

PATENT CLAIMS

FIGURE 1

JEDEC
SOLID STATE
PRODUCT OUTLINE

THIS **REGISTERED OUTLINE** HAS BEEN PREPARED BY THE JEDEC JC-11 COMMITTEE AND REFLECTS A PRODUCT WITH ANTICIPATED USAGE IN THE ELECTRONICS INDUSTRY; CHANGES ARE LIKELY TO OCCUR.

TITLE
SMALL SCALE
PLASTIC ULTRA, EXTRA, AND SUPER THIN
FINE PITCH QUAD FLAT NO LEAD PACKAGE
(WITH OPTIONAL THERMAL ENHANCEMENTS)

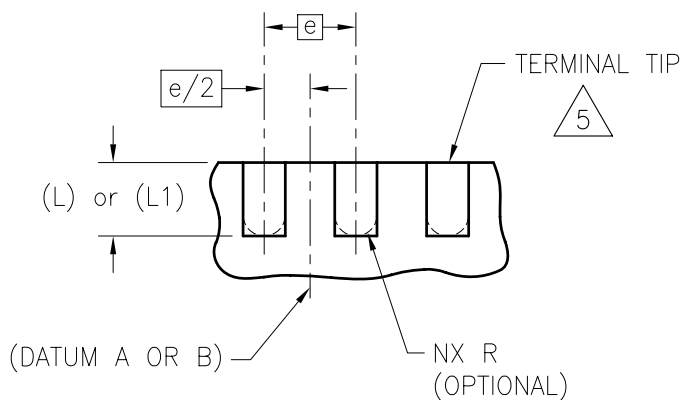
JESD-30 DESIGNATOR
(U,X1,X2)F-PQFN &
H-(U,X1,X2)F-PQFN

