

The documentation and process conversion measures necessary to comply with this document shall be completed by 12 March 2026.

INCH-POUND

MIL-PRF-19500/412G
w/AMENDMENT 2
12 November 2025
SUPERSEDING
MIL-PRF-19500/412G
w/AMENDMENT 1
27 November 2023

PERFORMANCE SPECIFICATION SHEET

TRANSISTOR, NPN, SILICON, POWER, THROUGH-HOLE MOUNT PACKAGE,
TYPES 2N3846 AND 2N3847, JAN, JANTX, JANTXV, AND JANS

This specification is approved for use by all Departments
and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of
this specification sheet and [MIL-PRF-19500](#).

1. SCOPE

1.1 Scope. This specification covers the performance requirements for NPN, silicon, power transistors. Four levels of product assurance (JAN, JANTX, JANTXV, and JANS) are provided for each encapsulated device.

1.2 Package outlines. The device package outlines are as follows: TO-63 in accordance with [figure 1](#), TO-254AA in accordance with [figure 2](#), and TO-257AA in accordance with [figure 3](#) for all encapsulated device types.

1.3 Maximum ratings.

Types	$P_T =$ $T_A = +25^\circ\text{C}$	$P_T =$ $T_C = +25^\circ\text{C}$ (1)	$R_{\theta JC}$ (2)	V_{EBO}	V_{CBO}	V_{CEO}	I_C	T_{STG} and T_J
	<u>W</u>	<u>W</u>	<u>$^\circ\text{C/W}$</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>A dc</u>	<u>$^\circ\text{C}$</u>
2N3846	4	150	1.0	10	300	200	20	-65 to +200
2N3846T1	4	150	1.0	10	300	200	20	-65 to +200
2N3846T3	4	125 (3)	1.3	10	300	200	20	-65 to +200
2N3847	4	150	1.0	10	400	300	20	-65 to +200
2N3847T1	4	150	1.0	10	400	300	20	-65 to +200
2N3847T3	4	125 (3)	1.3	10	400	300	20	-65 to +200

- (1) For derating, see [figures 4](#) and [5](#).
- (2) For thermal impedance curves, see [figures 6](#) and [7](#).
- (3) For TO-257 devices with typical mounting and small footprint, conservatively rated at 125 W and 1.3 $^\circ\text{C/W}$ only.

Comments, suggestions, or questions on this document should be addressed to DLA Weapons Support, ATTN: VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Semiconductor@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

AMSC N/A

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FSC 5961



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1.4 Primary electrical characteristics.

	h_{FE3} $V_{CE} = 3 \text{ V dc}$ $I_C = 10 \text{ A dc}$ (1)	$ h_{fe} $ $V_{CE} = 10 \text{ V dc}$ $I_C = 1 \text{ A dc}$ $f = 1 \text{ MHz}$	V_{BE} $V_{CE} = 3 \text{ V dc}$ $I_C = 10 \text{ A dc}$ (1)	$V_{CE(sat)}$ $I_B = 1.6 \text{ A dc}$ $I_C = 10 \text{ A dc}$ (1)	C_{obo} $V_{CB} = 10 \text{ V dc}$ $I_E = 0$ $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$
Min	12	10	<u>V dc</u>	<u>V dc</u>	<u>pF</u>
Max	60	35	1.2	0.75	750

(1) Pulsed (see 4.5.1).

1.5 Part or Identifying Number (PIN). The PIN is in accordance with [MIL-PRF-19500](#), and as specified herein. See 6.4 for PIN construction example and 6.5 for a list of available PINs.

1.5.1 JAN certification mark and quality level for encapsulated devices. The quality level designators for encapsulated devices that are applicable for this specification sheet from the lowest to the highest level are as follows: "JAN", "JANTX", "JANTXV", and "JANS".

1.5.2 Device type. The designation system for the device types of transistors covered by this specification sheet are as follows.

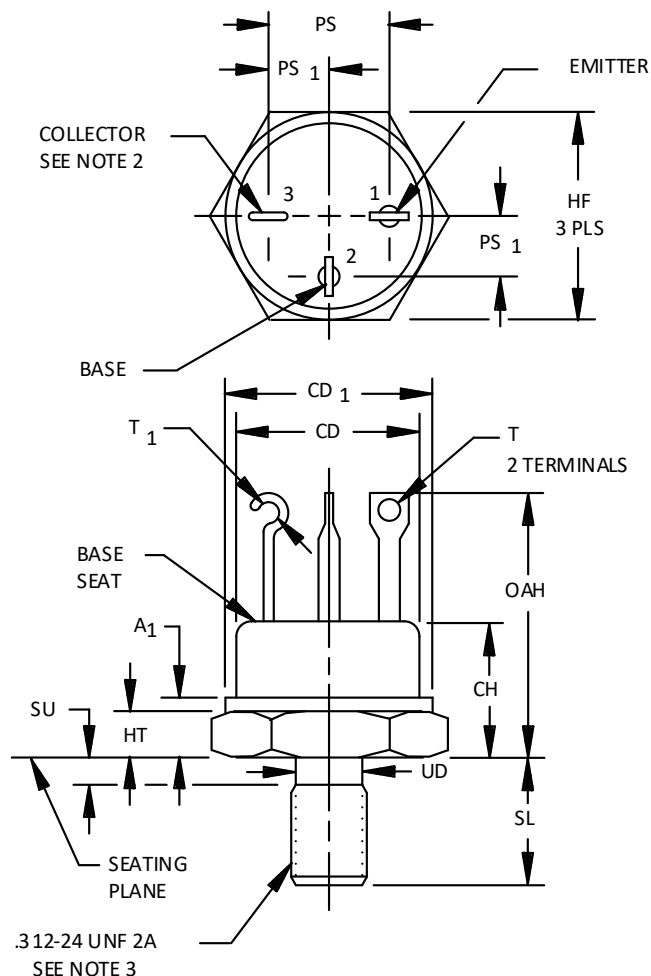
1.5.2.1 First number and first letter symbols. The transistors of this specification sheet use the first number and letter symbols "2N".

1.5.2.2 Second number symbols. The second number symbols for the transistors covered by this specification sheet are as follows: "3846", and "3847".

1.5.2.3 Suffix letters. No suffix letters are used on devices that are packaged in the TO-63 package of [figure 1](#). The suffix letters "T1" are used on devices that are packaged in the TO-254AA package of [figure 2](#). The suffix letters "T3" are used on devices packaged in the TO-257AA package of [figure 3](#).

