ENGINEERING PRACTICES STUDY

TITLE: SLASH SHEET FORMAT FOR SMALL JUNCTION DEVICES

Project number: 5961-2012-117

10 January 2014

STUDY PROJECT (SEE ATTACHMENT 1)

FINAL REPORT

Study Conducted by DLA LAND AND MARITIME

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I. OBJECTIVES: An engineering practice study was conducted to review MIL-PRF-19500 small junction device specification sheets. The purpose of this study was to obtain input from the military services, manufacturers, and user communities to standardize the screening and conformance inspection requirements across these small junction specification sheets.

II. BACKGROUND: MIL-PRF-19500 specification sheets covering small junction devices currently do not share the same screening and conformance inspection requirements. **Attachment 1** compares the existing screening, group B, and group C inspections. Highlighting has been added to show differences between the specification sheets, and direct links to the specification sheets are provided on the left of the table for review.

Recent comments received by DLA Land and Maritime have indicated that MIL-PRF-19500/317 is the specification sheet that has the best format to use as a model for the other specification sheets in the group, if the addition of a voltage range for group testing is added.

Recommended changes throughout the table include:

-Screening should not specify TJ requirements since this will require all of the devices to be put in an oven.
-Screening requirements should be by power level (for example 100 percent PD).
-Requirements for the voltage ranges should provide some flexibility; 5-15V proposed.
-If PD is set to 100%, it should not also be listed as Adjustable.

III. RESULTS: The comments submitted to DLA Land and Maritime have been reviewed and indicate that the proposed recommendations should be used as the basis for the proposed changes in the applicable specification sheets. Attachment 2 incorporates those proposed recommendations.

IV. CONCLUSIONS: Based on the comments received we will request data to support the revised burn-in and life tests and initiate projects on the listed small junction specification sheets using the proposed recommendations.

V. RECOMMENDATIONS: DLA Land and Maritime proposes that all the small junction specification sheets be updated based on the recommended changes (see **Attachment 2).** In addition, it is recommended that further evaluation be done by the manufacturers, military, and industry during individual specification sheet review periods to confirm the proposed changes are applicable to varying device types in this group of small junction device specification sheets.

Attachment 1: Existing small junction devices burn-in/Life test format.

Specification sheet	Screening	Group B		Group C
		JANS	JANTX	
253	VCB = 10-30 V dc; P_D = 75% T_J = +135°C minimum	VCB = 10 V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)
301	V_{CB} = 5 - 15 V dc, P_T = 100%	VCB = 10 V dc; PD 100% 1,000hrs 150C (Tj) Adjust T_A	VCB = 10 V dc; PD = 100% 1,000hrs 150C (Tj) Adjust T_A or PD	VCB = 10 V dc; PD = 100% 1,000hrs 150C (Tj) Adjust T_A
313	VCB = 10-30 V dc; PD = 75% TJ = +135°C minimum	VCB = 10 V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)
317 Proposed format.	VCB = 5-15 V dc; PD = 100%	VCB = ~~12~~ 5-15 V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A	VCB = 5-15 V dc; PD = 100% 1,000hrs 150C (Tj) Adjust T_A	VCB = 5-15 V dc; PD = 100% 1,000hrs 150C (Tj) Adjust T_A
323	VCB = 10-30 V dc; PD = 100%	VCB = 10 V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)
336	VCB = 10-30 V dc; PD = 75% TJ = +135°C minimum	VCB = 10 V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)
343	VCB = 15 V dc; PD = 100%	VCB = 10 V dc; PD 100% 1,000hrs 150C (Tj) Adjust T_A	VCB = 10 V dc PD 100% 1,000hrs 150C (Tj)	VCB = 10 V dc PD 100% 1,000hrs 150C (Tj)
354	VCB = 10-30 V dc; PD = 75% TJ = +135°C minimum	VCB = 10 V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)
355	VCB = 10-30 V dc; PD = 75% TJ = +135°C minimum	VCB = 10 V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)
376	VCB = 10-30 V dc; PD = 75% TJ = +135°C minimum	VCB = 10 V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)
398	VCB = 10-30 V dc; PD = 75% TJ = +135°C minimum	VCB = 10 V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10-30 V dc PD 75% 1,000hrs 150C (Tj)	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)
399	VCB = 10 V dc; PD = 75% TJ = +135°C minimum	VCB = 10 V dc; PD ≥ 75% 1,000hrs 150C (Tj) Adjust T_A	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj) Adjust T_A	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj) Adjust T_A

Specification sheet	Screening	Group B		Group C
		JANS	JANTX	
426	VCB = 10-20 V dc; PD = 100% 	VCB = 10 V dc; PD 100% 1,000hrs 150C (Tj) Adjust T_A	VCB = 10 V dc; PD = 100% 1,000hrs 150C (Tj) Adjust T_A	VCB = 10 V dc; PD = 100% 6,000 cycles 150C (Tj) Adjust T_A
453	VCB = 10-30 V dc; PD = 75% TJ = +135°C minimum	VCB = 10 V dc; PD 75% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10-30 V dc PD 75% 340hrs 150C (Tj)	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj)
511	VCB = 10 V dc; PD = 100% 	VCB = 10 V dc; PD 100% 1,000hrs 150C (Tj) Adjust T_A	VCB = 10 V dc PD 75% 1,000hrs 150C (Tj) Adjust T_A	VCB = 10 V dc PD 100% 1,000hrs 150C (Tj) Adjust T_A
522	VCB = 15 V dc; PD = 100% 	 Not Applicable 	VCB = 15 V dc; 150C (Tj) Adjust P_D	VCB = 15 V dc; 150C (Tj) Adjust P_D

Attachment 2: Proposed small junction devices burn-in/Life test format.