ISSUE
A

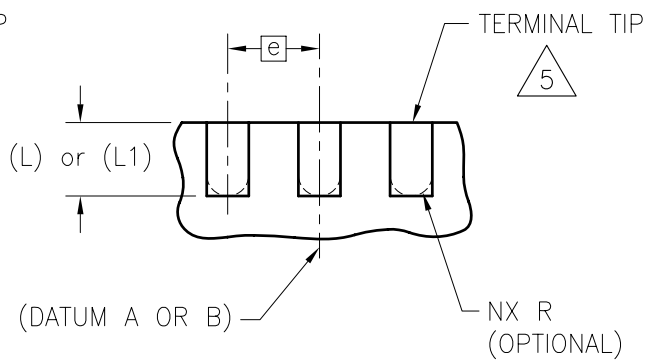
DATE
Sept
2007

MO-288

SHEET
1 OF 9

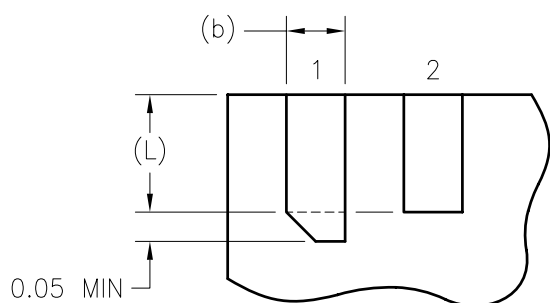


EVEN TERMINALS PER SIDE

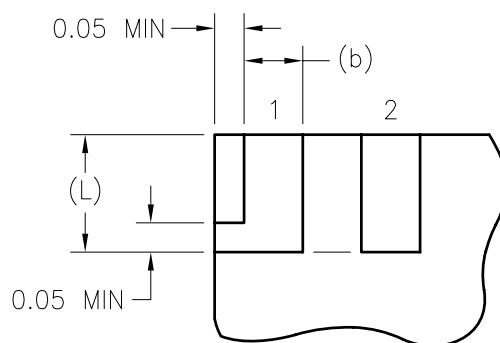


ODD TERMINALS PER SIDE

DETAIL A

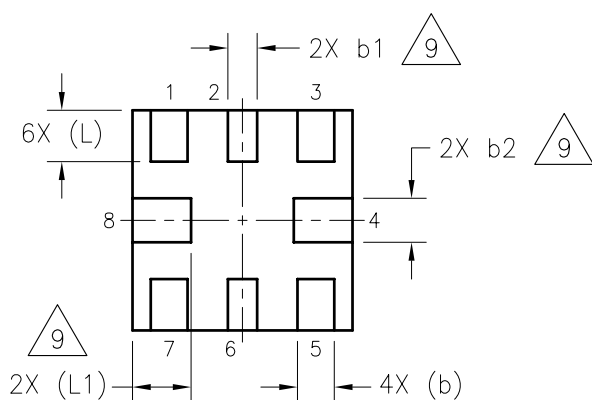


ELONGATION AND CHAMFER

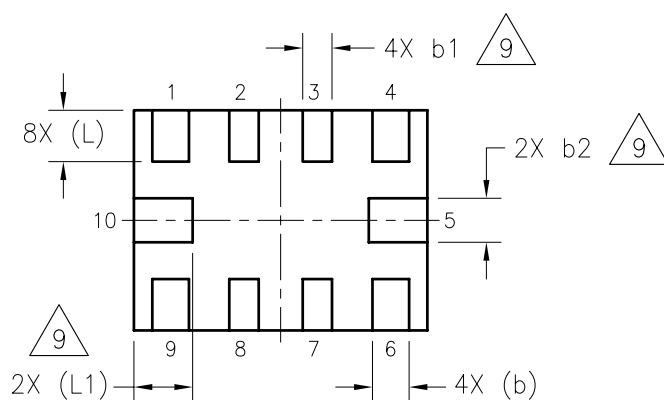


PROTRUSION

OPTIONAL PIN 1 IDENTIFIERS



VARIATIONS UECD, X1ECD, X2ECD



VARIATIONS UEFD, X1EFD, X2EFD

TERMINAL PATTERNS

JEDEC
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PRODUCT OUTLINE

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SHEET
2 OF 9

TABLE 1

VARIATION DESIGNATORS							
FIRST DIGIT CODE		SECOND DIGIT CODE		THIRD DIGIT CODE		FOURTH DIGIT CODE	
OVERALL HEIGHT		BODY LENGTH		BODY WIDTH		TERMINAL PITCH	
A	LETTER CODE	D	LETTER CODE	E	LETTER CODE	e	LETTER CODE
0.65 MAX	U	1.00	A	1.00	A	0.50	D
0.50 MAX	X1	1.10	B	1.40	B	0.40	E
0.40 MAX	X2	1.20	C	1.50	C	0.35	F
		1.40	D	1.70	D		
		1.50	E	1.80	E		
		1.80	F	2.00	F		
		2.00	G	2.10	G		
		2.30	H	2.60	H		
		2.50	J	2.80	J		
				3.00	K		

TABLE 2

COMMON DIMENSIONS									
	U: ULTRA THIN			X1: EXTRA THIN			X2: SUPER THIN		
SYMBOL	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
A	>0.50	—	0.65	>0.40	—	0.50	>0.30	—	0.40
A1	0	—	0.05	0	—	0.05	0	—	0.05
K	0.15	—	—	0.15	—	—	0.15	—	—
NOTES	1,2								
REF	11-778								
ISSUE	A								

TABLE 3

LEAD WIDTH			
b			
PITCH	MIN	NOM	MAX
0.50	0.20	0.25	0.30
0.40	0.15	0.20	0.25
0.35	0.14	0.17	0.20
NOTES	1,2,5		
REF	11-778		
ISSUE	A		

TABLE 4

TOLERANCE OF FORM & POSITION			
SYMBOL	PITCH		
	0.50	0.40	0.35
aaa	0.10	0.10	0.08
bbb	0.10	0.07	0.07
NOTES	1,2		
REF	11-778		
ISSUE	A		

TABLE 5

VARIATION SUMMARY TABLE					
BODY SIZE (D X E)	LEAD PITCH (e)	LEAD COUNT (N)	ULTRA THIN (U)	EXTRA THIN (X1)	SUPER THIN (X2)
1.10 X 1.40	0.35	10	UBBF	X1BBF	X2BBF
1.20 X 1.70	0.35	12	UCDF	X1CDF	X2CDF
1.40 X 1.80	0.40	10	UDEE	X1DEE	X2DEE
1.40 X 2.00	0.40	12	UDFE	X1DFE	X2DFE
1.50 X 1.50	0.50	8	UECD	X1ECD	X2ECD
1.50 X 1.70	0.35	14	UEDF	X1EDF	X2EDF
1.50 X 2.00	0.50	10	UEFD	X1EFD	X2EFD
1.50 X 2.10	0.35	16	UEGF	X1EGF	X2EGF
1.50 X 2.80	0.35	20	UEJF	X1EJF	X2EJF
1.80 X 2.60	0.40	16	UFHE	X1FHE	X2FHE
2.00 X 2.00	0.40	14	UGFE	X1GFE	X2GFE
2.30 X 2.80	0.35	24	UHJF	X1HJF	X2HJF
2.50 X 3.00	0.40	20	UJKE/UJKE-1	X1JKE/X1JKE-1	X2JKE/X2JKE-1

