

# *Specifications of Mobile QR Code*

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# Requirements of QR Code implementation

## 1. Mobile WEB network service

*A full line of QR Code applications are available with mobile WEB network service.*

## 2. Camera function

2-1. Close-up mode

2-2. Auto-focus

2-3. Optical zooming

2-4. Camera shake compensation

*Close-up mode offers user-friendly reading/operation.*

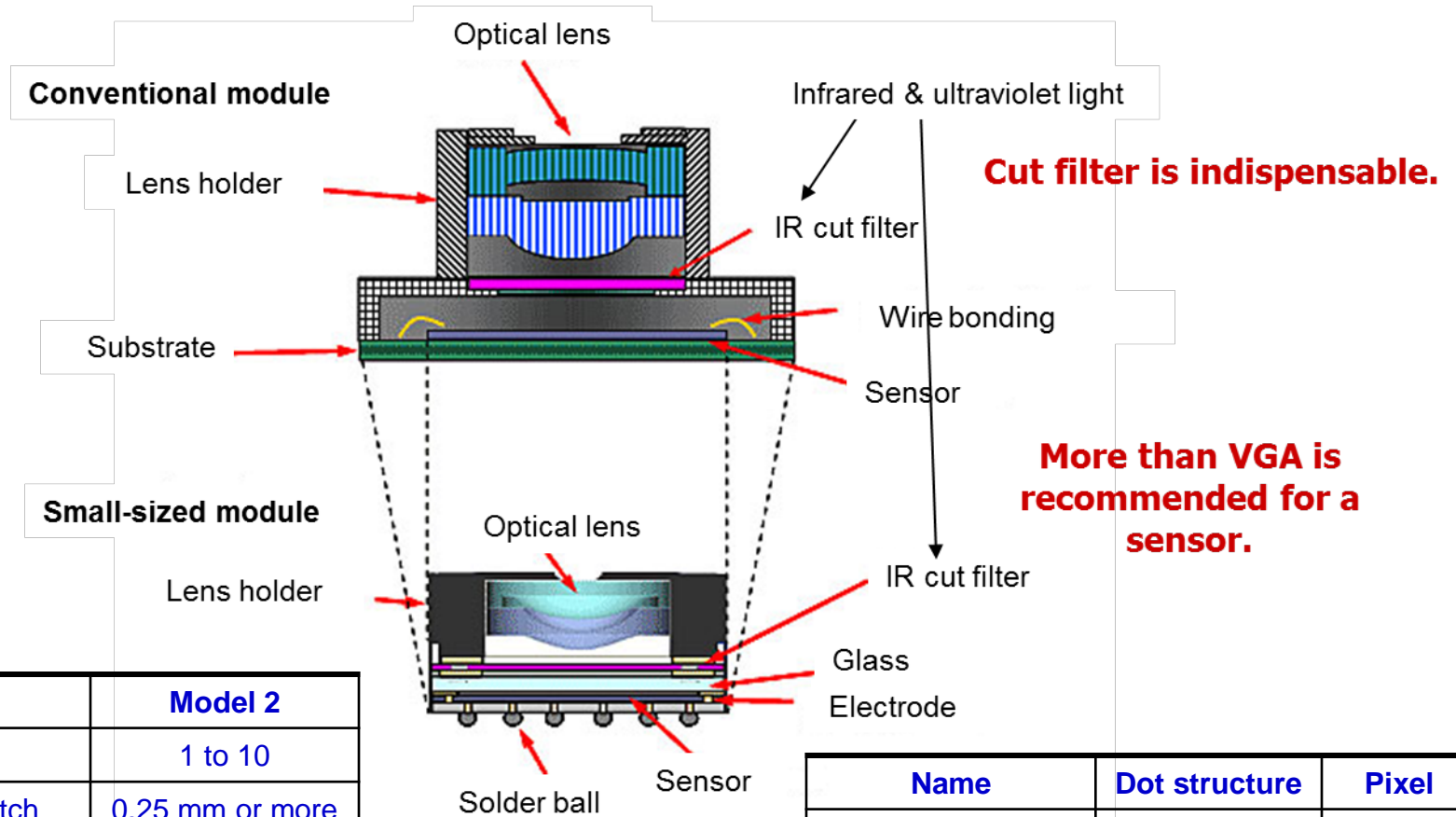
## 3. Camera module

3-1. Lens resolution

3-2. Number of image sensor pixels

## 4. Display




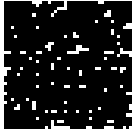
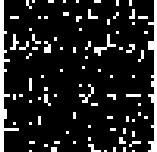
## Resolution of optical lens decides the need of image processing.