1.5.3 Lead finish. The lead finishes applicable to this specification sheet are listed on [QPDSIS-19500](#).

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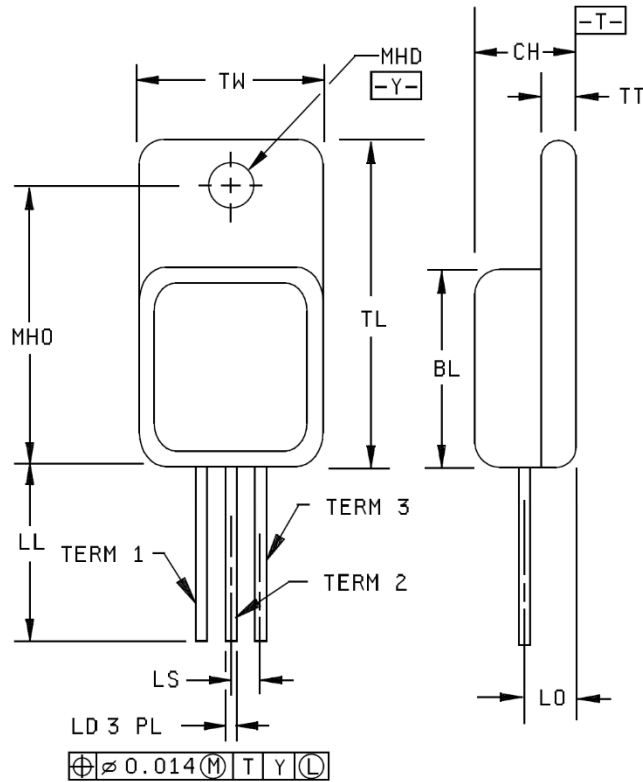
Ltr	Dimensions				Notes
	in	in	mm	mm	
	Min	Max	Min	Max	
A1		.300		7.62	
CD	.745 DIA	.775 DIA	18.92 DIA	19.69 DIA	
CD1	.775 DIA	.875 DIA	19.685 DIA	22.23 DIA	
CH	.480	.535	12.19	13.59	
HF	.855	.875	21.72	22.23	
HT	.090	.167	2.29	4.24	
OAH	.937	1.030	23.80	26.16	7
PS	.485	.515	12.32	13.08	4, 6
PS ₁	.240	.260	6.10	6.60	4, 6
SL	.460	.495	11.68	12.57	
SU		.105		2.67	8
T	.060 DIA	.105 DIA	1.52 DIA	2.67 DIA	
T ₁	.060 DIA	.105 DIA	1.52 DIA	2.67 DIA	2
UD	.278	.312	7.06	7.92	

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. The collector (hook) is electrically connected to the case. The other two terminals shall be electrically isolated from the case.
3. See FED-STD-H28A.
4. The orientation of the terminals in relation to the hex flats is not controlled.
5. The case temperature may be measured anywhere on the seating plane within .125 inch (3.18 mm) of the stud.
6. Terminal spacing measured at base seat only.
7. All three terminals.
8. Maximum unthreaded dimension.

FIGURE 1. Physical dimensions 2N3846 and 2N3847 (TO-63).

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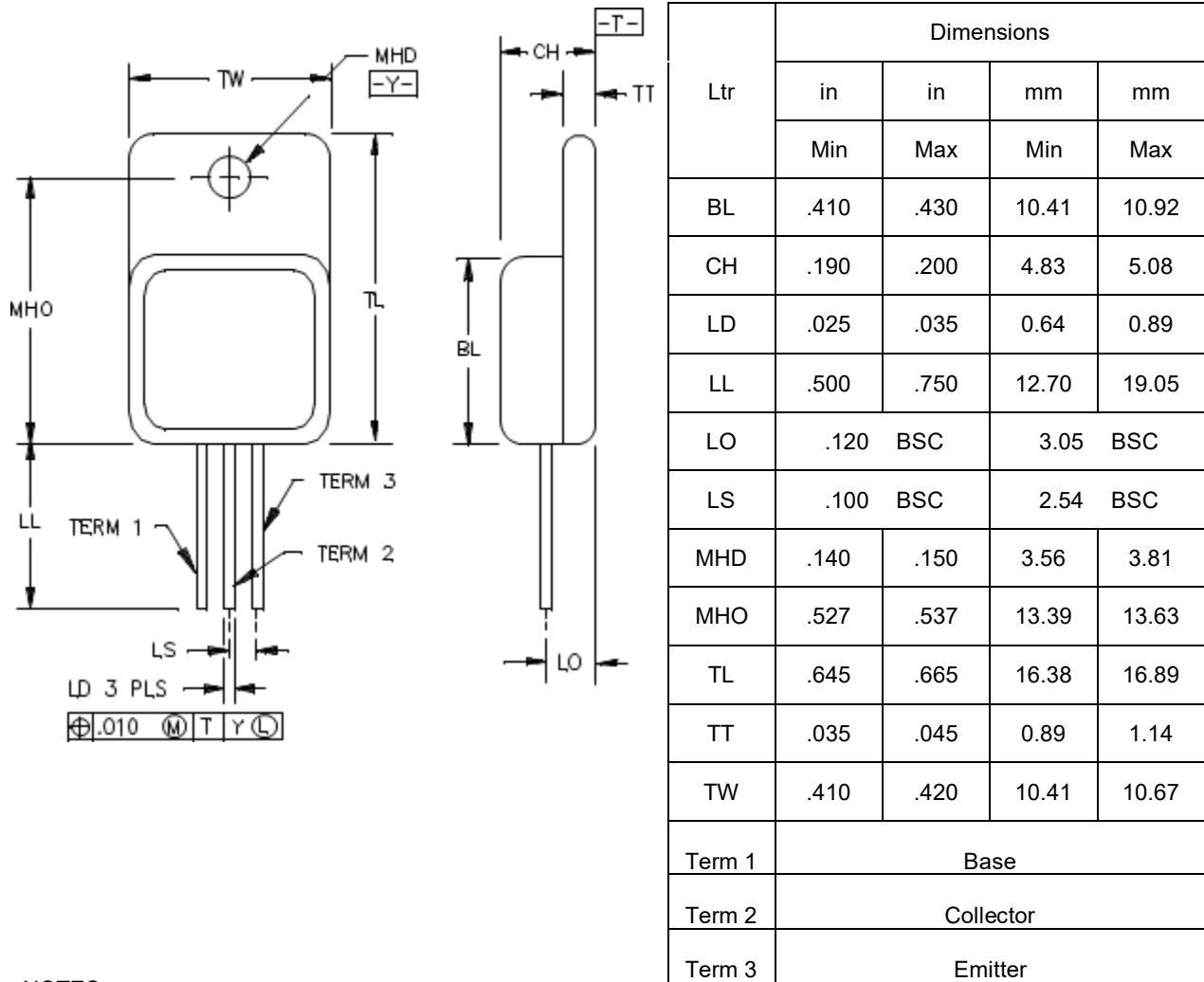


Ltr	Dimensions			
	in	in	mm	mm
	Min	Max	Min	Max
BL	.535	.545	13.59	13.84
CH	.249	.260	6.32	6.60
LD	.035	.045	0.89	1.14
LL	.510	.570	12.95	14.48
LO	.150	BSC	3.81	BSC
LS	.150	BSC	3.81	BSC
MHD	.139	.149	3.53	3.78
MHO	.665	.685	16.89	17.40
TL	.790	.800	20.07	20.32
TT	.040	.050	1.02	1.27
TW	.535	.545	13.59	13.84
Term 1	Base			
Term 2	Collector			
Term 3	Emitter			

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Methods used for electrical isolation of the terminals feedthroughs shall employ materials that contain a minimum of 90 percent AL_2O_3 (ceramic).
3. All terminals are isolated from case.

FIGURE 2. Dimensions and configuration for 2N3846T1 and 2N3847T1 (TO-254AA).



NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Methods used for electrical isolation of the terminals feedthroughs shall employ materials that contain a minimum of 90 percent AL_2O_3 (ceramic).
3. All terminals are isolated from case.

FIGURE 3. Dimensions and configuration for 2N3846T3 and 2N3847T3 (TO-257AA).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

[MIL-PRF-19500](#) - Semiconductor Devices, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

[MIL-STD-750](#) - Test Methods for Semiconductor Devices.

