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2016

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2016  
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2017

40% 50 “ ”  
7

### 1. 专项定位

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2. 申报主体

3. 支持方式

1	2	
	2	
“	” “	” “
”		

20%

“ ”

## 4. 立项要求

### 4.1

1

2

3

4

9

5

7

6

**4.2**

1

1

2

3

4

5

6



## 1.2

	14 MeV	$>1 \times 10^8$ n/s
175 °C	$\geq 350$	
$>3 \times 10^7$ n/s	$\geq 3000$	
	9	3
3		150
1500		

## 1.3

	10 kV	20 A
$\leq 5$ ns	10 ns 200 ns	
1 Hz 400 kHz	$\leq 100$ ns	200
ns 1 $\mu$ s	1 Hz 100 kHz	$\leq 0.5$
$\mu$ s	1 $\mu$ s 100 $\mu$ s	1 Hz 50 kHz

$\geq 5000$

9

3

3

30

X



$\geq 1$  W    2200 nm    3900 nm  
 $\leq 3.0$     RMS     $\leq 10$  MHz    1.46  
 $\mu\text{m}$     3.9  $\mu\text{m}$      $\geq 10$  GHz  
 $\geq 1$  K    /     $\leq 10$  mm     $\leq 10$  mm·mrad  
 $\leq 400$  mm $\times$ 300 mm $\times$ 200 mm  
 $\geq 1000$     9  
3    1    30  
500

**1.6**

1064 nm    20 kW  
20 kHz    80 kHz     $\leq 80$  MHz     $M^2 \leq 1.5$   
 $\geq 5000$     9  
3    3  
50    1000  
**1.7**    **CMOS**  
CMOS

		$\geq 2048 \times 2048$	$\leq 7.5 \mu\text{m} \times 7.5$
$\mu\text{m}$	400 nm	1000 nm	
$\geq 30\% @ 550 \text{ nm}$			10 V/lux.s @ 550 nm
$\leq 30 \text{ pA/cm}^2$		20 / @12	
			$\geq 5000$
	9	5	1
		1	

### 1.8

		$\geq 1 \text{ mm} \times 1 \text{ mm}$	$\geq 10^5$
$\leq 1 \text{ nA}$		$\geq 30\%$	380 nm 550 nm
$\leq 1 \text{ kHz}$		$\leq 300 \text{ ps}$	CMOS
			$\geq 15000$
	9	5	
	500		

### 1.9

			340 nm	1100 nm	
$\leq 0.02$ ppb			$\leq 20$ $\mu$ V		$\geq 3.5$
V	$\pm 1\%$		$\leq 1$ W	$\leq 45$ cm <sup>3</sup>	
		$\geq 15000$			9
	3		3		
300			200		
<b>1.10</b>					

X

			$\geq 314$ mm <sup>2</sup>	$\leq 5$
nA/cm <sup>2</sup>		$\leq 35$ e	155 eV (5.9 keV)	
	5 mW			
		$\geq 15000$		9
5			500	
<b>1.11</b>				

		20 °C	350 °C	
0 ppmV	900000 ppmV		1000 ppmV	900000

ppmV	$\leq \pm 3\%$	$\leq 10$ s
	$\geq 168$	
$\geq 2500$	9	2
1	500	2500

### 1.12

	$10\ \mu\text{m}$	$100\ \mu\text{m}$	$\leq 1\ \text{nm}$
$0.1\ \text{nm}$	$0.05\%$		
	$\geq 5000$		9
	4	1	
1000			

### 1.13

	$\geq 23$	$\leq 1''$
$\leq 100\ \text{mm} \times 25\ \text{mm}$	$\geq 10\ \text{kHz}$	$\geq 60\ \text{g}$
RS422	CAN	