Specification sheet	Screening	Group B		Group C
		JANS	JANTX	
253 2N930	VCB = 10-30 V dc; PD = ~~75%~~ 100% ~~TJ = +135°C minimum~~	VCB = 10-30V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A ~~or PD~~	VCB = 10-30V dc; PD ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = 10 -30V dc PD ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A
301 2N918	VCB = 5 - 15 V dc, PT = 100%	VCB = ~~10 V dc~~; 5 - 15 V dc PD 100% 1,000hrs 150C (Tj) Adjust T_A	VCB = ~~10 V dc~~; 5 - 15 V dc PD = 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A ~~or PD~~	VCB = ~~10 V dc~~; 5 - 15 V dc PD = 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A
313 2N2432	VCB = 10-30 V dc; PD = ~~75%~~ 100% ~~TJ = +135°C minimum~~	VCB = 10-30V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A ~~or PD~~	VCB = 10-30V dc ~~PD 75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = 10-30V dc ~~PD 75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A
317 2N2369A Proposed format.	VCB = 5-15 V dc; PD = 100%	VCB = ~~12~~ 5-15 V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A	VCB = 5-15 V dc; PD = 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = 5-15 V dc; PD = 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A
323 2N3251A	VCB = 10-30 V dc; PD = 100%	VCB = 10-30V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A ~~or P_D~~	VCB = 10-30V dc; PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = 10-30V dc; PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A
336 2N3810/11	VCB = 10-30 V dc; PD = 100%	VCB = 10-30V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10-30V dc; PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A or P_D	VCB = 10 V dc PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A or P_D
343 2N2857	VCB = 5-15 V dc; PD = 100%	VCB = 5-15 V dc; PD 100% 1,000hrs 150C (Tj) Adjust T_A	VCB = 5-15 V dc; PD 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = 5-15 V dc; PD 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A
354 2N2605	VCB = 10-30 V dc; PD = ~~75%~~ 100% ~~TJ = +135°C minimum~~	VCB = 10-30V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A ~~or P_D~~	VCB = 10-30V dc; PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = 10-30V dc; PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A
355 2N2920	VCB = 10-30 V dc; PD = 100% ~~TJ = +135°C minimum~~	VCB = 10-30V dc; PD 100% 96/216hrs 275/225C (Tj) Adjust T_A or P_D	VCB = 10-30V dc; PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust P_D or T_A	VCB = 10-30V dc; PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust P_D or T_A
376 2N2484	VCB = 10-30 V dc; PD = ~~75%~~ 100% ~~TJ = +135°C minimum~~	VCB = 10-30V dc PD 100% 96/216hrs 275/225C (Tj) Adjust T_A ~~or P_D~~	VCB = 10-30V dc PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = 10-30V dc PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A

Specification sheet	Screening	Group B		Group C
		JANS	JANTX	
398 2N3866A	VCB = 10-30 V dc; PD = ~~75%~~ 100% ~~TJ = +135°C minimum~~	VCB = 10-30V dc PD 100% 96/216hrs 275/225C (Tj) Adjust T_A ~~or P_D~~	VCB = 10-30 V dc PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = 10 V dc PD = ~~75%~~ 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A
399 2N3960	VCB = 10 5-12 V dc; PD = ~~75%~~ 100% ~~TJ = +135°C minimum~~	VCB = ~~10~~ 5-12 V dc; ~~PD ≥ 75%~~ PD=100% 1,000hrs 150C (Tj) Adjust T_A	VCB = ~~10~~ 5-12 V dc ~~PD 75%~~ PD=100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = ~~10~~ 5-12 V dc ~~PD 75%~~ PD=100 1,000hrs 150C (Tj) or 340hrs Adjust T_A
426 2N4957	VCB = ~~10-20~~ 10-30 V dc; PD = 100%	VCB = 10-30V dc PD 100% 1,000hrs 150C (Tj) Adjust T_A	VCB = 10-30V dc PD = 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = 10-30V dc PD = 100% ~~6,000 cycles~~ 1000hrs or 340hrs 150C (Tj) Adjust T_A
453 2N5109	VCB = 10-30 V dc; PD = ~~75%~~ 100% ~~TJ = +135°C minimum~~	VCB = 10-30V dc; ~~PD 75%~~ PD=100% 96/216hrs 275/225C (Tj) Adjust T_A ~~or P_D~~	VCB = 10-30 V dc ~~PD 75%~~ PD=100% 1,000 hrs 150C (Tj) or 340hrs Adjust T_A	VCB = 10 -30V dc ~~PD 75%~~ PD=100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A
511 2N4261	VCB = ~~10~~ 5-15 V dc; PD = 100%	VCB = ~~10~~ 5-15 V dc PD 100% 1,000hrs 150C (Tj) Adjust T_A	VCB = ~~10~~ 5-15 V dc ~~PD 75%~~ PD=100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A	VCB = ~~10~~ 5-15 V dc PD 100% 1,000hrs 150C (Tj) or 340hrs Adjust T_A
522 2N6603	VCB = 5-15 V dc;		VCB = 5-15 V dc;	VCB = 5-15 V dc;
	PD = 100%	Not Applicable	PD = 100% 1000hrs or 340hrs	PD = 100% 1000hrs or 340hrs
			150C (Tj)	150C (Tj)
			~~Adjust P_D~~ Adjust T_A	~~Adjust P_D~~ Adjust T_A