Alternate Shock Pulse Width Study PIND Test Results NASA MSFC Preliminary Data Review

Benny Damron, Jacobs Space Exploration Group, NASA Marshall Space Flight Center

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Agenda

1. PIND Anomaly Sample Package Test Status
2. Future plans

PIND Anomaly Sample Package Test Status

- PIND testing at MSFC recently completed.
- Data is being compiled for analysis.

First Group of Sample Package PIND Test Anomalies PIND Test Results

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NASA MSFC Standard Shock Pulse Width PIND “Dynamic” Mode the Test Results

Table 2. Test Facility PIND detection results for standard shock pulse width (~40 uS)

Test Facility NASA MSFC Standard PIND Test Results

PIND Equipment Manufacturer ____B&W_____ PIND Equipment Model number ___BW-LPD-DAQ4000_ S/N_____6004_____

Device Package Type & Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Comments
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	Group 1
PKG TYPE - 121 PGA	135	40	1000	1	X	X	X	X	
PKG TYPE - 121 PGA	135	40	1000	2	X	X	X		
PKG TYPE - 121 PGA	143	40	1000	1				?	suspect fail
PKG TYPE - 121 PGA	143	40	1000	2	X	X			
PKG TYPE - 8 PIN CERDIP	8	40	1000	1	X	X	X	X	
PKG TYPE - 8 PIN CERDIP	8	40	1000	2	X	X	X	X	
PKG TYPE - 8 PIN CERDIP	91	40	1000	1	X	X	X	X	
PKG TYPE - 8 PIN CERDIP	91	40	1000	2	X	X	X	X	
PKG TYPE - 8 PIN SIDE BR	241	40	1000	1	X	X	X	X	
PKG TYPE - 8 PIN SIDE BR	241	40	1000	2	X	X	X	X	
PKG TYPE - 8 PIN SIDE BR	247	40	1000	1	X	X	X	X	
PKG TYPE - 8 PIN SIDE BR	247	40	1000	2	X	X	X	X	
PKG TYPE- 20 PIN LCC	5	40	1000	1	X	X	X	X	
PKG TYPE- 20 PIN LCC	5	40	1000	2	X	X	X	X	
PKG TYPE- 20 PIN LCC	6	40	1000	1	X	X	X	X	
PKG TYPE- 20 PIN LCC	6	40	1000	2	X	X			
PKG TYPE - 32 PIN PGA	201	40	1000	1	X	X	X	X	
PKG TYPE - 32 PIN PGA	201	40	1000	2	X	X	X	X	
PKG TYPE - 32 PIN CQFP	11	40	1000	1	X	X	X	X	
PKG TYPE - 32 PIN CQFP	11	40	1000	2	X	X	X	X	

NASA MSFC Standard Shock Pulse Width PIND “Dynamic” Mode the Test Results

Table 2. Test Facility PIND detection results for standard shock pulse width (~40 uS)

Test Facility NASA MSFC Standard PIND Test Results

PIND Equipment Manufacturer ___B&W_____ PIND Equipment Model number ___BW-LPD-DAQ4000_ S/N_____6004_____

Device Package Type & Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Comments
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	Group 1
PKG TYPE - 32 PIN CQFP	21	40	1000	1	X	X	X	X	
PKG TYPE - 32 PIN CQFP	21	40	1000	2	X	X	X	X	
PKG TYPE - 14 PIN FP	3	40	1000	1					No detect
PKG TYPE - 14 PIN FP	3	40	1000	2	X			X	
PKG TYPE - 14 PIN FP	4	40	1000	1	X	X	X	X	
PKG TYPE - 14 PIN FP	4	40	1000	2	X	X	X	X	
PKG TYPE - TO-18	82	40	1000	1	X	X	X	X	
PKG TYPE - TO-18	82	40	1000	2	X	X	X	X	control?
PKG TYPE - TO-18	86	40	1000	1		?			pass
PKG TYPE - TO-18	86	40	1000	2					
PKG TYPE - TO-18	99	40	1000	1	X	X	X	X	
PKG TYPE - TO-18	99	40	1000	2	X	X	X	X	
PKG TYPE - TO-18	108	40	1000	1	X	X	X	X	
PKG TYPE - TO-18	108	40	1000	2	X	X			
PKG TYPE - TO-18	119	40	1000	1	X	X	X	X	
PKG TYPE - TO-18	119	40	1000	2	X	X	X	X	
JANSR2N7390	87	40	1000	1					pass
JANSR2N7390	87	40	1000	2					suspect
JANSR2N7390	88	40	1000	1					pass
JANSR2N7390	88	40	1000	2			X?		

NASA MSFC Standard Shock Pulse Width PIND “Dynamic” Mode the Test Results

Table 2. Test Facility PIND detection results for standard shock pulse width (~40 uS)

Test Facility NASA MSFC Standard PIND Test Results

PIND Equipment Manufacturer ___B&W___ PIND Equipment Model number ___BW-LPD-DAQ4000_ S/N_____6004_____

Device Package Type & Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Comments
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	Group 1
JANSR2N7390	89	40	1000	1					pass
JANSR2N7390	89	40	1000	2				?	failed
PKG TYPE - TO-5	77	40	1000	1					pass
PKG TYPE - TO-5	77	40	1000	2	?				pass
PKG TYPE - TO-5	78	40	1000	1					pass
PKG TYPE - TO-5	78	40	1000	2	?				pass
PKG TYPE - DO-13	205	40	1000	1	X	X	X	X	
PKG TYPE - DO-13	205	40	1000	2	X	X	X	X	
PKG TYPE - DO-13	206	40	1000	1		?			pass?
PKG TYPE - DO-13	206	40	1000	2	?				suspect fail
PKG TYPE - DO-13	213	40	1000	1	X	X	X	X	
PKG TYPE - DO-13	213	40	1000	2	X	X	X	X	
PKG TYPE - DO-13	237	40	1000	1	X		X		
PKG TYPE - DO-13	237	40	1000	2	X	X	X	X	
PKG TYPE - DO-13	238	40	1000	1	X	X	X	X	
PKG TYPE - DO-13	238	40	1000	2	X	X	X	X	
PKG TYPE - UB	2	40	1000	1	X	X	X	X	
PKG TYPE - UB	2	40	1000	2	X	X	X	X	
PKG TYPE - UB	26	40	1000	1				?	unknown?
PKG TYPE - UB	26	40	1000	2	X				suspect fail

NASA MSFC Standard Shock Pulse Width PIND “Dynamic” Mode the Test Results

Table 2. Test Facility PIND detection results for standard shock pulse width (~40 uS)

Test Facility NASA MSFC Standard PIND Test Results

PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 S/N 6004

Device Package Type & Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Comments
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	Group 1
PKG TYPE - UB	36	40	1000	1	X	X	X	X	
PKG TYPE - UB	36	40	1000	2	X	X	X	X	
PKG TYPE - UB	37	40	1000	1	X				
PKG TYPE - UB	37	40	1000	2	X				
PKG TYPE - UA	58	40	1000	1	X	X	X	X	
PKG TYPE - UA	58	40	1000	2	X	X	X	X	
PKG TYPE - UA	60	40	1000	1					
PKG TYPE - UA	60	40	1000	2	?				Control? - fail light o
PKG TYPE - UA	68	40	1000	1	X	X	X	X	
PKG TYPE - UA	68	40	1000	2	X	X	X	X	
PKG TYPE - UA	71	40	1000	1	X				
PKG TYPE - UA	71	40	1000	2	X				Failed
PKG TYPE - UMC	1	40	1000	1	X	X	X	X	
PKG TYPE - UMC	1	40	1000	2	X	X	X	X	Failed
PKG TYPE - UMC	2	40	1000	1				?	unknown?
PKG TYPE - UMC	2	40	1000	2				?	Failed
PKG TYPE - UMC	3	40	1000	1	X	X	X	X	
PKG TYPE - UMC	3	40	1000	2	X			X	Failed

First Group of Sample Package PIND Test Anomaly Results

- 121 pin PGA serial number 143 showed “No” particle detection in the dynamic mode first test run and 50 percent detection on second run.
- 20 pin LCC serial number 6 showed “No” particle detection in the dynamic mode first test run and 50 percent detection during the second test run.
- 14 pin FP serial number 3 showed “No” particle detection in the dynamic mode during first test run and 50 percent detection during the second test run.
- TO-39 serial number 88 showed suspect particle detection in the dynamic mode during first test run and 25 percent detection during second test run.
- DO-13 serial number 206 was a suspect passing device on both runs.
- UB serial number 26 showed “No” detection in the dynamic mode first test run and 25 percent detection in second test run.
- UMC serial number 2 showed “No” detection in the dynamic mode during both test runs but failed.

Second Group of Sample Package PIND Test Anomalies PIND Test Results

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NASA MSFC Standard Shock Pulse Width PIND “Dynamic” Mode the Test Results

Table 2. Test Facility PIND detection results for standard shock pulse width (~40 uS)

Test Facility MSFC Standard PIND Test Results

PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Group 2 NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
PKG TYPE - 7-pin FP	AL 1	40	1000	1	X	X	X	X	
PKG TYPE - 7-pin FP	AL 1	40	1000	2	X	X	X	X	
PKG TYPE - 7-pin FP	AL 2	40	1000	1	X	X	X	X	
PKG TYPE - 7-pin FP	AL 2	40	1000	2	X	X	X	X	
PKG TYPE - 7-pin FP	AL 3	40	1000	1	X	X	X	X	
PKG TYPE - 7-pin FP	AL 3	40	1000	2	X	X	X	X	
PKG TYPE - 16-pin FP	AL 4	40	1000	1	X	X			
PKG TYPE - 16-pin FP	AL 4	40	1000	2	X	X			
PKG TYPE - 16-pin FP	AL 5	40	1000	1	X	X	X	X	
PKG TYPE - 16-pin FP	AL 5	40	1000	2	X	X		X	
PKG TYPE - 16-pin FP	Sl 1	40	1000	1	X	X	X	X	
PKG TYPE - 16-pin FP	Sl 1	40	1000	2	X	X	X	X	
PKG TYPE - 16-pin FP	Sl 2	40	1000	1	X		X		
PKG TYPE - 16-pin FP	Sl 2	40	1000	2	X	X		X	
PKG TYPE - 16-pin FP	Sl 1	40	1000	1	X	X	X	X	
PKG TYPE - 16-pin FP	Sl 1	40	1000	2	X	X	X	X	
PKG TYPE - 16-pin FP	Sl 2	40	1000	1	X	X	X	X	
PKG TYPE - 16-pin FP	Sl 2	40	1000	2	X	X	X	X	
PKG TYPE - 16-pin FP	Sl 3	40	1000	1	X	X	X	X	
PKG TYPE - 16-pin FP	Sl 3	40	1000	2	X	X	X	X	

NASA MSFC Standard Shock Pulse Width PIND “Dynamic” Mode the Test Results

Table 2. Test Facility PIND detection results for standard shock pulse width (~40 uS)

Test Facility MSFC Standard PIND Test Results

PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Group 2 NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
PKG TYPE - TO-5	4	40	1000	1					
PKG TYPE - TO-5	4	40	1000	2					pass
PKG TYPE - TO-5	P 01	40	1000	1					
PKG TYPE - TO-5	P 01	40	1000	2					pass
PKG TYPE - TO-5	P 02	40	1000	1					
PKG TYPE - TO-5	P 02	40	1000	2					pass
PKG TYPE - TO-5	P 03	40	1000	1					
PKG TYPE - TO-5	P 03	40	1000	2					pass
PKG TYPE - TO-5	P 05	40	1000	1	X	X		X	
PKG TYPE - TO-5	P 05	40	1000	2	X	X	X	X	
PKG TYPE - TO-5	P 06	40	1000	1					pass
PKG TYPE - TO-5	P 06	40	1000	2					pass
PKG TYPE - TO-5	P 07	40	1000	1					pass
PKG TYPE - TO-5	P 07	40	1000	2					pass
PKG TYPE - TO-5	P 08	40	1000	1	X	X	X	X	
PKG TYPE - TO-5	P 08	40	1000	2	X	X			
PKG TYPE - TO-5	P 09	40	1000	1	X		X	x	
PKG TYPE - TO-5	P 09	40	1000	2	X			X	
PKG TYPE - TO-5	P 10	40	1000	1					pass
PKG TYPE - TO-5	P 10	40	1000	2					pass

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PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Group 2 NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
PKG TYPE - TO-5	P 11	40	1000	1					pass
PKG TYPE - TO-5	P 11	40	1000	2			?		fail light only
PKG TYPE - TO-5	P 12	40	1000	1					pass
PKG TYPE - TO-5	P 12	40	1000	2			?		fail light only
PKG TYPE - TO-5	P 13	40	1000	1	X	X	X	X	
PKG TYPE - TO-5	P 13	40	1000	2	X	X	X	X	
PKG TYPE - TO-5	P 14	40	1000	1					pass
PKG TYPE - TO-5	P 14	40	1000	2			X		
PKG TYPE - TO-5	P 15	40	1000	1					pass
PKG TYPE - TO-5	P 15	40	1000	2					pass
PKG TYPE - TO-5	P 16	40	1000	1					pass
PKG TYPE - TO-5	P 16	40	1000	2				X	
PKG TYPE - TO-5	P 17	40	1000	1	X	X			fail
PKG TYPE - TO-5	P 17	40	1000	2					pass
PKG TYPE - TO-5	P 18	40	1000	1				X	
PKG TYPE - TO-5	P 18	40	1000	2					pass
PKG TYPE - TO-5	P 19	40	1000	1				X	
PKG TYPE - TO-5	P 19	40	1000	2	X				
PKG TYPE - TO-5	P 20	40	1000	1					pass
PKG TYPE - TO-5	P 20	40	1000	2					pass

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Table 2. Test Facility PIND detection results for standard shock pulse width (~40 uS)

Test Facility MSFC Standard PIND Test Results

PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Group 2 NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
PKG TYPE - TO-5	S 04	40	1000	1	X	X	X	X	
PKG TYPE - TO-5	S 04	40	1000	2		X	X	X	
PKG TYPE - TO-5	S 05	40	1000	1	X	X		X	
PKG TYPE - TO-5	S 05	40	1000	2				X	
PKG TYPE - TO-5	S 08	40	1000	1	X	X	X	X	
PKG TYPE - TO-5	S 08	40	1000	2	X	X		X	
PKG TYPE - TO-5	S 11	40	1000	1					pass
PKG TYPE - TO-5	S 11	40	1000	2					
PKG TYPE - SMD 0.5	111	40	1000	1	X	X	X	X	
PKG TYPE - SMD 0.5	111	40	1000	2	X	X	X	X	
PKG TYPE - SMD 0.5	112	40	1000	1			X	X	
PKG TYPE - SMD 0.5	112	40	1000	2	X	X	X		
PKG TYPE - SMD 0.5	113	40	1000	1	X	X	X	X	
PKG TYPE - SMD 0.5	113	40	1000	2		X	X	X	
PKG TYPE - SMD 0.5	114	40	1000	1					pass
PKG TYPE - SMD 0.5	114	40	1000	2					OOF
PKG TYPE - SMD 0.5	115	40	1000	1	X	X	X	X	
PKG TYPE - SMD 0.5	115	40	1000	2	X	X	X	X	
PKG TYPE - SMD 0.5	116	40	1000	1					
PKG TYPE - SMD 0.5	116	40	1000	2					

NASA MSFC Standard Shock Pulse Width PIND “Dynamic” Mode the Test Results

Table 2. Test Facility PIND detection results for standard shock pulse width (~40 uS)

Test Facility MSFC Standard PIND Test Results

PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000_SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Group 2 NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
PKG TYPE - SMD 0.5	117	40	1000	1					
PKG TYPE - SMD 0.5	117	40	1000	2					
PKG TYPE - SMD 0.5	118	40	1000	1	X	X	X	X	
PKG TYPE - SMD 0.5	118	40	1000	2	X			X	
PKG TYPE - SMD 0.5	119	40	1000	1		X		X	
PKG TYPE - SMD 0.5	119	40	1000	2				?	OOF
PKG TYPE - SMD 0.5	120	40	1000	1	X	X	X	X	
PKG TYPE - SMD 0.5	120	40	1000	2	X	X	X	X	
PKG TYPE - SMD 0.5	211	40	1000	1					pass
PKG TYPE - SMD 0.5	211	40	1000	2					
PKG TYPE - SMD 0.5	212	40	1000	1					pass
PKG TYPE - SMD 0.5	212	40	1000	2					
PKG TYPE - SMD 0.5	213	40	1000	1					pass
PKG TYPE - SMD 0.5	213	40	1000	2					
PKG TYPE - SMD 0.5	214	40	1000	1					pass
PKG TYPE - SMD 0.5	214	40	1000	2					
PKG TYPE - SMD 0.5	215	40	1000	1					pass
PKG TYPE - SMD 0.5	215	40	1000	2					
PKG TYPE - SMD 0.5	216	40	1000	1					pass
PKG TYPE - SMD 0.5	216	40	1000	2					

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Test Facility MSFC Standard PIND Test Results

PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Group 2 NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
PKG TYPE - SMD 0.5	217	40	1000	1					pass
PKG TYPE - SMD 0.5	217	40	1000	2					
PKG TYPE - SMD 0.5	218	40	1000	1					pass
PKG TYPE - SMD 0.5	218	40	1000	2					
PKG TYPE - SMD 0.5	219	40	1000	1					pass
PKG TYPE - SMD 0.5	219	40	1000	2					
PKG TYPE - SMD 0.5	220	40	1000	1					pass
PKG TYPE - SMD 0.5	220	40	1000	2					
PKG TYPE - TO-254	101	40	1000	1				X	
PKG TYPE - TO-254	101	40	1000	2			X		
PKG TYPE - TO-254	102	40	1000	1	X	X	X	X	
PKG TYPE - TO-254	102	40	1000	2	X	X			
PKG TYPE - TO-254	103	40	1000	1	X	X			
PKG TYPE - TO-254	103	40	1000	2	X		X	X	
PKG TYPE - TO-254	104	40	1000	1	X	X	X	X	
PKG TYPE - TO-254	104	40	1000	2	X	X	X		
PKG TYPE - TO-254	105	40	1000	1	X	X	X	X	
PKG TYPE - TO-254	105	40	1000	2	X	X	X	X	
PKG TYPE - TO-254	106	40	1000	1	X		X	X	
PKG TYPE - TO-254	106	40	1000	2		X	X		OOF

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PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Group 2 NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
PKG TYPE - TO-254	107	40	1000	1	X	X	X	X	
PKG TYPE - TO-254	107	40	1000	2	X	X	X	X	
PKG TYPE - TO-254	108	40	1000	1	X	X	X	X	
PKG TYPE - TO-254	108	40	1000	2	X	X	X	X	
PKG TYPE - TO-254	109	40	1000	1		X			
PKG TYPE - TO-254	109	40	1000	2					OOF
PKG TYPE - TO-254	110	40	1000	1	X	X	X	X	
PKG TYPE - TO-254	110	40	1000	2	X		X	X	
PKG TYPE - TO-254	201	40	1000	1					OOF
PKG TYPE - TO-254	201	40	1000	2					
PKG TYPE - TO-254	202	40	1000	1					OOF
PKG TYPE - TO-254	202	40	1000	2					
PKG TYPE - TO-254	203	40	1000	1					
PKG TYPE - TO-254	203	40	1000	2				X?	OOF
PKG TYPE - TO-254	204	40	1000	1	X	X	X	X	
PKG TYPE - TO-254	204	40	1000	2					OOF
PKG TYPE - TO-254	205	40	1000	1	X			X	
PKG TYPE - TO-254	205	40	1000	2	X				
PKG TYPE - TO-254	206	40	1000	1		X	X	X	
PKG TYPE - TO-254	206	40	1000	2					

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PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Group 2 NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
PKG TYPE - TO-254	207	40	1000	1	X				
PKG TYPE - TO-254	207	40	1000	2					
PKG TYPE - TO-254	208	40	1000	1				X	
PKG TYPE - TO-254	208	40	1000	2					OOF
PKG TYPE - TO-254	209	40	1000	1			X		
PKG TYPE - TO-254	209	40	1000	2					
PKG TYPE - TO-254	210	40	1000	1		X			
PKG TYPE - TO-254	210	40	1000	2					pass
JANSR2N7626UB	1	40	1000	1	X	X	X	X	OOF
JANSR2N7626UB	1	40	1000	2					OOF
JANSR2N7626UB	9	40	1000	1	X		X	X	OOF
JANSR2N7626UB	9	40	1000	2					OOF
JANSR2N7626UB	18	40	1000	1	X	X	X	X	OOF
JANSR2N7626UB	18	40	1000	2					OOF
JANSR2N7626UB	23	40	1000	1	X	X	X	X	Red Pack - X-Ray
JANSR2N7626UB	23	40	1000	2	X	X	X	X	Red Pack - X-Ray
JANSR2N7626UB	132	40	1000	1	X	X	X	X	Red Pack - X-Ray
JANSR2N7626UB	132	40	1000	2	X	X	X	X	Red Pack - X-Ray
JANSR2N7626UB	185	40	1000	1	X	X		X	OOF
JANSR2N7626UB	185	40	1000	2					OOF

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PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				Group 2 NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
JANSR2N7626UB	190	40	1000	1	X	X	X	X	OOF
JANSR2N7626UB	190	40	1000	2					OOF
JANSR2N7626UB	214	40	1000	1	X	X		X	OOF
JANSR2N7626UB	214	40	1000	2					OOF
JANSR2N7626UB	447	40	1000	1	X	X	X	X	Red Pack - X-Ray
JANSR2N7626UB	447	40	1000	2	X	X	X	X	Red Pack - X-Ray
JANSR2N7626UB	467	40	1000	1	X	X	X	X	Red Pack - X-Ray
JANSR2N7626UB	467	40	1000	2	X	X	X	X	Red Pack - X-Ray
JANSR2N7616UB	253	40	1000	1	X	X		X	1st Pass PIND
JANSR2N7616UB	253	40	1000	2		X	X		1st Pass PIND
JANSR2N7616UB	334	40	1000	1	X	X	X	X	1st Pass PIND
JANSR2N7616UB	334	40	1000	2	X	X	X	X	1st Pass PIND

Second Group of Sample Package PIND Test Anomaly Results

- TO-254 serial number 106 showed 75 percent particle detection in the dynamic mode during first test run and 50 percent during second test run.
- TO-254 serial number 109 showed 25 percent detection in first run and no detection in second run.
- TO-254 serial numbers 207, 209, and 210 showed 25 percent detection in first run and no detection in second run.
- SMD 0.5 serial number 112 showed 50 percent particle detection in the dynamic mode during first test run and 75 percent during second test run.
- SMD 0.5 serial number 113 showed 100 percent particle detection in the dynamic mode during first test run and 25 percent during the second test run.
- SMD 0.5 serial number 117 showed “No” particle detection in the dynamic mode during both test runs.
- SMD 0.5 serial number 118 showed 100 percent particle detection in the dynamic mode during first test run and 50 percent during second test run.
- UB serial number 253 showed 75 percent particle detection in the dynamic mode during first test run and 50 percent during second test run.

Third Group of Sample Package PIND Test Anomalies PIND Test Results

By NASA MSFC

NASA MSFC Standard Shock Pulse Width PIND “Dynamic” Mode the Test Results

Table 2. Test Facility PIND detection results for standard shock pulse width (~40 uS)

Test Facility NSWC CRANE Standard PIND Test Results

PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
JANSR2N7616UBC	470	40	1000	1	X	X	X	X	
JANSR2N7616UBC	470	40	1000	2	X	X	X	X	
JANSR2N7616UBC	603	40	1000	1	X	X	X	X	
JANSR2N7616UBC	603	40	1000	2	X	X	X	X	
JANSF2N7626UBCN	661	40	1000	1	X	X		X	
JANSF2N7626UBCN	661	40	1000	2	X	X	X	X	
JANSF2N7626UBN	45	40	1000	1	X	X	X	X	
JANSF2N7626UBN	45	40	1000	2	X	X	X	X	
JANSF2N7626UBN	162	40	1000	1	X	X	X	X	
JANSF2N7626UBN	162	40	1000	2	X	X	X	X	signal varies
JANSF2N7626UBN	167	40	1000	1					pass
JANSF2N7626UBN	167	40	1000	2	X		X	X	
JANSF2N7626UBN	250	40	1000	1					pass
JANSF2N7626UBN	250	40	1000	2	X	X	X	X	
JANSF2N7626UBN	405	40	1000	1	X	X	X	X	
JANSF2N7626UBN	405	40	1000	2	X	X	X		
JANSF2N7626UBN	426	40	1000	1	X	X	X	X	
JANSF2N7626UBN	426	40	1000	2	X	X		X	
JANSF2N7626UBN	431	40	1000	1	X			X	
JANSF2N7626UBN	431	40	1000	2	X	X	X		
JANSF2N7626UBN	461	40	1000	1	X	X			
JANSF2N7626UBN	461	40	1000	2	X	X	X	X	

NASA MSFC Standard Shock Pulse Width PIND "Dynamic" Mode the Test Results

Table 2. Test Facility PIND detection results for standard shock pulse width (~40 uS)

Test Facility NSWC CRANE Standard PIND Test Results

PIND Equipment Manufacturer B&W PIND Equipment Model number BW-LPD-DAQ4000 SN 6004

Device Part Number - optional	Serial number	Pulse Width in uS	Shock pulse in g's		Vibration detection (X=detect)				NOTES
				Run #	Vib 1	Vib 2	Vib 3	Vib 4	
JANSF2N7626UBN	470	40	1000	1	X	X	X	X	
JANSF2N7626UBN	470	40	1000	2		X	X	X	
JANSF2N7626UBN	573	40	1000	1	X	X	X	X	
JANSF2N7626UBN	573	40	1000	2	X			X	
JANSF2N7626UBN	588	40	1000	1	X	X	X	X	
JANSF2N7626UBN	588	40	1000	2	X	X	X	X	
JANSF2N7626UBN	593	40	1000	1	X	X			
JANSF2N7626UBN	593	40	1000	2		X		?	
JANSF2N7626UBN	598	40	1000	1	X	X	X		
JANSF2N7626UBN	598	40	1000	2		X			
JANSF2N7626UBN	614	40	1000	1		X			
JANSF2N7626UBN	614	40	1000	2		X		X	
JANSF2N7626UBN	659	40	1000	1	X	X	X	X	
JANSF2N7626UBN	659	40	1000	2	X	X			
JANSF2N7626UBN	683	40	1000	1		X	X	X	
JANSF2N7626UBN	683	40	1000	2	X	X	X	X	
JANSF2N7626UBN	754	40	1000	1	X	X		X	
JANSF2N7626UBN	754	40	1000	2	X	X	X		
JANSF2N7626UBN	755	40	1000	1	X				
JANSF2N7626UBN	755	40	1000	2	X	X			
JANSF2N7626UBN	774	40	1000	1				?	fail
JANSF2N7626UBN	774	40	1000	2	X	X		X	close to passing

Third Group of Sample Package PIND Test Anomaly Results

- UBCN serial number 661 showed 75 percent particle detection in the dynamic mode during first test run and 100 percent during second test run.
- UBN serial number 167 showed “No” particle detection in the dynamic mode during first test run and 100 percent during the second test run.
- UBN serial number 431 showed 50 percent particle detection in the dynamic mode during first test run and 75 percent during second test run.
- UBN serial number 461 showed 50 percent particle detection in the dynamic mode during first test run and 100 percent during second test run.
- UBN serial number 598 showed 75 percent particle detection in the dynamic mode during first test run and 25 percent during second test run
- UBN serial number 774 showed “No” particle detection in the dynamic mode during first test run and 75 percent during second test run.

NASA MSFC Standard Shock Pulse Width PIND Anomalies Results Summary

Plan for retesting of the PIND package anomalies involved the following steps:

- 1. X-ray sample packages identified as anomalies prior to PIND retest and record information about particle location.
- 2. Perform PIND retest of PIND anomalies and record results.
- 3. X-ray sample packages and record information about particle location changes.

Longer Shock Pulse Width Task Proposal Future Plans

- Compile X-ray files for package sample anomalies.
- Summarize test results for January 2025 JEDEC task group meeting.
- Begin process of setting up dates to test samples at Spectral Dynamics and B&W Engineering using standard shock pulse and alternate shock pulse PIND test equipment.

Thank you!

- We would like to express our appreciation to the task group members, NASA NEPAG program, Government Working Group, and NSWC Crane for their continued support of this effort.

- Contact information:

Benny Damron
Jacobs Space Exploration Group (JSEG)
NASA Marshall Space Flight Center
Benny.Damron@nasa.gov

Christian Schuler
NSWC Crane Division
christian.d.schuler.civ@us.navy.mil

Acronyms

- DLA – Defense Logistics Agency
- DLR – German Aerospace Center
- DPA – Destructive Physical Analysis
- ESA – European Space Agency
- ESD – Electrostatic Discharge
- FOD – Foreign Object Debris
- JEDEC – JEDEC Solid State Technology Association
- NASA – National Aeronautics and Space Administration
- MSFC- Marshall Space Flight Center
- NSWC Crane – Naval Surface Warfare Center, Crane Division
- OOF – Out of Family
- PIND – Particle Impact Noise Detection
- STU – Sensitivity Test Unit