15000

9

2

1

4

3

*z*

*y*

$\geq 18000$

3

$\leq 0.001$

$\geq 30000$

1

2

9

3

5000

### 1.16

$\leq 0.00001 \text{ g}$

$\leq 120 \text{ g}$

$< 3 \text{ s}$

$0.03 \text{ mg}$

$5 \text{ g}$

$\pm 2 \text{ ppm/K}$

$10^\circ\text{C}$

$30^\circ\text{C}$

$\geq 5000$

9

2

1

300

600

### 1.17

$\pm 100000 \text{ nT}$

$2 \text{ pT}\sqrt{\text{Hz}}$   $1 \text{ Hz}$

$0.05^\circ$

$0.01\%$

DC  $10 \text{ kHz}$

$10 \text{ cm}^3$   
 $\geq 5000$  9  
 5 3  
 500  
**1.18**

10 L/s 25 L/s 50 L/s 200 L/s 400 L/s  
 $\leq 5.0 \times 10^{-10} \text{ Pa}$   $\leq 25 \text{ }^\circ\text{C}$   
 85%  $1.0 \times 10^{-7} \text{ Pa}$   
 50%  $1.0 \times 10^{-7} \text{ Pa}$   
 $\leq 1 \text{ Gs}$   $\leq 5 \times 10^{-13} \text{ mBar}$   
 50  
 $\geq 15000$  9  
 2 1  
 250  
**1.19**

$\geq 20 \text{ } \mu\text{m}$  X Y  $\geq 100 \text{ } \mu\text{m}$  Z  
 $\leq 0.4 \text{ nm}$  Z

	$\leq 0.1 \text{ nm}$		$\leq 0.3\%$		$\leq \pm 2 \text{ nm}$
	1 kg	120 g		X Y	$\geq 350 \text{ Hz}$
Z		$\geq 1400 \text{ Hz}$			
		$\geq 5000$			9
	2		1		
100					

## 2. 高端通用仪器工程化及应用开发

		8	
			8
	10		4
<b>2.1</b>			

		$\geq 120000$	1 pg
50 amu	4000 amu		$\leq 10 \text{ ppm}$
	$\geq 90\%$		
	$\geq 1000$		8
20		5	5



2000

**2.2**

$\leq 5$  pg/s C16

$\leq 0.005\%$  V/V C4

$\leq 10$  pg/s

320°C

$\geq 5000$

8

3

3

50

2000

**2.3**

100 mm

100 mm 1000 mm

$\leq 5 \mu\text{m}$   $\geq 600 \text{ Hz}$  170 600 nm  
 $\leq 0.015 \text{ nm}$   $\geq 10$  C Si Mn  
Cr Ni Mo Cu Al  $\leq 0.002\%$   
RSD $\leq 1\%$  P S  $\leq 0.001\%$  RSD $\leq 3\%$   
1 10 mm/min

$\geq 3500$  8 3  
3 50

## 2.4

$\leq 100 \text{ nm}$   $\leq 100 \text{ ms}$   
 $\geq 1 \text{ cm}$   $\leq 1 \mu\text{m}$   $\geq 2.5$   
THz

$\geq 1000$   
8 5 2  
2 8  
1600

## 2.5

		$\geq 1 \text{ m} \times 1 \text{ m} \times 2 \text{ m}$	$\leq 1 \text{ mm}$
	$\leq 0.05 \text{ mm}$	$\geq 12 \text{ bit}$	
		$\leq 1 \text{ s}$	
$\geq 2000$		8	10
	5	3	
10		2000	
<b>2.6</b>			
		$\geq 13 \text{ N}$	40 keV
10 MeV		$\geq 90\%$ 1.33 MeV	$\leq 1.2$
keV	122 keV	$\leq 2.0 \text{ keV}$	1332 keV
	$\geq 40$		
	$\geq 5000$		8
3		6	50 /
		5000	

## 2.7

I/Q		2	50 MSa/s	10 GSa/s
4 GHz			10 bit	2 G
	$\pm 1$ dB			$-50$ dBc
dBc/Hz	10 kHz			$\leq -90$
$\geq 5000$			8	5
	3		3	
100			2000	

## 2.8

		16	100 MHz
12 GHz	1 Hz	$-120$ dBm	$+8$ dBm

	40 MHz		16	100
MHz	12 GHz		-153 dBm	

$\geq 2000$		8		2
	2	1		
20		3000		
<b>2.9</b>				

				DSP
FPGA			A/D	D/A
			512	800
Mbps		4		200 Msps A/D
16 bit			4	
200 Msps	D/A	16 bit		10
				100
			$\geq 2000$	
8		3		3