(Copies of these documents are available online at <https://quicksearch.dla.mil>).

2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General. The individual item requirements shall be as specified in [MIL-PRF-19500](#) and as modified herein.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturer's list ([QML-19500](#)) before contract award (see [4.2](#) and [6.3](#)).

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in [MIL-PRF-19500](#).

V_{CEX} - Collector cutoff voltage (dc) with specified circuit between base and emitter.

R_{ISO} - Resistance between device case and leads.

3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in [MIL-PRF-19500](#) and in [figure 1](#), [figure 2](#) (TO-254AA), and [figure 3](#) (TO-257AA) herein.

3.4.1 Lead finish. Lead finish shall be solderable in accordance with [MIL-PRF-19500](#), [MIL-STD-750](#), and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see [6.2](#)).

3.5 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in [1.3](#), [1.4](#), and [table I](#) herein.

3.6 Electrical test requirements. The electrical test requirements shall be [table I](#) as specified herein.

3.7 Marking. Marking shall be in accordance with [MIL-PRF-19500](#).

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3.8 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Screening (see 4.3).
- c. Conformance inspection (see 4.4 and table I and table II).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500 and as specified herein.

4.2.1 Group E qualification. Group E inspection shall be performed for qualification or re-qualification only. In case qualification was awarded to a prior revision of the specification sheet that did not request the performance of table II tests, the tests specified in table II herein that were not performed in the prior revision shall be performed on the first inspection lot of this revision to maintain qualification.

4.3 Screening (JANS, JANTX, and JANTXV levels only). Screening shall be in accordance with table E-IV of MIL-PRF-19500, and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen	Measurements for JANS level	Measurements for JANTX and JANTXV level
(1) 3c	Thermal impedance (see 4.3.2).	Thermal impedance (see 4.3.2).
9	ICES and hFE3 of table I shall be measured and the data recorded.	Not applicable
11	ICES and hFE3 of table I shall be retested and the data recorded. $\Delta I_{CES} = 100$ percent or 2 μA , whichever is greater. $\Delta h_{FE3} = \pm 20$ percent.	ICES and hFE3 of table I shall be measured and the data recorded.
12	See 4.3.1.	See 4.3.1.
13	Subgroups 2 of table I herein; ICES and hFE3 of table I shall be retested and the data recorded. $\Delta I_{CES} = 100$ percent or 2 μA , whichever is greater. $\Delta h_{FE3} = \pm 20$ percent.	Subgroups 2 of table I herein; ICES and hFE3 of table I shall be retested and the data recorded. $\Delta I_{CES} = 100$ percent or 2 μA , whichever is greater. $\Delta h_{FE3} = \pm 20$ percent.
17	For TO-254AA packages; Method 1081 of MIL-STD-750 (see 4.3.3), Endpoints: Subgroup 2 of table I herein.	For TO-254AA packages; Method 1081 of MIL-STD-750 (see 4.3.3), Endpoints: Subgroup 2 of table I herein.

- (1) Shall be performed anytime after temperature cycling, screen 3a; JANTX and JANTXV levels do not need to be repeated in screening requirements.

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4.3.1 Power burn-in conditions. $V_{CB} = 10$ to 30 V dc, power shall be applied to the device to achieve a junction temperature, $T_J = +175^\circ\text{C}$ minimum.

4.3.2 Thermal impedance. The thermal impedance measurements shall be performed in accordance with method 3131 of MIL-STD-750 using the guidelines in that method for determining I_M , I_H , t_H , t_{MD} (and V_C where appropriate). The thermal impedance limit used in screen 3c of 4.3 herein and subgroup 2 of table I shall comply with the thermal impedance graph in figures 6 and 7 (less than or equal to the curve value at the same t_H time) and shall be less than the process determined statistical maximum limit as outlined in method 3131.

4.3.3 Dielectric withstanding voltage.

- a. Magnitude of test voltage..... 900V dc.
- b. Duration of application of test voltage..... 15 seconds (min).
- c. Points of application of test voltage..... All leads to case (bunch connection).
- d. Method of connection..... Mechanical.
- e. Kilovolt-ampere rating of high voltage source 1,200 V/1.0 mA (min).
- f. Maximum leakage current..... 1.0 mA.
- g. Voltage ramp up time..... 500 V/second.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500, and as specified herein. If alternate screening is being performed in accordance with MIL-PRF-19500, a sample of screened devices shall be submitted to and pass the requirements of table I, subgroup 1 and 2 inspection only (table E-VIB, group B, subgroup 1 is not required to be performed again if group B has already been satisfied in accordance with 4.4.2).

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500, and table I herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E-VIA (JANS) and table E-VIB (JAN, JANTX, and JANTXV) of MIL-PRF-19500 and herein.

4.4.2.1 Quality level JANS, table E-VIA of MIL-PRF-19500.

Subgroup	Method	Condition
B2	2026	For 2N3846 and 2N3847, depth $\geq .10$ inch (2.54 mm), $t = 10 \pm 1$ second.
B4	1037	$V_{CB} \geq 20$ V dc.
B5	1027	$V_{CB} \geq 20$ V dc, adjust P_T and T_A to achieve $T_J = +175^\circ\text{C} \pm 12.5^\circ\text{C}$; marking legibility requirements shall not apply; $T_A = +100^\circ\text{C}$ max.

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4.4.2.2 Quality levels JAN, JANTX and JANTXV, table E-VIB of [MIL-PRF-19500](#).

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B1	2026	For 2N3846 and 2N3847, depth $\geq$.10 inch (2.54 mm), $t = 10 \pm 1$ second.
B3	1037	For solder die attach: 2,000 cycles, $V_{CB} \geq 20$ V dc.
B3	1026	For eutectic die attach: $V_{CB} \geq 20$ V dc, adjust P_T or T_A to achieve $T_J = 175^\circ\text{C min.}$, $T_A \leq +35^\circ\text{C}$.
B6	1032	$T_A = +200^\circ\text{C}$.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E-VII of [MIL-PRF-19500](#) and as follows.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	1056	Test condition B.
C2	2036	Test condition A, for 2N3846 and 2N3847, weight = 7 lbs ± 5 ounces, $t = 15$ seconds, tubulated leads only; for 2N3846T1, 2N3846T3, 2N3847T1, and 2N3847T3, weight = 4.5 kg, $t = 10$ seconds.
C2	2036	Test condition D2, 2N3846 and 2N3847 only, torque = 30 inch-pounds, $t = 30$ seconds.
C2	2036	Test condition D1, 2N3846 and 2N3847 only, torque = 6 inch-ounces, $t = 15$ seconds.
C5	3131	See 4.3.2 , $R_{\theta JC} = 1.0^\circ\text{C/W}$ for 2N3846, 2N3846T1, 2N3847, and 2N3847T1, $R_{\theta JC} = 1.3^\circ\text{C/W}$ for 2N3846T3 and 2N3847T3.
C6	1037	For solder die attach: 6,000 cycles, $V_{CB} \geq 20$ V dc.
C6	1026	For eutectic die attach: $V_{CB} \geq 20$ V dc, adjust P_T or T_A to achieve $T_J = +175^\circ\text{C minimum}$, $T_A \leq +35^\circ\text{C}$.