TABLE 6

VARIATIONS									
□ = 0.50 PITCH									
SYMBOL	VARIATION	UECD	UEFD						NOTES
		X1ECD	X1EFD						
		X2ECD	X2EFD						
b1	MIN	0.15	0.15						
	NOM	0.20	0.20						5,9
	MAX	0.25	0.25						
b2	MIN	0.25	0.25						
	NOM	0.30	0.30						5,9
	MAX	0.35	0.35						
D BSC		1.50	1.50						
E BSC		1.50	2.00						
D2	MIN	—	—						
	NOM	—	—						
	MAX	—	—						
E2	MIN	—	—						
	NOM	—	—						
	MAX	—	—						
L	MIN	0.25	0.25						
	NOM	0.35	0.35						
	MAX	0.45	0.45						
L1	MIN	0.30	0.30						
	NOM	0.40	0.40						9
	MAX	0.50	0.50						
N		8	10						3
ND		1	1						3,6
NE		3	4						3,6
NOTES		1,2							
REF		11-778							
ISSUE		A							

TABLE 7

VARIATIONS									
\square = 0.40 PITCH									
VARIATION SYMBOL	UDEE	UDFE	UGFE	UFHE	UJKE	UJKE-1			NOTES
	X1DEE	X1DFE	X1GFE	X1FHE	X1JKE	X1JKE-1			
	X2DEE	X2DFE	X2GFE	X2FHE	X2JKE	X2JKE-1			
D BSC	1.40	1.40	2.00	1.80	2.50	2.50			
E BSC	1.80	2.00	2.00	2.60	3.00	3.00			
D2	MIN	—	—	—	—	1.20			
	NOM	—	—	—	—	1.30			
	MAX	—	—	—	—	1.40			
E2	MIN	—	—	—	—	1.70			
	NOM	—	—	—	—	1.80			
	MAX	—	—	—	—	1.90			
L	MIN	0.30	0.30	0.30	0.30	0.30			
	NOM	0.40	0.40	0.40	0.40	0.40			
	MAX	0.50	0.50	0.50	0.50	0.50			
N	10	12	14	16	20	20			3
ND	3	1	2	4	3	3			3,6
NE	2	5	5	4	7	7			3,6
NOTES	1,2								
REF	11-778								
ISSUE	A								

TABLE 8

VARIATIONS									
\square = 0.35 PITCH									
VARIATION SYMBOL		UBBF	UCDF	UEDF	UEGF	UEJF	UHJF		NOTES
		X1BBF	X1CDF	X1EDF	X1EGF	X1EJF	X1HJF		
		X2BBF	X2CDF	X2EDF	X2EGF	X2EJF	X2HJF		
D BSC		1.10	1.20	1.50	1.50	1.50	2.30		
E BSC		1.40	1.70	1.70	2.10	2.80	2.80		
D2	MIN	—	—	—	—	—	—		
	NOM	—	—	—	—	—	—		
	MAX	—	—	—	—	—	—		
E2	MIN	—	—	—	—	—	—		
	NOM	—	—	—	—	—	—		
	MAX	—	—	—	—	—	—		
L	MIN	0.20	0.20	0.20	0.20	0.20	0.20		
	NOM	0.30	0.30	0.30	0.30	0.30	0.30		
	MAX	0.40	0.40	0.40	0.40	0.40	0.40		
L1	MIN	0.30	0.30	0.30	0.30	0.30	0.30		
	NOM	0.40	0.40	0.40	0.40	0.40	0.40		9
	MAX	0.50	0.50	0.50	0.50	0.50	0.50		
N		10	12	14	16	20	24		3
ND		1	1	2	2	2	4		3,6
NE		4	5	5	6	8	8		3,6
NOTES		1,2							
REF		11–778							
ISSUE		A							

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5M-1994.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. N IS THE TOTAL NUMBER OF TERMINALS. ND AND NE REFER TO THE NUMBER OF TERMINALS ON EACH D AND E SIDE RESPECTIVELY.