20

2000

**2.10**

/ /

1310±20 nm 1550±20 nm

±0.5 dBo -2

dBm +4 dBm

-25 dBm +4 dBm

10 MHz 50 GHz

≤±2.2

dBe ≤±2.7 dBe

≤±1.3 dBe

≥5000

8

4

3

1

30

2000

**2.11**

$\geq \varnothing 300 \text{ mm}$  12  
 $\geq 200 \mu\text{m}$   $\leq 0.1 \text{ nm RMS}$   
 $\leq 0.01 \text{ nm}$  1 nm 200  $\mu\text{m}$   
 $\geq 3$   $\leq 0.1 \text{ nm}$   $\leq 2\%$   
 $\leq 1\%$   $\leq 2 \mu\text{m}$   
 $\geq 3000$   
8 20 5  
3 10  
2000  
**2.12**

$\leq 0.1 \text{ nm}$   $\leq 30$   
nm,  $\leq 1 \text{ mm}$   $\leq 150 \text{ nm}$  1 mm  
 $\leq 1 \mu\text{m}$   $\leq 1/100$   
 $\leq 2 \cdot 10^{-7} \text{ nm}(\text{W}/\text{Hz})^{1/2}$   $\geq 100 \mu\text{m}$

$\geq 50 \text{ mm}$   
 $\geq 25 \text{ fps}$   
 $\geq 1000$   
 2                      3                      8                      4                      5000

### 3. 专业重大科学仪器开发及应用示范

8  
 10                      4                      8  
**3.1 X**

X

$\leq 1 \mu\text{m}$                        $\geq 1 \text{ W}/\mu\text{m}$  X  
 $\leq 100 \text{ LP}/\text{mm}$   
 $\geq 300 \text{ mm} \times 300 \text{ mm}$   
 $\geq 3000$   
 8                      6                      2



2

30

### 3.2

			360°	±45°
	≥100 m		≤10 μm/m	
	≤0.3 mm@100 m		≤1.0"	
	≤1.0"		≤1.0"	
			≥800	
8		5		2
			3000	2

### 3.3

		15000	105000 nT	
≥40000 nT/m		≤0.0006 nT√Hz	RMS	≥100
Sa/s	≤0.002 nT	0.1	1 Hz	≤±0.25
nT	<± 0.3 nT			15° 75°

105° 165°

≥2000

8

3

3

3

5000

3.4

/

/

20000 rpm

80000 rpm

0.5 Nm

50 Nm

3

kW 100 kW

5‰

2%

0 20 μm

≤0.2 μm

1

S1 S6

IEEE

≥1000

8 3 3  
3 100  
**3.5**

$\geq 500^{\circ}\text{C}$   $\geq 8$   $\leq 10\%$   
10 Hz 40 kHz  $\geq 102.4 \text{ kSa/s}$   
 $\geq 130 \text{ dB}$   $\leq \pm 0.02 \text{ dB}$   
 $\leq \pm 0.2^{\circ}$  40 kHz  
 $\geq 2000$  8  
5 3 3  
1000

**3.6**

$\geq 500 \text{ m}$



$\leq 0.5 \text{ Nm}$

ISO 15066

$\geq 5000$  8 3  
3 2  
20 5000  
**3.8**

$\geq 30 \text{ fps}$   $\geq 100$   
400 nm 1000 nm  $\leq 2 \text{ nm}$   
 $\geq 1000$   
8 10  
5 3  
3000  
**3.9**

		-100°C	100°C	
$\leq 10^{-5}$ Pa		$\leq \pm 0.005$ mm		$\leq \pm 0.1$
		$\leq 0.5\%$		
$\leq 0.1\%$		$\leq 0.5\%$		0
500 Nm	$\leq 0.5\%$ FS		$\geq 150$	$\geq 5$
kHz	$\geq 20$	$\leq 0.5\%$		
		$\geq 1000$		
8		3	3	
3		15		4500

### 3.10

RV

RV

				$\leq \pm 2$
		$\leq \pm 1$		$\leq 5000$
Nm	$\leq 0.2\%$ FS			
		6000 rpm		$\leq \pm 15$
	$\leq \pm 7.5$		0	5000 Nm