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table E-IX of [MIL-PRF-19500](#) and as specified herein.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of [MIL-STD-750](#).

4.5.2 Burnout by pulsing. This test shall be conducted in a circuit capable of supplying the specified pulse conditions to the transistor under test. Good engineering practices shall be utilized to eliminate inductive effects in the circuitry and power supply. Rise and fall times of the pulse shall be less than 10 percent of the specified t_p . Non-inductive monitoring techniques shall be utilized and the value of any monitoring resistor shall be less than $V_{CC} / (20 I_c)$.

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TABLE I. Group A inspection.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits	Limits	Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical inspection	2071					
<u>Subgroup 2</u>						
Thermal impedance <u>2/</u>	3131	See 4.3.2	$Z_{\theta JX}$			°C/W
Collector to emitter breakdown voltage 2N3846, 2N3846T1, 2N3846T3 2N3847, 2N3847T1, 2N3847T3	3011	Bias condition D; $I_C = 200$ mA dc; $I_B = 0$; pulsed (see 4.5.1)	$V_{(BR)CEO}$	200		V dc
				300		V dc
Collector to emitter cutoff current 2N3846, 2N3846T1, 2N3846T3 2N3847, 2N3847T1, 2N3847T3	3041	Bias condition C, $V_{BE} = 0$	I_{CES}			
		$V_{CE} = 300$ V dc			10	μA dc
		$V_{CE} = 400$ V dc			10	μA dc
Collector to emitter cutoff current 2N3846, 2N3846T1, 2N3846T3 2N3847, 2N3847T1, 2N3847T3	3041	Bias condition D, $I_B = 0$.	I_{CEO}			
		$V_{CE} = 200$ V dc;			5	mA dc
		$V_{CE} = 300$ V dc			5	mA dc
Emitter to base cutoff current	3061	Bias condition D, $V_{EB} = 10$ V dc, $I_C = 0$.	I_{EBO}		250	μA dc
Forward-current transfer ratio	3076	Pulsed (see 4.5.1), $V_{CE} = 3$ V dc; $I_C = 1$ A dc	h_{FE1}	70		
Forward-current transfer ratio	3076	Pulsed (see 4.5.1), $V_{CE} = 3$ V dc; $I_C = 5$ A dc	h_{FE2}	40	240	
Forward-current transfer ratio	3076	Pulsed (see 4.5.1), $V_{CE} = 3$ V dc; $I_C = 10$ A dc	h_{FE3}	12	60	
Base to emitter voltage	3066	Test condition B, pulsed (see 4.5.1), $V_{CE} = 3$ V dc; $I_C = 10$ A dc	V_{BE}		1.20	V dc
Base to emitter voltage (saturated)	3066	Test condition A, pulsed (see 4.5.1), $I_B = 1.6$ A, $I_C = 10$ A dc	$V_{BE(sat)}$		1.30	V dc

See footnote at end of table.

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TABLE I. Group A inspection - Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits	Limits	Unit
	Method	Conditions		Min	Max	
<u>Subgroup 2</u> - Continued						
Collector to emitter voltage (saturated)	3071	Pulsed (see 4.5.1), $I_B = 1.6$ A, $I_C = 10$ A dc	$V_{CE(sat)}$		0.75	V dc
<u>Subgroup 3</u>						
High temperature operation:		$T_A = +150^\circ\text{C}$				
Collector to emitter cutoff current	3041	Bias condition C; $V_{BE} = 0$	I_{CES}			
2N3846, 2N3846T1, 2N3846T3		$V_{CE} = 300$ V dc			10	mA dc
2N3847, 2N3847T1, 2N3847T3		$V_{CE} = 400$ V dc			10	mA dc
Low temperature operation:		$T_A = -55^\circ\text{C}$				
Forward-current transfer ratio	3076	Pulsed (see 4.5.1), $V_{CE} = 3$ V dc; $I_C = 10$ A dc	h_{FE4}	10		
<u>Subgroup 4</u>						
Magnitude of common-emitter small-signal short circuit forward-current transfer ratio	3306	$V_{CE} = 10$ V dc, $f = 1$ MHz, $I_C = 1.0$ A dc	$ h_{fe} $	10	35	
Small-signal short circuit forward-current transfer ratio	3206	$V_{CE} = 10$ V dc, $f = 1$ kHz, $I_C = 5.0$ A dc	h_{fe}	50	250	
Open circuit output capacitance	3236	$V_{CB} = 10$ V dc, $I_E = 0$, $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	C_{obo}		750	pF
Turn-on time		$I_C = 10$ A dc, $I_{B(1)} = 2$ A dc, $I_{B(2)} = -2$ A dc $V_{BE(off)} \approx -7.5$ V dc, $R_L = 15$ ohms, see figure 8	t_{on}		4	μs
Turn-off time		$I_C = 10$ A dc, $I_{B(1)} = 2$ A dc, $I_{B(2)} = 2$ A dc $V_{BE(off)} \approx -7.5$ V dc, $R_L = 15$ ohms see figure 8	t_{off}		7	μs

See footnote at end of table.

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TABLE I. Group A inspection - Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits	Limits	Unit
	Method	Conditions		Min	Max	
<u>Subgroup 5</u>						
Burnout by pulsing (safe operating area - dc)	3005 (3051)	$T_C = +100^\circ\text{C}$; pre-pulse condition: figure 9, $V_{CE} = 0$; $I_C = 0$ pulse condition: (see 4.5.2)				
Test 1		$V_{CE} = 7.5 \text{ V dc}$, $I_C = 20 \text{ A dc}$, $t_p = 1.0 \text{ s}$, 1 cycle				
Test 2		$V_{CE} = 200 \text{ V dc}$, $I_C = 100 \text{ mA dc}$, $t_p = 1.0 \text{ s}$, 1 cycle				
Test 3		$V_{CE} = 58 \text{ V dc}$, $I_C = 1.0 \text{ A dc}$ $t_p = 1.0 \text{ s}$, 1 cycle				
Burnout by pulsing (safe operating area - dc) 2N3847, 2N3847T1, 2N3847T3 only	3005 (3051)	$T_C = +100^\circ\text{C}$; pre-pulse condition: see figure 9, $V_{CE} = 300 \text{ V dc}$, $I_C = 20 \text{ mA dc}$, $t_p = 1.0 \text{ s}$, 1 cycle, (T1 and T3 may require heatsink).				
Unclamped inductive sweep		$T_C = +100^\circ\text{C}$, $I_B = 2 \text{ A dc}$, $I_C = 20 \text{ A dc}$, see figure 10				
Clamped inductive sweep		$T_C = +100^\circ\text{C}$, $I_B = 2 \text{ A dc}$, $I_C = 20 \text{ A dc}$, see figure 11				
End-point electrical measurements		See table I, subgroup 2 herein				
<u>Subgroups 6 and 7</u>						
Not applicable						