TERMINAL #1 IDENTIFIER AND TERMINAL NUMBERING CONVENTION SHALL CONFORM TO JEP95, SECTION 3, SPP-002. PIN #1 IDENTIFIER MUST BE LOCATED WITHIN THE ZONE INDICATED. TOPSIDE TERMINAL #1 IDENTIFIER MAY BE MOLDED OR MARKED FEATURE. OPTIONAL IDENTIFIER ON BOTTOM SURFACE MAY BE MOLDED, MARKED, OR METALLIZED FEATURE.



DIMENSIONS b, b1, b2 APPLY TO THE METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.25 FROM THE TERMINAL TIP. IF THE TERMINAL HAS THE OPTIONAL RADIUS ON THE OTHER END OF THE TERMINAL, DIMENSIONS b, b1, b2 SHALL NOT BE MEASURED IN THE RADIUS AREA.

6. DEPOPULATION IS POSSIBLE IN A SYMMETRICAL FASHION.



VARIATION X2JKE-1 IS SHOWN FOR ILLUSTRATION ONLY. DIMENSION L1 DOES NOT APPLY TO THIS VARIATION.



UNILATERAL COPLANARITY ZONE APPLIES TO THE EXPOSED THERMAL PAD AS WELL AS THE TERMINALS.



DIMENSIONS b1, b2, AND L1 ARE VARIATION SPECIFIC LEAD WIDTHS AND LEAD LENGTH. THESE DIMENSIONS DO NOT APPLY TO ALL VARIATIONS.



OPTIONAL PIN 1 IDENTIFIER PROTRUSION AND LEAD ELONGATION IS OUTSIDE OF THE PIN DIMENSIONS b AND L BY A MINIMUM OF 0.05 MM.

11. THIS OUTLINE CONFORMS TO JEP95, SECTION 4.20, AND SECTION 3.0, SPP-017.



VARIOUS COMPANIES HAVE ISSUED PATENTS AND RELATED PATENT APPLICATIONS THAT MAY APPLY TO THIS REGISTRATION. IF THE CURRENT ISSUE PATENTS OR LATER PATENTS RESULTING FROM RELATED APPLICATIONS DO APPLY, THESE COMPANIES INTEND TO COMPLY WITH THE JEDEC PATENT POLICY AND LICENSE UNDER REASONABLE TERMS AND CONDITIONS THAT ARE DEMONSTRABLY FREE OF ANY UNFAIR DISCRIMINATION. REFERENCED U.S. PATENT NUMBERS ARE AS FOLLOWS.

AMKOR TECHNOLOGY	5,866,939; 6,143,981; 6,281,568; 6,331,451; 6,433,277;
	6,448,633; 6,455,356; 6,469,369; 6,475,827; 6,476,478;
	6,501,161; 6,521,987; 6,525,406; 6,545,345; 6,555,899;
	6,580,159; 6,597,059; 6,605,865; 6,605,866; 6,608,366;
	6,611,047; 6,616,436; 6,627,976; 6,630,728; 6,639,308;
	6,646,339; 6,677,662; 6,677,663; 6,684,496
ASAT	6,229,200B1; 6,242,281B1; 6,294,100B1; 6,545,347B2;
	6,585,905B1; 6,734,044; 6,940,154; 7,071,545;
	7,091,581; 7,247,526
FUJITSU LIMITED	6,072,239; 6,159,770; 6,329,711; 6,376,921; 6,573,121
NATIONAL SEMICONDUCTOR	6,130,473

Change Record

If the change involves any words added or deleted (excluding deletion of accidentally repeated words), the change is to be included below. Punctuation changes may or may not be included.

Initial Issue: A	Date: September 2007	Item: 11-778
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Revision History:

Issue:	Date:	Item:
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Location	Changed from:	Changed to:

Issue:	Date:	Item:
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Location	Changed from:	Changed to:

Issue:	Date:	Item:
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Location	Changed from:	Changed to: