.18
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		0.76	
Q2	.030		0.76	
Term 1	Collector			
Term 2	Base			
Term 3	Emitter			