

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Mechanical standardization of semiconductor devices –
Part 6-8: General rules for the preparation of outline drawings of surface
mounted semiconductor device packages – Design guide for glass sealed
ceramic quad flatpack (G-QFP)**

[IEC 60191-6-8:2001](#)

<https://standards.iteh.ai/catalog/standards/sist/1945548b-389c-41ee-abd5->

**Normalisation mécanique des dispositifs à semiconducteurs –
Partie 6-8: Règles générales pour la préparation des dessins d'encombrement
des dispositifs à semiconducteurs à montage en surface – Guide de conception
pour les boîtiers plats quadrangulaires en céramique, scellement verre (G-QFP)**



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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<https://standards.iteh.ai/catalog/standards/sist/1945548b-389c-41ee-abd5-578c-710e11691601/iec-60191-6-8>

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

**Part 6-8: General rules for the preparation of outline drawings
of surface mounted semiconductor device packages –
Design guide for glass sealed ceramic quad flatpack (G-QFP)**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60191-6-8 has been prepared by subcommittee 47D: Mechanical standardization of semiconductor devices, of IEC technical committee 47: Semiconductor devices.

This bilingual version (2013-01) corresponds to the monolingual English version, published in 2001-08.

The text of this standard is based on the following documents:

FDIS	Report on voting
47D/438/FDIS	47D/456/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 6-8: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Design guide for glass sealed ceramic quad flatpack (G-QFP)

1 Scope and object

This part of IEC 60191 provides the common outline drawings and dimensions for all types of structures and composed materials of glass sealed ceramic quad flatpack (hereinafter called G-QFP).

The object of this design guide is to standardize outlines and obtain interchangeability of G-QFP.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60191. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60191 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60191 (all parts), *Mechanical standardization of semiconductor devices*

3 Definitions

For the purpose of this part of IEC 60191, the following definition, as well as those given in the other parts of this standard, apply.

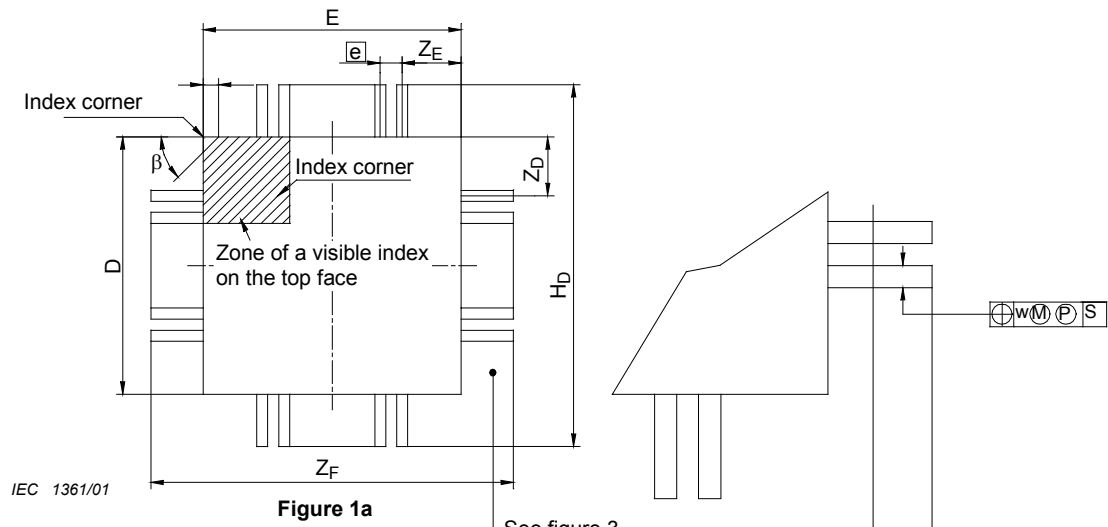
3.1

G-QFP

glass sealed package with gull-wing formed terminals which are led out in four directions to mount on PCB surface

4 Numbering of the pins

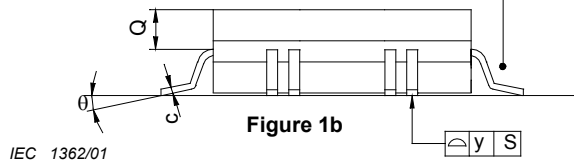
The index area is positioned at the upper left corner of the package body when it is viewed from the seating plane. The terminal that is closest to the index corner is numbered 1, and continued terminals that count in counter-clockwise directions are numbered 2, 3.



IEC 1361/01

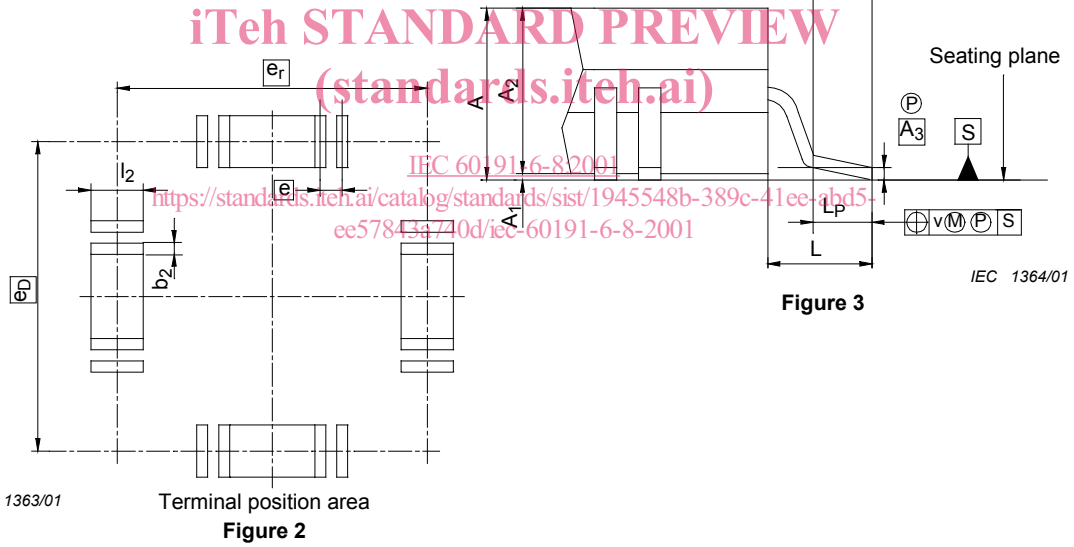
Figure 1a

See figure 3



IEC 1362/01

Figure 1b



IEC 1363/01

Terminal position area
Figure 2

Figure 3

IEC 1364/01

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Table 1 – Group 1: Dimensions appropriate to mounting and interchangeability