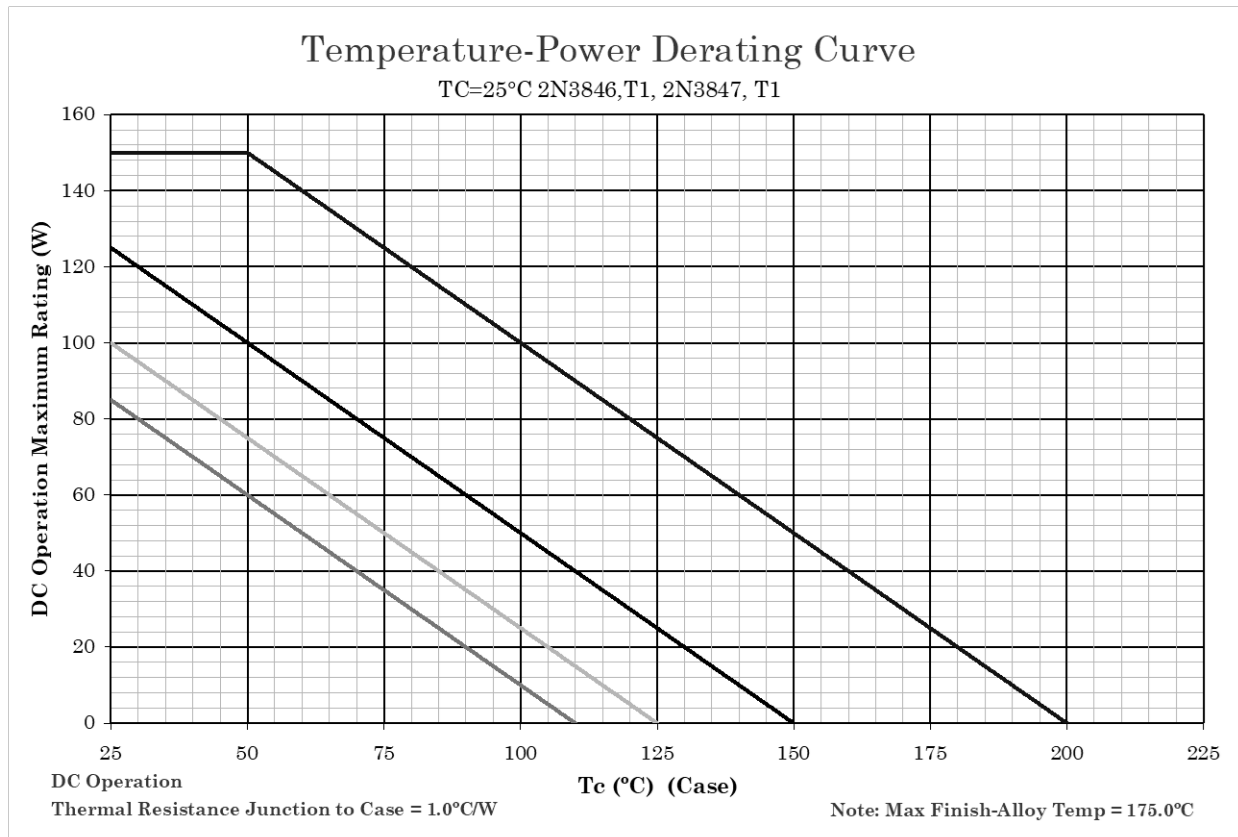
1/ For sampling plan, see MIL-PRF-19500.

2/ For end-point measurements, this test is required for the following subgroups:
Group B, subgroups 3, 4, and 5 (JANS).
Group B, subgroups 2 and 3 (JAN, JANTX, and JANTXV).
Group C, subgroup 2 and 6.
Group E, subgroup 1.

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TABLE II. Group E inspection (all quality levels) - for qualification and re-qualification only.

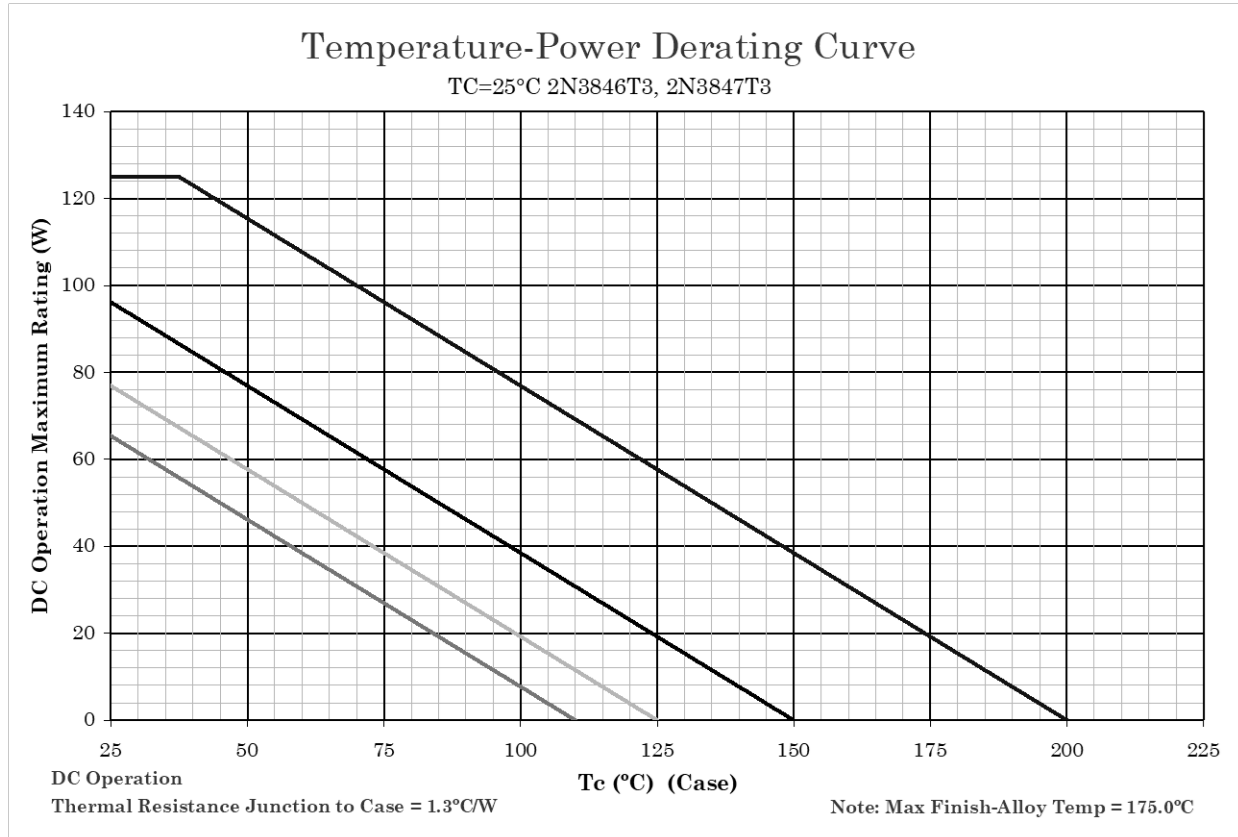
Inspection		MIL-STD-750	Qualification
	Method	Conditions	
Subgroup 1			45 devices, c = 0
Thermal shock glass strain	1056	0°C to +100°C, 100 cycles	
Hermetic seal	1071	Fine and gross leak.	
Electrical measurements		See table I , subgroup 2 herein.	
<u>Subgroup 2</u>			45 devices, c = 0
Steady-state dc blocking life	1039 or 1048	1,000 hours	
Electrical measurements		See table I , subgroup 2 herein.	
<u>Subgroup 4</u>			Sample size N/A
Thermal impedance curves		See MIL-PRF-19500 .	
<u>Subgroup 5</u>			3 devices, c = 0
Barometric pressure	1001	Pressure = 8.0 mm Hg time = 60 seconds; normal mounting	
<u>Subgroup 8</u>			45 devices, c = 0
Reverse stability	1033	Condition A for devices $\geq$ 400 V, Condition B for devices < 400 V.	



NOTES:

1. All devices are capable of operating at $\leq T_J$ specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum T_J allowed.
2. Derate design curve constrained by the maximum junction temperature ($T_J \leq +200^\circ\text{C}$) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at $T_J \leq +150^\circ\text{C}$ where the maximum temperature of electrical test is performed.
4. Derate design curves chosen at $T_J \leq +125^\circ\text{C}$ and $+110^\circ\text{C}$ to show power rating where most users want to limit T_J in their application.

FIGURE 4. Temperature-power derating curve.

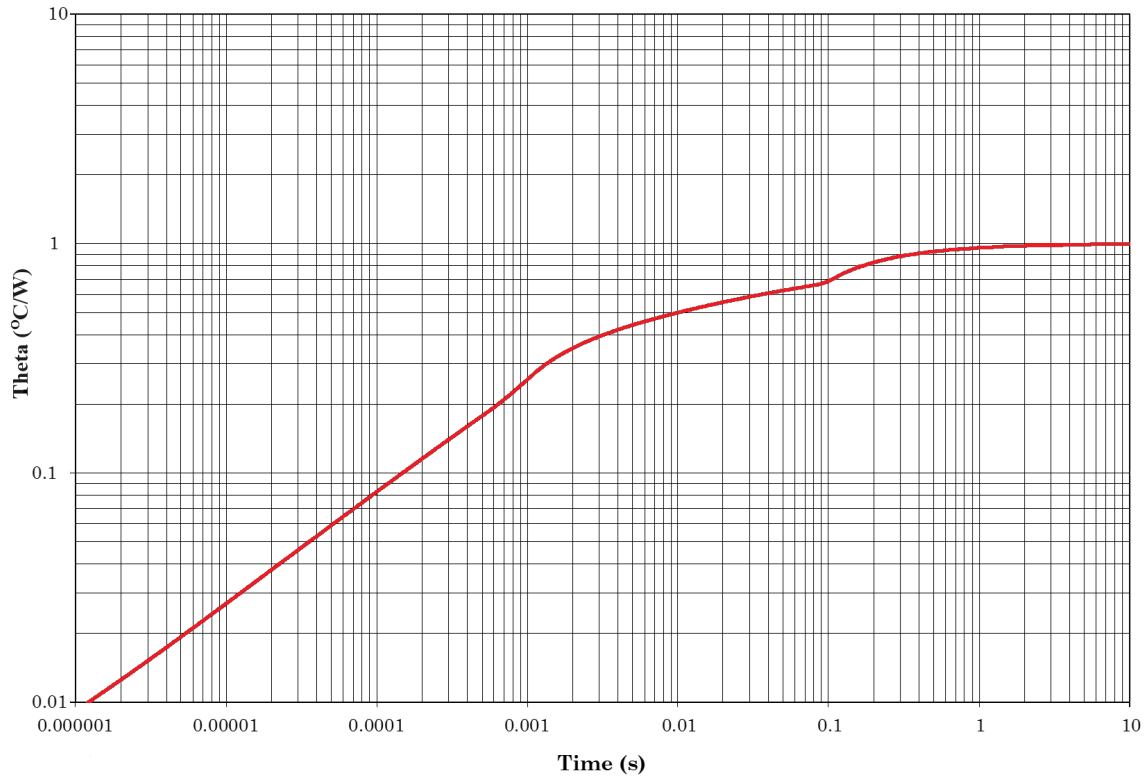


NOTES:

1. All devices are capable of operating at $\leq T_J$ specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum T_J allowed.
2. Derate design curve constrained by the maximum junction temperature ($T_J \leq +200^\circ\text{C}$) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at $T_J \leq +150^\circ\text{C}$ where the maximum temperature of electrical test is performed.
4. Derate design curves chosen at $T_J \leq +125^\circ\text{C}$ and $+110^\circ\text{C}$ to show power rating where most users want to limit T_J in their application.

FIGURE 5. Temperature-power derating curve.

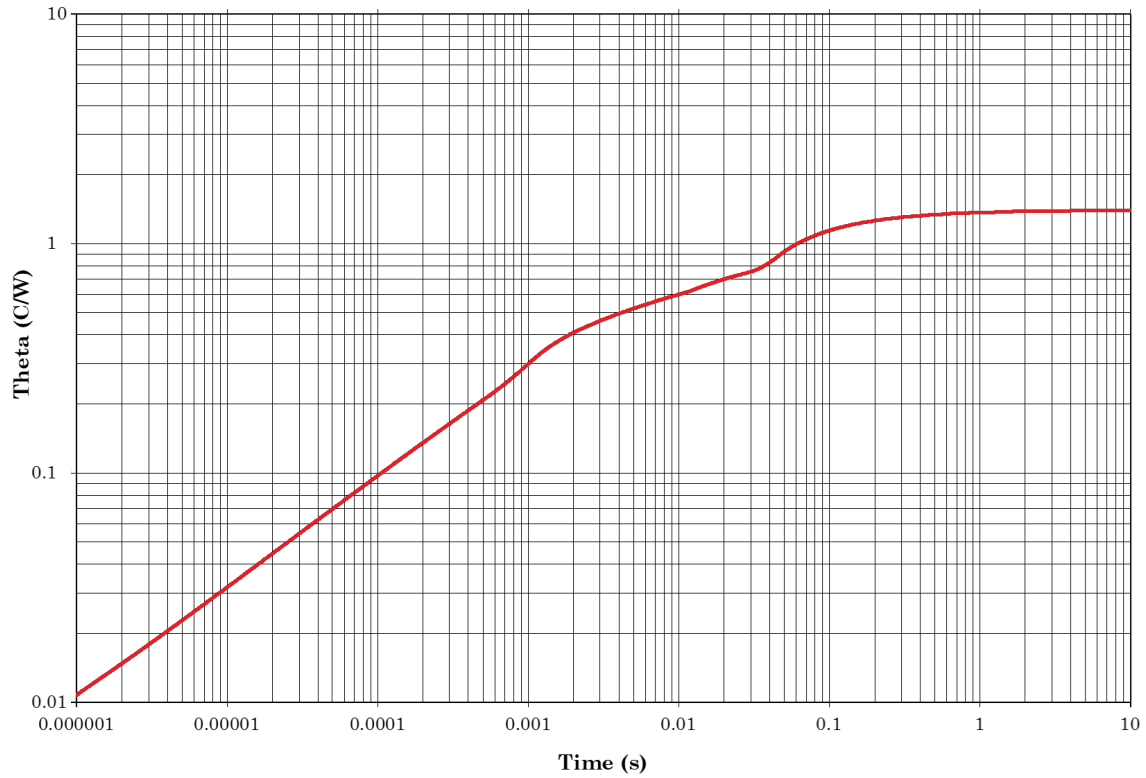
Maximum Thermal Impedance



$T_C = +25^{\circ}\text{C}$. Thermal resistance = 1.0 $^{\circ}\text{C/W}$.

FIGURE 6. Thermal impedance graph ($R_{\theta JC}$) for 2N3846, 2N3847, 2N3846T1 and 2N3847T1.