<b>Model</b>	<b>Model 2</b>
Version	1 to 10
Min. cell pitch	0.25 mm or more
Error correction	M
Reading direction	360°
Reading distortion	+/- 20°

Name	Dot structure	Pixel
1 million or more	-----	1 million
VGA	640 x 480	310,000
CIF	352 x 288	110,000
QVCA	320 x 240	80,000

# Size and volume of QR Code data (1)

Ver.	Cell	Data bit	Numeric	Alphanumeric	Binary	Kanji	Sample of QR Code
2	25 X 25	224	63	38	26	16	
4	33 X 33	512	149	90	62	38	
6	41 X 41	864	255	154	106	65	
8	49 X 49	1232	365	221	152	93	
10	57 X 57	1728	513	311	213	131	

# Size and volume of QR Code data (2)

Version	Cell	ECC Level	Data bits	Numeric	Alphanumeric	Binary	Kanji
1	21x21	L	152	41	25	17	10
		M	128	34	20	14	8
		Q	104	27	16	11	7
		H	72	17	10	7	4
2	25x25	L	272	77	47	32	20
		M	224	63	38	26	16
		Q	176	48	29	20	12
		H	128	34	20	14	8
3	29x29	L	440	127	77	53	32
		M	352	101	61	42	26
		Q	272	77	47	32	20
		H	208	58	35	24	15
4	33x33	L	640	187	114	78	48
		M	512	149	90	62	38
		Q	384	111	67	46	28
		H	288	82	50	34	21
5	37x37	L	864	255	154	106	65
		M	688	202	122	84	52
		Q	496	144	87	60	37
		H	368	106	64	44	27
6	41x41	L	1,088	322	195	134	82
		M	864	255	154	106	65
		Q	608	178	108	74	45
		H	480	139	84	58	36
7	45x45	L	1,248	370	224	154	95
		M	992	293	178	122	75
		Q	704	207	125	86	53
		H	528	154	93	64	39
8	49x49	L	1,552	461	279	192	118
		M	1,232	365	221	152	93
		Q	880	259	157	106	66
		H	688	202	122	84	52
9	53x53	L	1,856	552	335	230	141
		M	1,456	432	262	180	111
		Q	1,056	312	189	130	80
		H	800	235	143	98	60
10	57x57	L	2,192	652	395	271	167
		M	1,728	513	311	213	131
		Q	1,232	364	221	151	93
		H	976	288	174	119	74

# Decoding test without a macro lens (1)

Targeted handsets: NOKIA3230, NOKIA6600, NOKIA6680, NOKIA7610, A5506T(KDDI), N900i(NTT DoCoMo)

Condition: This is a testing if QR codes printed on papers can be decoded when they are scanned with the above handsets without zoom-macro lens(close-up lens) .

## RESULTS

➤ There are big differences in the decoding ratio depending on the camera performance of handsets. In the case that the cell size of QR codes is more than 0.9 and its version is 1 or later, all handsets can decode them. (QR code whose cell size is 0.9mm and version 5 can't be decoded with NOKIA3230.)

➤ N900i (without zoom-macro lens) can take images of QR codes from almost the same distance as when using close-up lens. If the cell size of QR codes is more than 0.6, it can decode them.

➤ There are big difference in the fair distance for decoding (the distance of a targeted QR code to a camera) of cameras if handsets don't have zoom-macro lens.

### Fair distance for decoding

NOKIA3230	: about 10cm	NOKIA6600	: about 10cm
NOKIA6680	: about 10cm	NOKIA7610	: about 8cm
A5506T	: about 20cm	N900i	: about 4cm







Cell size	Version	The numbers of cell	size on a side	Data Volume (alphanumeric character)	NOKIA 3230	NOKIA 6600	NOKIA 6680	NOKIA 7610	A5506T	N900i
0.5	1	21X21	14.5mm	20	×	×	×	×	×	×
	3	29X29	18.5mm	63	×	×	×	×	×	×
	5	37X37	22.5mm	123	×	×	×	×	×	×
0.6	1	21X21	17.4mm	20	×	×	×	×	×	○
	3	29X29	22.2mm	63	×	×	×	×	×	○
	5	37X37	27.0mm	123	×	×	×	×	×	○
0.7	1	21X21	20.3mm	20	×	×	×	×	×	○
	3	29X29	25.9mm	63	×	△	×	○	○	○
	5	37X37	31.5mm	123	×	△	×	○	○	○
0.8	1	21X21	23.2mm	20	×	○	×	○	○	○
	3	29X29	29.6mm	63	×	○	×	○	○	○
	5	37X37	36.0mm	123	×	○	×	○	○	○
0.9	1	21X21	26.1mm	20	○	○	○	○	○	○
	3	29X29	33.3mm	63	○	○	○	○	○	○
	5	37X37	40.5mm	123	×	○	○	○	○	○
1.0	1	21X21	29.0mm	20	○	○	○	○	○	○
	3	29X29	37.0mm	63	○	○	○	○	○	○
	5	37X37	45.0mm	123	○	○	○	○	○	○

-“Cell size” is indicated in millimeters







-“Size on a side” refers the size per one side. It includes a margin of 4 cells on the left, right, top and bottom.