	$\leq 0.2\%$ FS	/		$\pm 1$ rpm
			/	
$\geq 8000$			8	3
	2		2	
10			1500	
<b>3.11</b>				
			pH	
	$< 0.1\%$	pH	$< 0.1$	$< 0.1\%$
$< 0.05$ mg/kg	$< 0.05$ mg/kg		$< 1$ mg/kg	$< 5$ mg/kg
$< 0.05$ mg/kg	$< 5$ mg/kg		$< 1$ mg/kg	$< 0.01$ mg/kg
$\leq 10\%$	$\leq 15\%$			$< 0.1$
mg/kg	$\leq 10\%$		$\leq 20\%$	
			$\geq 2000$	
9		5		10
			50	3000

### 3.12

				$\leq 0.01$ ppb	
		$\leq 0.05$ ppb			
$\leq 0.5$ ppb		$\leq 5\%$	$\leq 5\%$	24	$\leq 1\%$
					HJ
654-2013				9	
6		3		3	
	50			3000	

### 3.13

	10		$\geq 6$	
$\leq 3\%$		$\leq 0.01$ mg/L	$\leq 0.05$ mg/L	$\leq 0.01$



mg/L            ≤0.005 mg/L            ≤0.02 mg/L            ≤0.1 mg/L  
 ≤0.001 mg/L            ≤0.005 mg/L            ≤0.1 mg/L  
 ≤0.1 mg/L            ≤0.005 mg/L            ≤0.05  
 mg/L

HJ/T 101-2003

9

5

3

3

100

3000

**3.14**

≥10

≥4

≥1 /

≤10%

≥10

≥90%

≥2000

≤20

≥1440

8

2

3

1

50

1000

**3.15**

	$\leq 5 \mu\text{m}$	/
$\geq 150 \text{ mm}/48 \text{ K}$	$\geq 100 \times 150 \text{ mm}$	$\geq 100000$
s		$\geq 95\%$
		$\geq 1000$
	8	10
	3	3
		3000

**3.16**

	$1550 \text{ nm} \pm 5 \text{ nm}$
$-15000 \mu\epsilon$ $+15000 \mu\epsilon$	$\leq \pm 10 \mu\epsilon$
$\geq 60 \text{ km}$	$\leq 0.2 \text{ m}$

2  
 30  
 3.17  
 1  
 2000  
 8  
 5  
 $\geq 5000$

0 1500  
 $\geq 350$  km  
 5%  
 0.5%  
 mm  
 $\geq 80\%$   
 $\leq 0.2$ m  
 $\geq 6$  m  
 $\leq 1.5$  m  
 $\leq 1.5$  m  
 MPa  
 2  
 12  
 4 m/s  
 5×5

$\geq 100$  km

3

2

2

8

1

### 3.18

$S \leq 0.1\%$   $Cl \leq 0.1\%$   $As \leq 0.001\%$

$Pb \leq 0.001\%$   $Cd \leq 0.001\%$   $Cu \leq 0.01\%$   $Mn \leq 0.001\%$   $Zn \leq 0.01\%$

$Au \leq 0.01\%$   $Pt \leq 0.01\%$

$\geq 20$

$\geq 100$

5

5

$\geq 3000$

8

3

3

3

2000

### 3.19

			$1 \times 10^{10} \text{ n/cm}^2 \cdot \text{s}$	$1.4 \times 10^{14}$
$\text{n/cm}^2 \cdot \text{s}$		$\leq 2\%$	$\leq 1 \text{ s}$	0
$^{\circ}\text{C}$	1000	$^{\circ}\text{C}$		$\leq \pm 50$
mm		3	$\leq 30 \text{ s}$	
		$\geq 80000$		8
	5		3	
1				