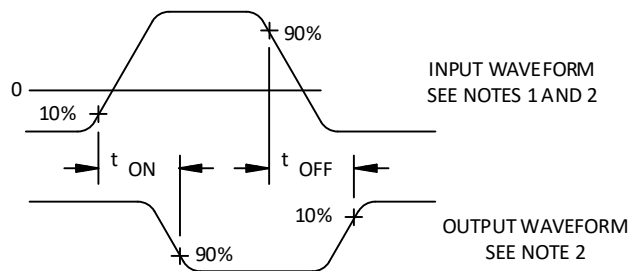
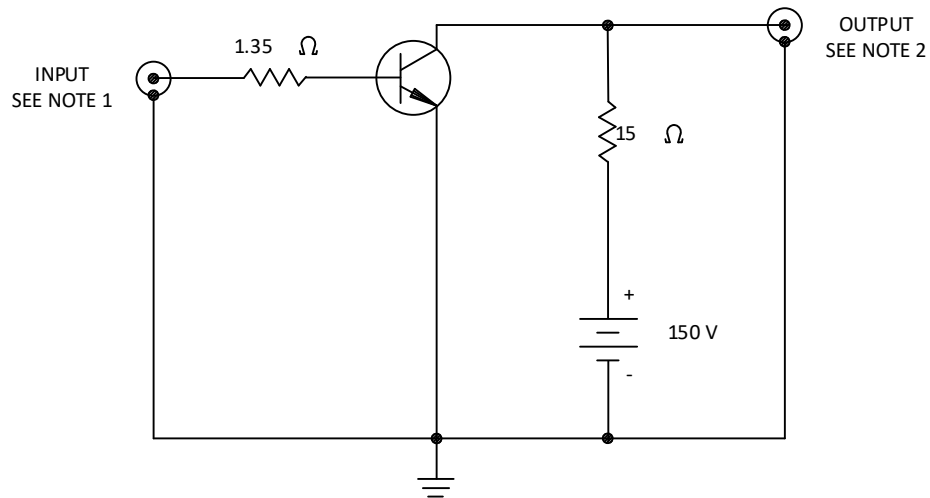
Maximum Thermal Impedance



$R_{\theta JC} = 1.3^{\circ}\text{C/W}$ Caution: Maximum finish temperature for solder alloys = $+175^{\circ}\text{C}$.

FIGURE 7. Thermal impedance graph ($R_{\theta JC}$) for 2N3846T3 and 2N3847T3.

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NOTES:

1. The input waveform has the following characteristics: $t_r \leq 100$ ns, $t_f \leq 100$ ns, $PW = 20$ μ s, duty cycle ≤ 0.2 percent.
2. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 5$ ns, $R_{in} \geq 1$ M Ω , $C_{in} \leq 5$ pF.
3. Resistors must be noninductive types.

FIGURE 8. Switching time test circuit.

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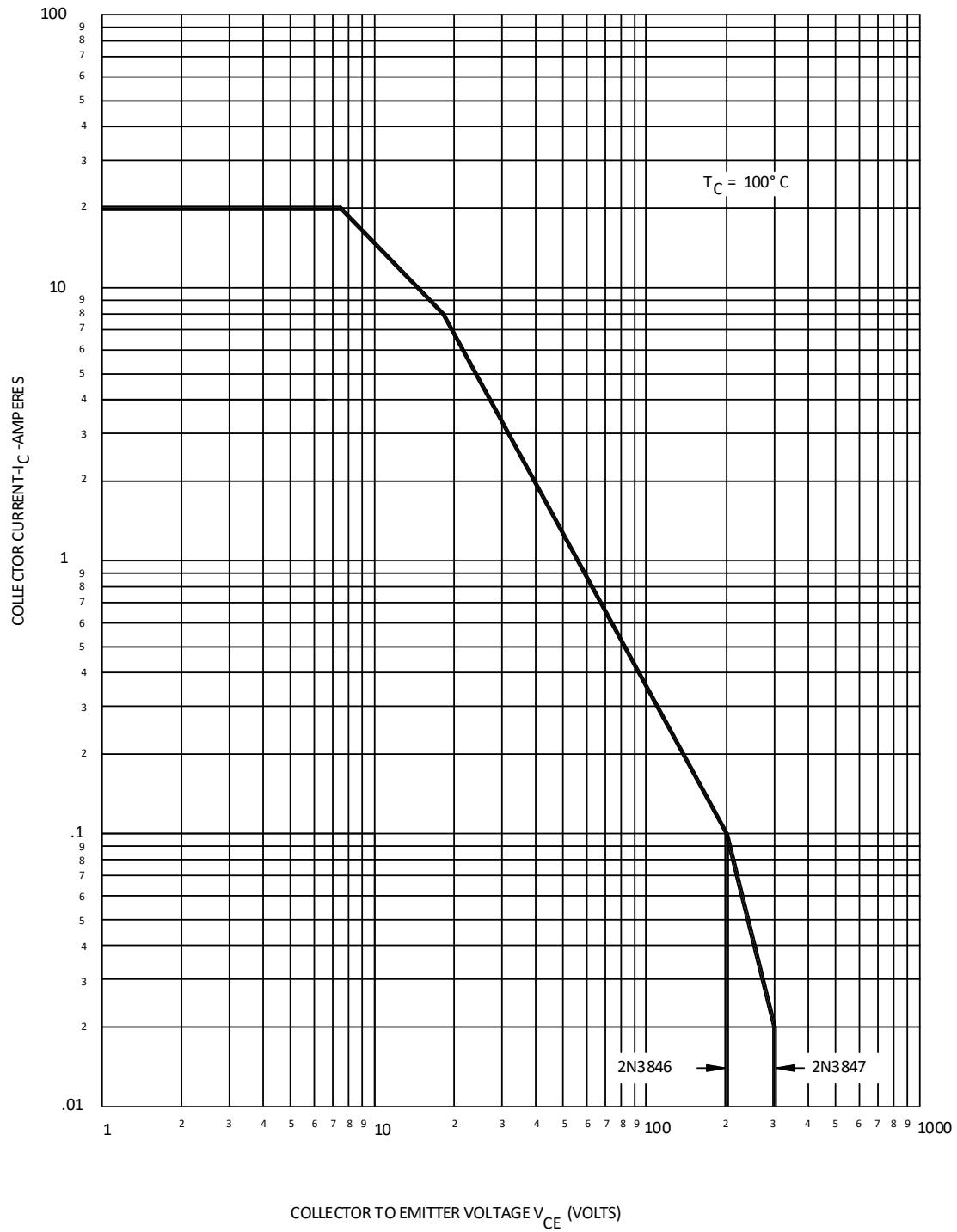
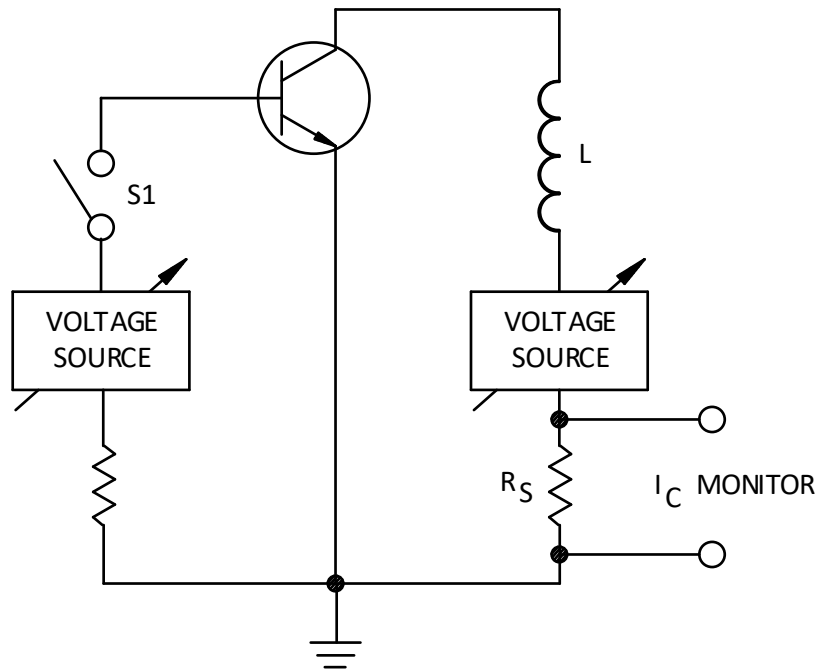