-“Data volume” refers the maximum number of characters that can be contained in a QR code including only alphanumeric characters.

# Decoding test without a macro lens (2)







Cell pitch	Version 1	Version 3	Version 5
0.5mm	 <p>NOKIA 3230:NG NOKIA6800:NG NOKIA 6880:NG NOKIA7610:NG A5506T:NG N900i:NG</p>	 <p>NOKIA 3230:NG NOKIA6800:NG NOKIA 6880:NG NOKIA7610:NG A5506T:NG N900i:NG</p>	 <p>NOKIA 3230:NG NOKIA6800:NG NOKIA 6880:NG NOKIA7610:NG A5506T:NG N900i:NG</p>
0.6mm	 <p>NOKIA 3230:NG NOKIA6800:NG NOKIA 6880:NG NOKIA7610:NG A5506T:NG N900i:OK</p>	 <p>NOKIA 3230:NG NOKIA6800:NG NOKIA 6880:NG NOKIA7610:NG A5506T:NG N900i:OK</p>	 <p>NOKIA 3230:NG NOKIA6800:NG NOKIA 6880:NG NOKIA7610:NG A5506T:NG N900i:OK</p>

# Decoding test without a macro lens (3)

Cell pitch	Version 1	Version 3	Version 5
0.7mm	 <p>NOKIA 3230:NG NOKIA6800:NG NOKIA 6880:NG NOKIA7610:NG A5506T:NG N900i:OK</p>	 <p>NOKIA 3230:NG NOKIA6800:OK NOKIA 6880:NG NOKIA7610:OK A5506T:OK N900i:OK</p>	 <p>NOKIA 3230:NG NOKIA6800:OK NOKIA 6880:NG NOKIA7610:OK A5506T:OK N900i:OK</p>
0.8mm	 <p>NOKIA 3230:NG NOKIA6800:OK NOKIA 6880:NG NOKIA7610:OK A5506T:OK N900i:OK</p>	 <p>NOKIA 3230:NG NOKIA6800:OK NOKIA 6880:NG NOKIA7610:OK A5506T:OK N900i:OK</p>	 <p>NOKIA 3230:NG NOKIA6800:OK NOKIA 6880:NG NOKIA7610:OK A5506T:OK N900i:OK</p>



# Decoding test without a macro lens (4)

Cell pitch	Version 1	Version 3	Version 5
0.9mm	 NOKIA 3230:OK NOKIA6600:OK NOKIA 6680:OK NOKIA7610:OK A5506T:OK N900i:OK	 NOKIA 3230:OK NOKIA6600:OK NOKIA 6680:OK NOKIA7610:OK A5506T:OK N900i:OK	 NOKIA 3230:NG NOKIA6600:OK NOKIA 6680:OK NOKIA7610:OK A5506T:OK N900i:OK
1.0mm	 NOKIA 3230:OK NOKIA6600:OK NOKIA 6680:OK NOKIA7610:OK A5506T:OK N900i:OK	 NOKIA 3230:OK NOKIA6600:OK NOKIA 6680:OK NOKIA7610:OK A5506T:OK N900i:OK	 NOKIA 3230:OK NOKIA6600:OK NOKIA 6680:OK NOKIA7610:OK A5506T:OK N900i:OK

# QR Code displayed on Screen

Backlight LCD does not affect readability.

Readers produced by Denso Wave can read more than 20 times for 30 seconds, and read more than 40mm in depth.



Recommend 0.33-040 for cell pitch of display.(Crystalline liquid)

**NM502i** P2102V, D501i, P251iS , D251iS, R692i , F671i , D04 , D06, D31DN02 , DN03 , K03 , K04 , K05 , K06 , K51, N03 , N04 , N05, NW01, P02, P03, P51, PE03II , SA02 , SA03, SA04 , SA05, SA51, SH52 , T04 , T06, T07, T08, T09, T51, A1011ST, A1013K, A1014ST , A1101S, A3011SA, A3012CA, A3013T, A3014S, A3015SA, A5301T , A5302CA , A5303H, A5304T , C3001H, C3003P, C301T, C302H , C304SH, C305S, C307K, C308P, C309H, C310T, C313K, C413S, C452CA, TD11, TK03, TK04 , TK05, TK12 , TK21, TK22, TK23S, TP11, TS02, TS11, TT21, TT22

**Thank you for your attention!**

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