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- 2.
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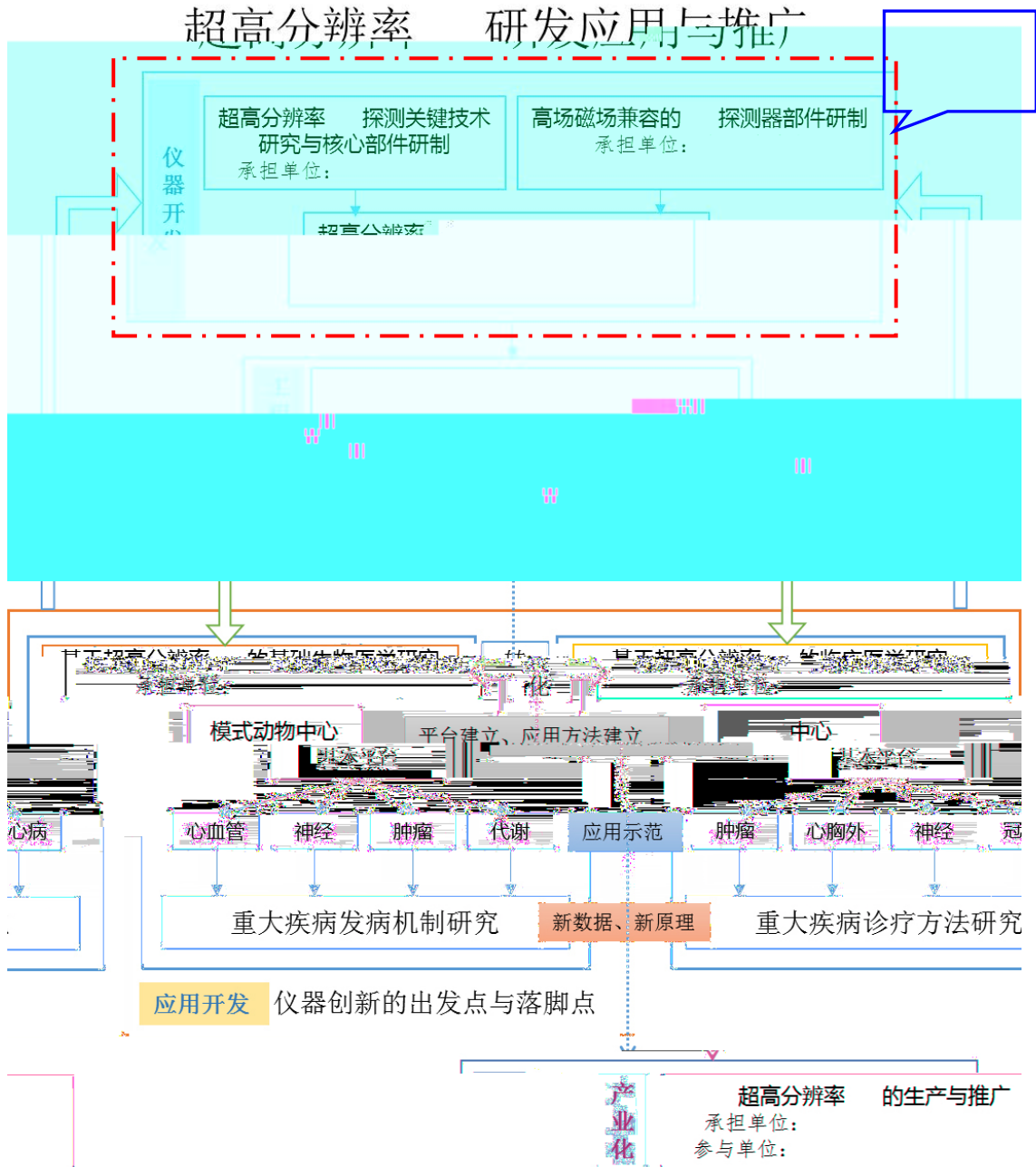
1  
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MTBF

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GB/T 5080

GB/T 2423

GB/T 16260

GB/T 17626

GB/T

25000

2.

FRACAS

3.



**3**

5000

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				/	
			ID		



**2**

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...					
* 5					
		2016			
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2					
...					

**3**

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2						
3						
...						

- 1.
- 2.
- 3.

4

				/	/	/	
	.....						
	.....						

				MTBF $\geq$ XXXX	MTBF $\geq$ XXXX	MTBF $\geq$ XXXX	
		.....					
		.....					

1 “ ”

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4 “ ”

**5** /

		/	/

**6**

	TRL	
	TRL 3	1 / 2 3 4 5 6
	TRL 6	1 2 3 4 5 6 FRACAS
	TRL 8	1 2 3 4 / / 5 6 7 8