Ref.	Limits to be observed			Recommended values for the dimensions		Note ^a																																	
	Min.	Nom.	Max.	mm																																			
n		X				1																																	
n _D		X				1																																	
n _E		X				1																																	
A			X	A max. = 0,5 × m m = 3, 4, 5, 6, 7, 8, 9, 10, 11		2																																	
A1	X	X	X	<table border="1"> <tr> <td>A1_{min}</td> <td>0,00</td> <td>0,25</td> </tr> <tr> <td>A1_{nom}</td> <td>0,10</td> <td>0,40</td> </tr> <tr> <td>A1_{max}</td> <td>0,25</td> <td>0,50</td> </tr> </table>		A1 _{min}	0,00	0,25	A1 _{nom}	0,10	0,40	A1 _{max}	0,25	0,50																									
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A2	X	X	X	<table border="1"> <tr> <td>A2_{min}</td> <td>0,51</td> <td>1,01</td> <td>1,51</td> <td>2,01</td> <td>2,51</td> </tr> <tr> <td>A2_{nom}</td> <td>0,76</td> <td>1,26</td> <td>1,76</td> <td>2,26</td> <td>2,76</td> </tr> <tr> <td>A2_{max}</td> <td>1,00</td> <td>1,50</td> <td>2,00</td> <td>2,50</td> <td>3,00</td> </tr> </table> <table border="1"> <tr> <td>A2_{min}</td> <td>3,01</td> <td>3,51</td> <td>4,01</td> <td>4,51</td> </tr> <tr> <td>A2_{nom}</td> <td>3,26</td> <td>3,76</td> <td>4,26</td> <td>4,76</td> </tr> <tr> <td>A2_{max}</td> <td>3,50</td> <td>4,00</td> <td>4,50</td> <td>5,00</td> </tr> </table>		A2 _{min}	0,51	1,01	1,51	2,01	2,51	A2 _{nom}	0,76	1,26	1,76	2,26	2,76	A2 _{max}	1,00	1,50	2,00	2,50	3,00	A2 _{min}	3,01	3,51	4,01	4,51	A2 _{nom}	3,26	3,76	4,26	4,76	A2 _{max}	3,50	4,00	4,50	5,00	
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A2 _{max}	3,50	4,00	4,50	5,00																																			
A ₃		X		A ₃ = 0,25																																			
b _p	X	X	X	<table border="1"> <thead> <tr> <th>e</th> <th>b_{p min}</th> <th>b_{p nom}</th> <th>b_{p max}</th> </tr> </thead> <tbody> <tr> <td>1,0</td> <td>0,35</td> <td>0,42</td> <td>0,50</td> </tr> <tr> <td>0,8</td> <td>0,30</td> <td>0,37</td> <td>0,45</td> </tr> <tr> <td>0,65</td> <td>0,25</td> <td>0,32</td> <td>0,40</td> </tr> <tr> <td>0,5</td> <td>0,15</td> <td>0,22</td> <td>0,30</td> </tr> <tr> <td>0,4</td> <td>0,15</td> <td>0,18</td> <td>0,22</td> </tr> </tbody> </table>		e	b _{p min}	b _{p nom}	b _{p max}	1,0	0,35	0,42	0,50	0,8	0,30	0,37	0,45	0,65	0,25	0,32	0,40	0,5	0,15	0,22	0,30	0,4	0,15	0,18	0,22										
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D		X		<table border="1"> <thead> <tr> <th></th> <th>E_{nom}</th> <th>D_{nom}</th> </tr> </thead> <tbody> <tr> <td>Regular square</td> <td>5 × K – 0,8 6 × K – 0,8 7 × K – 0,8 20 + 4m – 0,8</td> <td></td> </tr> <tr> <td>Rectangular</td> <td>7 × K – 0,8</td> <td>5 × 2K – 0,8</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">E_{nom} × D_{nom}</th> </tr> <tr> <th>Square</th> <th>Rectangular</th> </tr> </thead> <tbody> <tr> <td>9,2 × 9,2</td> <td>13,2 × 19,2</td> </tr> <tr> <td>11,2 × 11,2</td> <td>27,2 × 39,2</td> </tr> <tr> <td>13,2 × 13,2</td> <td></td> </tr> <tr> <td>19,2 × 19,2</td> <td></td> </tr> <tr> <td>23,2 × 23,2</td> <td></td> </tr> <tr> <td>27,2 × 27,2</td> <td></td> </tr> <tr> <td>31,2 × 31,2</td> <td></td> </tr> <tr> <td>35,2 × 35,2</td> <td></td> </tr> <tr> <td>39,2 × 39,2</td> <td></td> </tr> </tbody> </table>			E _{nom}	D _{nom}	Regular square	5 × K – 0,8 6 × K – 0,8 7 × K – 0,8 20 + 4m – 0,8		Rectangular	7 × K – 0,8	5 × 2K – 0,8	E _{nom} × D _{nom}		Square	Rectangular	9,2 × 9,2	13,2 × 19,2	11,2 × 11,2	27,2 × 39,2	13,2 × 13,2		19,2 × 19,2		23,2 × 23,2		27,2 × 27,2		31,2 × 31,2		35,2 × 35,2		39,2 × 39,2		4		
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39,2 × 39,2																																							
E		X		<p>K = 2, 4 m = 3, 4, 5</p>																																			

^a See notes on pages 9 and 10.

Table 1 (continued)

Ref.	Limits to be observed			Recommended values for the dimensions mm	Note ^a																
	Min.	Nom.	Max.																		
\boxed{e}		X		\boxed{e} nom. = 1,0; 0,8; 0,65; 0,5; 0,4	5																
H _D	X	X	X	H _{D nom} = D _{nom} + 2L _{nom} H _{D min} = D _{nom} - 0,2 H _{D max} = D _{nom} + 0,2																	
H _E	X	X	X	H _{E nom} = E _{nom} + 2L _{nom} H _{E min} = H _{E nom} - 0,2 H _{E max} = H _{E nom} + 0,2																	
L		X		L _{nom} = 1,8; 2,1; 2,4																	
L _p	X	X	X	<table border="1"> <thead> <tr> <th>L_{nom}</th> <th>L_{p min}</th> <th>L_{p nom}</th> <th>L_{p max}</th> </tr> </thead> <tbody> <tr> <td>1,8, 2,1</td> <td>0,45</td> <td>0,60</td> <td>0,75</td> </tr> <tr> <td>2,4</td> <td>0,73</td> <td>0,88</td> <td>1,03</td> </tr> </tbody> </table>	L _{nom}	L _{p min}	L _{p nom}	L _{p max}	1,8, 2,1	0,45	0,60	0,75	2,4	0,73	0,88	1,03					
L _{nom}	L _{p min}	L _{p nom}	L _{p max}																		
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v			X	v _{max} = 0,3	6																
w			X	<table border="1"> <thead> <tr> <th>\boxed{e}</th> <th>w_{max}</th> <th>\boxed{e}</th> <th>w_{max}</th> </tr> </thead> <tbody> <tr> <td>1,0</td> <td>0,20</td> <td>0,5</td> <td>0,10</td> </tr> <tr> <td>0,8</td> <td>0,16</td> <td>0,4</td> <td>0,10</td> </tr> <tr> <td>0,65</td> <td>0,13</td> <td></td> <td></td> </tr> </tbody> </table>	\boxed{e}	w _{max}	\boxed{e}	w _{max}	1,0	0,20	0,5	0,10	0,8	0,16	0,4	0,10	0,65	0,13			6
\boxed{e}	w _{max}	\boxed{e}	w _{max}																		
1,0	0,20	0,5	0,10																		
0,8	0,16	0,4	0,10																		
0,65	0,13																				
y			X	y _{max} = 0,10																	
θ	X	X	X	θ _{min} = 0° θ _{nom} = 3° θ _{max} = 10°																	

^a See notes on pages 9 and 10.

Table 2 – Group 2: Dimensions appropriate to mounting and gauging

Ref.	Limits to be observed			Recommended values for the dimensions mm	Note ^a												
	Min.	Nom.	Max.														
b_2			X	$b_{2 \max} = b_{p \max} + W_{\max}$ <table border="1"> <thead> <tr> <th>e</th> <th>$b_{2 \max}$</th> </tr> </thead> <tbody> <tr> <td>1,00</td> <td>0,70</td> </tr> <tr> <td>0,80</td> <td>0,61</td> </tr> <tr> <td>0,65</td> <td>0,53</td> </tr> <tr> <td>0,50</td> <td>0,40</td> </tr> <tr> <td>0,40</td> <td>0,32</td> </tr> </tbody> </table>	e	$b_{2 \max}$	1,00	0,70	0,80	0,61	0,65	0,53	0,50	0,40	0,40	0,32	
e	$b_{2 \max}$																
1,00	0,70																
0,80	0,61																
0,65	0,53																
0,50	0,40																
0,40	0,32																
e		X		$e_{\text{nom}} = 1,0; 0,8; 0,65; 0,5; 0,4$	5												
e_D		X		$e_D = H_{D \text{ nom}} - L_{p \text{ nom}}$													
e_F		X		$e_F = H_{E \text{ nom}} - L_{p \text{ nom}}$													
l_2			X	$l_{2 \max} = L_{p \max} + V_{\max}$ <table border="1"> <thead> <tr> <th>L_{nom}</th> <th>$l_{2 \max}$</th> </tr> </thead> <tbody> <tr> <td>1,8; 2,1</td> <td>1,05</td> </tr> <tr> <td>2,4</td> <td>1,33</td> </tr> </tbody> </table>	L_{nom}	$l_{2 \max}$	1,8; 2,1	1,05	2,4	1,33							
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Table 3 – Group 3: Dimensions appropriate to automated handling

Ref.	Limits to be observed			Recommended values for the dimensions mm	Note																																	
	Min.	Nom.	Max.																																			
A ₂	X	X	X	<table border="1"> <tr> <td>A_{2 min}</td> <td>0,51</td> <td>1,01</td> <td>1,51</td> <td>2,01</td> <td>2,51</td> </tr> <tr> <td>A_{2 nom}</td> <td>0,76</td> <td>1,26</td> <td>1,76</td> <td>2,26</td> <td>2,76</td> </tr> <tr> <td>A_{2 max}</td> <td>1,00</td> <td>1,50</td> <td>2,00</td> <td>2,50</td> <td>3,00</td> </tr> </table> <table border="1"> <tr> <td>A_{2 min}</td> <td>3,01</td> <td>3,51</td> <td>4,01</td> <td>4,51</td> </tr> <tr> <td>A_{2 nom}</td> <td>3,26</td> <td>3,76</td> <td>4,26</td> <td>4,76</td> </tr> <tr> <td>A_{2 max}</td> <td>3,50</td> <td>4,00</td> <td>4,50</td> <td>5,00</td> </tr> </table>	A _{2 min}	0,51	1,01	1,51	2,01	2,51	A _{2 nom}	0,76	1,26	1,76	2,26	2,76	A _{2 max}	1,00	1,50	2,00	2,50	3,00	A _{2 min}	3,01	3,51	4,01	4,51	A _{2 nom}	3,26	3,76	4,26	4,76	A _{2 max}	3,50	4,00	4,50	5,00	
A _{2 min}	0,51	1,01	1,51	2,01	2,51																																	
A _{2 nom}	0,76	1,26	1,76	2,26	2,76																																	
A _{2 max}	1,00	1,50	2,00	2,50	3,00																																	
A _{2 min}	3,01	3,51	4,01	4,51																																		
A _{2 nom}	3,26	3,76	4,26	4,76																																		
A _{2 max}	3,50	4,00	4,50	5,00																																		
D	X		X	$D_{min} = D_{nom} - 0,3$ $D_{max} = D_{nom} + 0,3$																																		
E	X		X	$E_{min} = E_{nom} - 0,3$ $E_{max} = E_{nom} + 0,3$																																		
k	X			No definition																																		
Q	X			No definition																																		
β		X		β = 45°																																		

iTeh STANDARD PREVIEW

Table 4 – Group 4: Dimensions for information only

Ref.	Limits to be observed			Recommended values for the dimensions IEC 60191-6-8:2001 mm	Note ^a									
	Min.	Nom.	Max.											
c	X		X	<table border="1"> <tr> <td>\boxed{e}</td> <td>C_{min}</td> <td>C_{max}</td> </tr> <tr> <td>$\boxed{e} \geq 0,65$</td> <td>0,12</td> <td>0,23</td> </tr> <tr> <td>$\boxed{e} \leq 0,50$</td> <td>0,10</td> <td>0,20</td> </tr> </table>	\boxed{e}	C _{min}	C _{max}	$\boxed{e} \geq 0,65$	0,12	0,23	$\boxed{e} \leq 0,50$	0,10	0,20	7
\boxed{e}	C _{min}	C _{max}												
$\boxed{e} \geq 0,65$	0,12	0,23												
$\boxed{e} \leq 0,50$	0,10	0,20												
Z _D		X	X	$Z_{D\ nom} = (D_{nom} - (n_D - 1) \boxed{e}) / 2$ $Z_{D\ max} = (D_{max} - (n_D - 1) \boxed{e}) / 2$	8									
Z _E		X	X	$Z_{E\ nom} = (E_{nom} - (n_E - 1) \boxed{e}) / 2$ $Z_{E\ max} = (E_{max} - (n_E - 1) \boxed{e}) / 2$	8									

^a See notes on pages 9 and 10.

NOTE 1 The relation between the package body size and the maximum number of terminals will be as shown in the following table.

a) Regular square shape series

$E \times D^*$	$n_{nom} (n_{D\ nom} = n_{E\ nom} = n_{nom} / 4)$				
	1,00	0,80	0,65	0,50	0,40
\boxed{e}					
10 × 10	36	44	52	64	80
12 × 12		48	64	80	100
14 × 14	52	64	80	100	120
20 × 20	76	88	112	144	176
24 × 24				176	216
28 × 28		128	160	208	256
32 × 32			184	240	296
36 × 36				272	336
40 × 40			232	304	376

b) Rectangular shape series

$E \times D^a$	$n_{nom} (n_{D\ nom}, n_{E\ nom})$				
	1,00	0,80	0,65	0,50	0,40
\boxed{e}					
14 × 20	64 (13, 19)	80 (16, 24)	100 (20, 30)		
28 × 40				256 (52, 76)	

^a The E, D values shown in this table indicate integral numbers (as shown) minus 0,8 mm.

NOTE 2 The values stipulated by the mathematical expression must be applied to the individual overall dimensional standards.

NOTE 3 The following values are recommended for the thickness of the ceramic excluding the sealing glass.

Base	1,27
Cap	1,27
Frame	0,76
Lid	0,76

