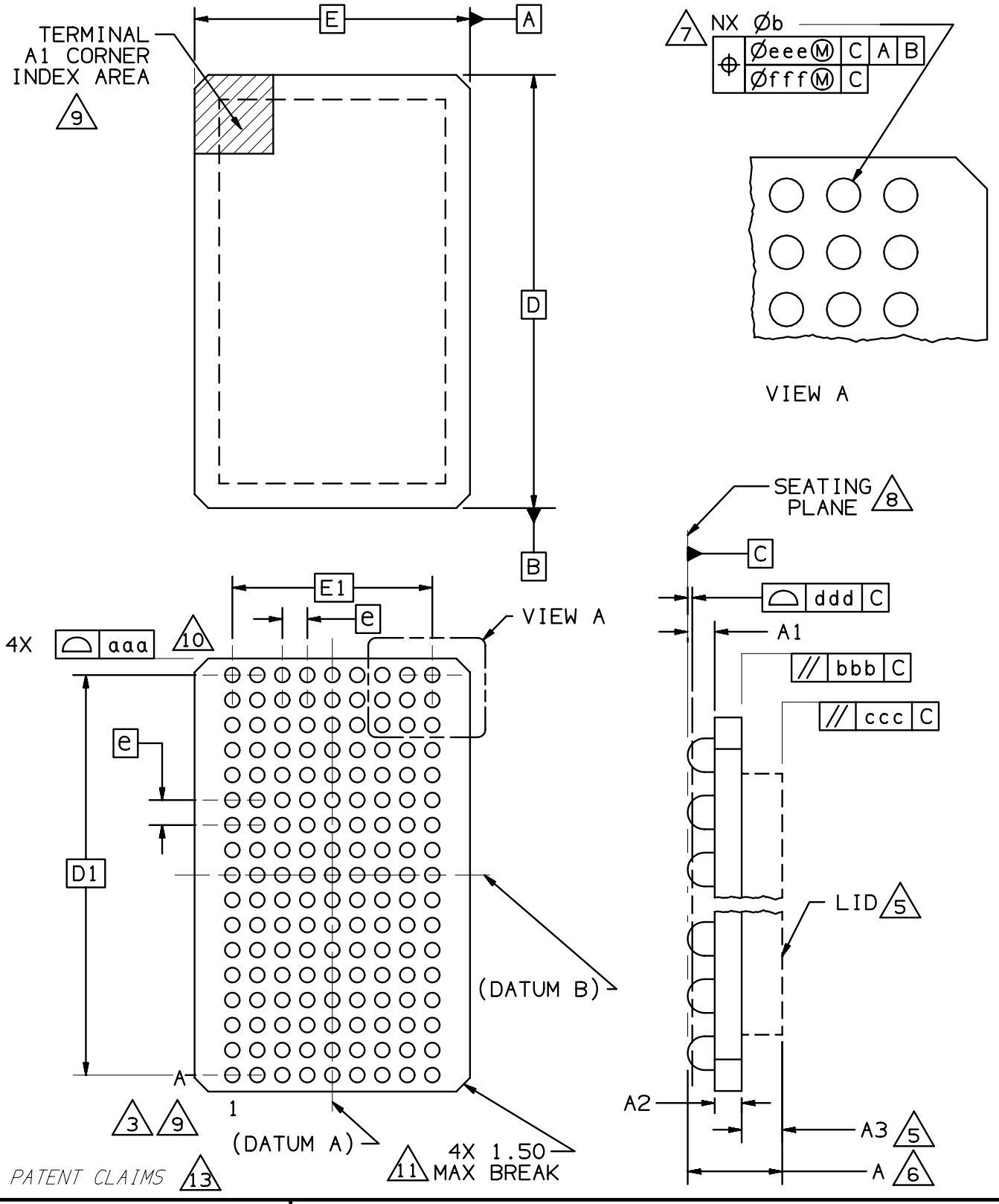

JEDEC SOLID STATE PRODUCT OUTLINES	THIS *STANDARD OUTLINE* HAS BEEN PREPARED BY THE JEDEC JC-11 COMMITTEE AND REFLECTS A PRODUCT WITH ACCEPTANCE IN THE ELECTRONICS INDUSTRY; CHANGES ARE NOT LIKELY TO OCCUR.

TITLE	JESD-30 DESIGNATOR	ISSUE	DATE		SHEET
RECTANGULAR PLASTIC BALL GRID ARRAY FAMILY, 1.27, 1.0 PITCH	R-PBGA-B	C	MAY 2000	MS-028	1 OF 4

SYMBOL	VARIATIONS (ALL DIMENSIONS IN MILLIMETERS)							
	AA			NOTE	AB			NOTE
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.	
A	--	2.15	3.50	6	--	2.15	3.50	6
A1	0.50	0.60	0.70		0.50	0.60	0.70	
A2	0.10	--	2.50		0.10	--	2.50	
A3	--	--	2.50	5	--	--	2.50	5
b	0.60	0.75	0.90	7	0.60	0.75	0.90	7
D		22 BSC.		10		22 BSC.		10
D1		20.32 BSC.				20.32 BSC.		
E		14 BSC.		10		14 BSC.		10
E1		7.62 BSC.				10.16 BSC.		
e		1.27 BSC.				1.27 BSC.		
MD		17		4		17		4
ME		7		4		9		4
N		119		4		153		4
TOLERANCES OF FORM AND POSITION								
aaa		0.20				0.20		
bbb		0.25				0.25		
ccc		0.35				0.35		
ddd		0.20				0.20		
eee		0.30				0.30		
fff		0.15				0.15		
NOTE	1,2				1,2			
REF.	MO-163A--11-372				MO-163A--11-372			
ISSUE	B				B			

SYMBOL	VARIATIONS (ALL DIMENSIONS IN MILLIMETERS)							
	AC			NOTE				NOTE
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.	
A	--	2.15	3.50	6				
A1	0.50	0.60	0.70					
A2	0.10	--	2.50					
A3	--	--	2.50	5				
b	0.60	0.75	0.90	7				
D		25 BSC.		10				
D1		22.86 BSC.						
E		21 BSC.		10				
E1		12.70 BSC.						
e		1.27 BSC.						
MD		19		4				
ME		11		4				
N		209		4				
	TOLERANCES OF FORM AND POSITION							
aaa		0.20						
bbb		0.25						
ccc		0.35						
ddd		0.20						
eee		0.30						
fff		0.15						
NOTE	1,2							
REF.	MO-163B--11-452							
ISSUE	B							

JEDEC SOLID STATE PRODUCT OUTLINES	TITLE RECTANGULAR PLASTIC BALL GRID ARRAY FAMILY, 1.27, 1.0 PITCH	ISSUE C	DATE MAY 2000	MS-028	SHEET 2 OF 4

SYMBOL	VARIATIONS (ALL DIMENSIONS IN MILLIMETERS)							
	BA			NOTE	BB			NOTE
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.	
A	--	--	2.20	6	--	--	2.20	6
A1	0.40	0.50	0.60		0.40	0.50	0.60	
A2	0.10	--	--		0.10	--	--	
A3	--	--	1.40	5	--	--	1.40	5
b	0.50	0.60	0.70	7	0.50	0.60	0.70	7
D		18 BSC.		10		18 BSC.		10
D1		16.00 BSC.				16.00 BSC.		
E		11 BSC.		10		11 BSC.		10
E1		6.00 BSC.				8.00 BSC.		
e		1.00 BSC.				1.00 BSC.		
MD		17		4		17		4
ME		7		4		9		4
N		119		4		153		4
TOLERANCES OF FORM AND POSITION								
aaa		0.20				0.20		
bbb		0.25				0.25		
ccc		0.35				0.35		
ddd		0.15				0.15		
eee		0.25				0.25		
fff		0.10				0.10		
NOTE	1,2				1,2			
REF.	11-550S				11-550S			
ISSUE	C				C			

SYMBOL	VARIATIONS (ALL DIMENSIONS IN MILLIMETERS)							
	BC			NOTE				NOTE
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.	
A	--	--	2.20					
A1	0.40	0.50	0.60					
A2	0.10	--	--					
A3	--	--	1.40					
b	0.50	0.60	0.70					
D		22 BSC.						
D1		18.00 BSC.						
E		14 BSC.						
E1		10.00 BSC.						
e		1.00 BSC.						
MD		19						
ME		11						
N		209						
	TOLERANCES OF FORM AND POSITION							
aaa		0.20						
bbb		0.25						
ccc		0.35						
ddd		0.15						
eee		0.25						
fff		0.10						
NOTE	1,2							
REF.	11-550S							
ISSUE	C							

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMENSIONS IN MILLIMETERS.
3. TERMINAL POSITION DESIGNATION PER JEDEC PUBLICATION 95-1, SPP-010.
4. SYMBOL "MD" IS THE BALL MATRIX SIZE IN THE "D" DIRECTION, "ME" IS THE BALL MATRIX SIZE IN THE "E" DIRECTION, AND SYMBOL "N" IS THE MAXIMUM ALLOWABLE NUMBER OF SOLDER BALLS.
5. LID MAY EXTEND TO PERIPHERY OF PACKAGE AND MAY CONSIST OF MOLDING COMPOUND, EPOXY, METAL, CERAMIC OR OTHER MATERIAL. LID MAY EXTEND ABOVE OR BELOW THE PACKAGE BODY SURFACE OR MAY BE INCORPORATED WITHIN THE PACKAGE BODY, E.G., COMPLETE BODY OVERMOLD.
6. THIS DIMENSION INCLUDES STANDOFF "A1", PACKAGE BODY THICKNESS AND LID HEIGHT BUT DOES NOT INCLUDE ATTACHED FEATURES , E.G., EXTERNAL HEATSINK OR CHIP CAPACITORS. AN INTEGRAL HEATSLUG IS NOT AN ATTACHED FEATURE.
7. DIMENSION "b" IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO PRIMARY DATUM C.
8. PRIMARY DATUM C AND THE SEATING PLANE ARE DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS.
9. A1 CORNER MUST BE IDENTIFIED. IDENTIFICATION MAY BE BY MEANS OF CHAMFER, METALLIZED MARKINGS, INDENTATION, CONTRASTING INK MARK, OR OTHER FEATURE OF THE PACKAGE BODY, LID OR INTEGRAL HEATSLUG. MARK MUST BE VISIBLE FROM TOP SURFACE.
10. BILATERAL TOLERANCE ZONE IS APPLIED TO ALL FOUR SIDES OF THE PACKAGE BODY
11. ACTUAL SHAPE OF THIS FEATURE IS OPTIONAL.
12. 9X17 ARRAY SHOWN FOR ILLUSTRATION PURPOSES.
13. NATIONAL SEMICONDUCTOR HAS STATED THAT U.S. PATENT NUMBERS 4688152, 4778641 AND 4868349 MAY RELATE TO A CERTAIN IMPLEMENTATION OF THIS PACKAGE OUTLINE. CITIZEN WATCH COMPANY HAS STATED THAT U.S. PATENT NUMBERS 4822550 AND 4935581 MAY RELATE TO A CERTAIN IMPLEMENTATION OF THIS PACKAGE OUTLINE.