FIGURE 9. Rated safe operating region.



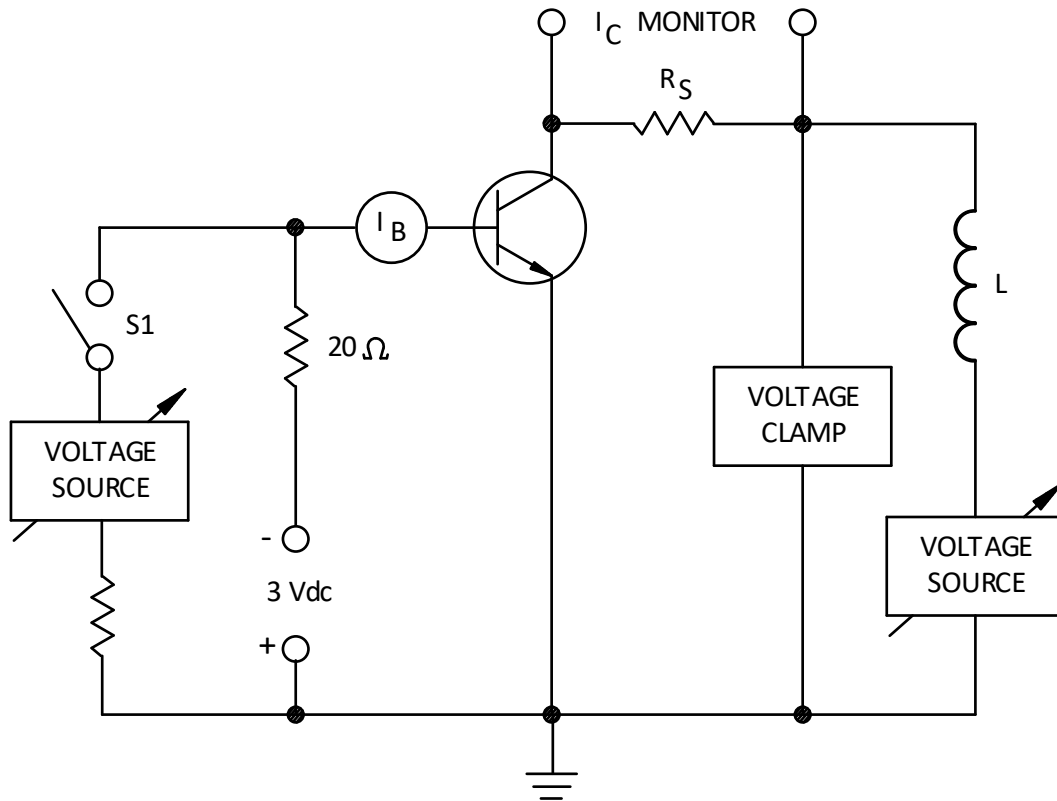
PROCEDURE:

1. With switch S1 closed, set the specified conditions.
2. Open S1.
3. Perform specified end-point tests.

NOTES:

1. $L = 1.0 \text{ mH}$.
2. $R_S \leq 1.0 \text{ ohm}$ (noninductive).

FIGURE 10. Unclamped inductive sweep test circuit diagram.



PROCEDURE:

1. With switch S1 closed, set the specified conditions.
2. Open S1.
3. Perform specified end-point tests.

NOTES:

1. $L = 1.0$ mH.
2. $R_S \leq 1.0$ ohm (noninductive).
3. Voltage clamp = 2N3846, 2N3846T1, 2N3846T3 = 300 V dc.
2N3847, 2N3847T1, 2N3847T3 = 400 V dc.

FIGURE 11. Clamped inductive sweep test circuit diagram.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory. The notes specified in MIL-PRF-19500 are applicable to this specification.)

6.1 Intended use. Semiconductors conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

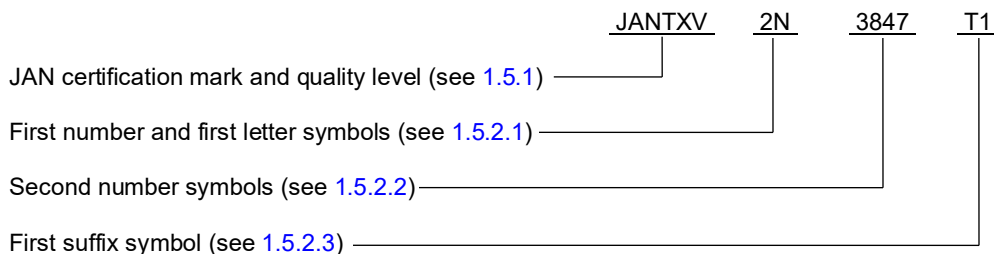
6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Packaging requirements (see 5.1).
- c. Lead finish (see 3.4.1).
- d. The complete PIN, see 1.5 and 6.5.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML-19500) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DLA Weapons Support, ATTN: VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail vqe.chief@dla.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <https://assist.dla.mil>.

6.4 PIN construction example.

6.4.1 Encapsulated devices The PINs for encapsulated devices are constructed using the following form.



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6.5 List of PINs. The following is a list of possible PINs available on this specification sheet.

PINs for types 2N3846	PINs for types 2N3847
JAN2N3846	JAN2N3847
JAN2N3846T1	JAN2N3847T1
JAN2N3846T3	JAN2N3847T3
JANTX2N3846	JANTX2N3847
JANTX2N3846T1	JANTX2N3847T1
JANTX2N3846T3	JANTX2N3847T3
JANTXV2N3846	JANTXV2N3847
JANTXV2N3846T1	JANTX2N3847T1
JANTXV2N3846T3	JANTX2N3847T3
JANS2N3846	JANS2N3847
JANS2N3846T1	JANS2N3847T1
JANS2N3846T3	JANS2N3847T3

6.6 Request for new types and configurations. Requests for new device types or configurations for inclusions in this specification sheet should be submitted to: DLA Weapons Support, ATTN: VAC, Post Office Box 3990, Columbus, OH 43218-3990 or by electronic mail at Semiconductor@dla.mil.

6.7 Amendment notations. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:
Army – CR
Navy – SH
Air Force – 85
NASA – NA
DLA – CC

Preparing activity:
DLA – CC

(Project 5961–2025–105)

Review activity:
Air Force – 19

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