Fig.1f left Weight adjust.	
Buffer	1X
DTT	3 mM
dNTP	25 µM
rTα-FAM	25 nM
X_1toα (cT_p)	0 ~ 10 nM
X_1tof (fT)	0 ~ 10 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	40 u.mL^{-1}
ttRecJ	3 nM
Nb.BsmI	400 u.mL^{-1}
X_1	0 ~ 10 nM
T	45 °C

Fig.1f middle Summation	
Buffer	1X
DTT	3 mM
dNTP	25 µM
rTα-FAM	25 nM
X_1toα (cT_p)	5 nM
X_1tof (fT)	5 nM
X_2toα (cT_p)	10 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	40 u.mL^{-1}
ttRecJ	3 nM
Nb.BsmI	400 u.mL^{-1}
X_1	0 ~ 10 nM
X_2	0 ~ 10 nM
T	45 °C

Fig.1f right Activation f.	
Buffer	1X
DTT	3 mM
dNTP	25 µM
aTα	30 nM
dTα	0 ~ 50 nM
rTα-FAM	25 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	400 u.mL^{-1}
α	0 ~ 50 nM
T	45 °C

Fig.2a Positive Bulk	
Buffer	1X
DTT	3 mM
dNTP	100 µM
aTα	30 nM
dTα	30 nM
rTα-FAM	25 nM
X_1toα (cT_p)	1 nM
X_2toα (cT_p)	1 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	400 u.mL^{-1}
X_1	0 ~ 1 nM
X_2	0 ~ 1 nM
T	45 °C

Fig.2b Negative Bulk	
Buffer	1X
DTT	3 mM
dNTP	100 µM
aTα	30 nM
dTα	5 nM
rTα-FAM	25 nM
X_1todTα (cT_n)	0.6 nM
X_1todTf (fT)	0.4 nM
X_2toα (cT_p)	1 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	400 u.mL^{-1}
Nt.BstNBI	10 u.mL^{-1}
X_1	0 ~ 1 nM
X_2	0 ~ 1 nM
T	45 °C

Fig.2c Positive droplet 1	
Buffer	1X
DTT	3 mM
dNTP	100 µM
aTα	30 nM
dTα	15 nM
rTα-FAM	25 nM
X_1toα (cT_p)	0.5 nM
X_1tof (fT)	0.5 nM
X_2toα (cT_p)	0.5 nM
X_2tof (fT)	0.5 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	400 u.mL^{-1}
Dx Casc.Blue	200 nM
Dx Alexa594	25 nM
Dx Cy7	250 nM
Tube 1	
Mastermix + X_1 1 nM	
Dx Cy7	750 nM
Tube 2	
Mastermix + X_2 1 nM	
Dx Alexa594	75 nM
Tube 3	
Mastermix	
T	45 °C

Fig.2c Positive droplet 2	
Buffer	1X
DTT	3 mM
dNTP	100 µM
aTα	30 nM
dTα	15 nM
rTα-FAM	25 nM
X_1toα (cT_p)	0.75 nM
X_1tof (fT)	0.25 nM
X_2toα (cT_p)	0.75 nM
X_2tof (fT)	0.25 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	400 u.mL^{-1}
Dx Casc.Blue	200 nM
Dx Alexa594	25 nM
Dx Cy7	250 nM
Dx Alexa647	50 nM
Tube 1	
Mastermix + X_1 1 nM	
Dx Cy7	750 nM
Tube 2	
Mastermix + X_2 1 nM	
Dx Alexa594	75 nM
Tube 3	
Mastermix	
T	45 °C

Fig.2c Positive droplet 3	
Buffer	1X
DTT	3 mM
dNTP	100 μM
aTα	30 nM
dTα	18 nM
rTα-FAM	25 nM
X_1toα (cT_p)	0.5 nM
X_1tof (fT)	0.5 nM
X_2toα (cT_p)	0.5 nM
X_2tof (fT)	0.5 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	400 u.mL^{-1}
Dx Casc.Blue	200 nM
Dx Alexa594	25 nM
Dx Cy7	250 nM
Dx Alexa647	200 nM

Tube 1	
Mastermix + X_1 1 nM	
Dx Cy7	750 nM
Tube 2	
Mastermix + X_2 1 nM	
Dx Alexa594	75 nM
Tube 3	
Mastermix	
T	45 °C

Fig.2d Negative droplet 3	
Buffer	1X
DTT	3 mM
dNTP	100 μM
aTα	30 nM
dTα	5 nM
rTα-FAM	25 nM
X_1todTα (cT_n)	0.6 nM
X_1todTf (fT)	0.4 nM
X_2toα (cT_p)	1 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	400 u.mL^{-1}
Dx Casc.Blue	200 nM
Dx Alexa594	25 nM
Dx Cy7	250 nM

Tube 1	
Mastermix + X_1 1 nM	
Dx Cy7	750 nM
Tube 2	
Mastermix + X_2 1 nM	
Dx Alexa594	75 nM
Tube 3	
Mastermix	
T	45 °C

Fig.S12c,f Majority voting	
Buffer	1X
DTT	3 mM
dNTP	25 μM
aTα$_{MV}$	40 nM
dTα$_{MV}$	50 nM
rTα$_{MV}$-Cy5	25 nM
X_1toα$_{MV}$ (cT_p)	96 pM
X_2toα$_{MV}$ (cT_p)	84 pM
X_3toα$_{MV}$ (cT_p)	140 pM
X_4toα$_{MV}$ (cT_p)	230 pM
X_5toα$_{MV}$ (cT_p)	360 pM
X_6toα$_{MV}$ (cT_p)	72 pM
X_7toα$_{MV}$ (cT_p)	140 pM
X_8toα$_{MV}$ (cT_p)	60 pM
X_9toα$_{MV}$ (cT_p)	170 pM
X_{10}toα$_{MV}$ (cT_p)	48 pM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	18 nM
Nb.BsmI	300 u.mL^{-1}
X_1 ~X_{10} combinations	5 nM each
T	48.5 °C

Fig.S12f Majority voting X_3^V	
Buffer	1X
DTT	3 mM
dNTP	25 μM
aTα$_{MV}$	40 nM
dTα$_{MV}$	50 nM
rTα$_{MV}$-Cy5	25 nM
X_1toα$_{MV}$ (cT_p)	96 pM
X_2toα$_{MV}$ (cT_p)	84 pM
X_3todTα$_{MV}$ (cT_n)	300 pM
X_4toα$_{MV}$ (cT_p)	230 pM
X_5toα$_{MV}$ (cT_p)	360 pM
X_6toα$_{MV}$ (cT_p)	72 pM
X_7toα$_{MV}$ (cT_p)	140 pM
X_8toα$_{MV}$ (cT_p)	60 pM
X_9toα$_{MV}$ (cT_p)	170 pM
X_{10}toα$_{MV}$ (cT_p)	48 pM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	18 nM
Nb.BsmI	300 u.mL^{-1}
Nt.BstNBI	10 u.mL^{-1}
X_1 ~X_{10} combinations	5 nM each
T	48.5 °C

Fig.S12f Majority voting X_7^V	
Buffer	1X
DTT	3 mM
dNTP	25 μM
aTα$_{MV}$	40 nM
dTα$_{MV}$	50 nM
rTα$_{MV}$-Cy5	25 nM
X_1toα$_{MV}$ (cT_p)	96 pM
X_2toα$_{MV}$ (cT_p)	84 pM
X_3toα$_{MV}$ (cT_p)	140 pM
X_4toα$_{MV}$ (cT_p)	230 pM
X_5toα$_{MV}$ (cT_p)	360 pM
X_6toα$_{MV}$ (cT_p)	72 pM
X_7todTα$_{MV}$ (cT_n)	1.5 nM
X_8toα$_{MV}$ (cT_p)	60 pM
X_9toα$_{MV}$ (cT_p)	170 pM
X_{10}toα$_{MV}$ (cT_p)	48 pM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	18 nM
Nb.BsmI	300 u.mL^{-1}
Nt.BstNBI	10 u.mL^{-1}
X_1 ~X_{10} combinations	5 nM each
T	48.5 °C

Fig.S12f Majority voting X_8^V	
Buffer	1X
DTT	3 mM
dNTP	25 μM
aTα$_{MV}$	40 nM
dTα$_{MV}$	50 nM
rTα$_{MV}$-Cy5	25 nM
X_1toα$_{MV}$ (cT_p)	96 pM
X_2toα$_{MV}$ (cT_p)	84 pM
X_3toα$_{MV}$ (cT_p)	140 pM
X_4toα$_{MV}$ (cT_p)	230 pM
X_5toα$_{MV}$ (cT_p)	360 pM
X_6toα$_{MV}$ (cT_p)	72 pM
X_7toα$_{MV}$ (cT_p)	140 pM
X_8toα$_{MV}$ (cT_p)	1.5 nM
X_9toα$_{MV}$ (cT_p)	170 pM
X_{10}toα$_{MV}$ (cT_p)	48 pM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	18 nM
Nb.BsmI	300 u.mL^{-1}
Nt.BstNBI	10 u.mL^{-1}
X_1 ~X_{10} combinations	5 nM each
T	40~50 °C

Fig.S12f Majority voting X_3^M	
Buffer	1X
DTT	3 mM
dNTP	25 µM
$aT\alpha_{MV}$	40 nM
$dT\alpha_{MV}$	50 nM
$rT\alpha_{MV}$-Cy5	25 nM
X_1toa_{MV} (cT_p)	96 pM
X_2toa_{MV} (cT_p)	84 pM
X_3toa_{MV} (cT_p)	500 pM
X_4toa_{MV} (cT_p)	230 pM
X_5toa_{MV} (cT_p)	360 pM
X_6toa_{MV} (cT_p)	72 pM
X_7toa_{MV} (cT_p)	140 pM
X_8toa_{MV} (cT_p)	60 pM
X_9toa_{MV} (cT_p)	170 pM
$X_{10}toa_{MV}$ (cT_p)	48 pM
BSA 9000S	0.2 $mg.mL^{-1}$
Vent(exo-)	30 $u.mL^{-1}$
ttRecJ	18 nM
Nb.BsmI	300 $u.mL^{-1}$
X_1 ~X_{10} combinations	5 nM each
T	48.5 °C

Fig.S12f Majority voting X_4^M	
Buffer	1X
DTT	3 mM
dNTP	25 µM
$aT\alpha_{MV}$	40 nM
$dT\alpha_{MV}$	50 nM
$rT\alpha_{MV}$-Cy5	25 nM
X_1toa_{MV} (cT_p)	96 pM
X_2toa_{MV} (cT_p)	84 pM
X_3toa_{MV} (cT_p)	500 pM
X_4toa_{MV} (cT_p)	1 nM
X_5toa_{MV} (cT_p)	360 pM
X_6toa_{MV} (cT_p)	72 pM
X_7toa_{MV} (cT_p)	140 pM
X_8toa_{MV} (cT_p)	60 pM
X_9toa_{MV} (cT_p)	170 pM
$X_{10}toa_{MV}$ (cT_p)	48 pM
BSA 9000S	0.2 $mg.mL^{-1}$
Vent(exo-)	30 $u.mL^{-1}$
ttRecJ	18 nM
Nb.BsmI	300 $u.mL^{-1}$
X_1 ~X_{10} combinations	5 nM each
T	48.5 °C

Fig.3 1D gate function	
Buffer	1X
DTT	3 mM
dNTP	100 µM
aTα	30 nM
dTα	20 nM
rTα-FAM	25 nM
aTβ	30 nM
dTβ	20 nM
rTβ-Hex	25 nM
aTγ	30 nM
dTγ	20 nM
rTγ-Cy5	25 nM
let7atoα (cT_n)	100 pM
let7atoβ (cT_n)	100 pM
αtoγ (cT_p)	1 nM
βtodTγ (cT_n)	3 nM
BSA 9000S	0.2 $mg.mL^{-1}$
Vent(exo-)	30 $u.mL^{-1}$
ttRecJ	23 nM
Nb.BsmI	400 $u.mL^{-1}$
Nt.BstNBI	10 $u.mL^{-1}$
Dx Casc.Blue	200 nM
Dx Alexa594	75 nM
Tube 1	
Mastermix + Let7a 200 pM	
Dx Casc.Blue	200 nM
Tube 2	
Mastermix + dTβ 50 nM	
Dx Alexa594	75 nM
Tube 3	
Mastermix	
T	46 °C

Fig.4 and Ext. Data Fig.8	
Buffer	1X
DTT	3 mM
dNTP	100 µM
aTα	30 nM
dTα	5 nM
rTα-FAM	25 nM
aTβ	30 nM
dTβ	15 nM
rTβ-Cy5	25 nM
$X_1todT\alpha$ (cT_n)	0.6 nM
X_1todTf (fT)	0.4 nM
$X_1toβ$ (cT_p)	0.1 nM
$X_2toα$ (cT_p)	1 nM
$X_2toβ$ (cT_p)	0.1 nM
αNORβ gate Atto Rho6G	20 nM
BSA 9000S	0.2 $mg.mL^{-1}$
Vent(exo-)	30 $u.mL^{-1}$
ttRecJ	23 nM
Nb.BsmI	400 $u.mL^{-1}$
Nt.BstNBI	10 $u.mL^{-1}$
Dx Casc.Blue	50 nM
Dx Alexa594	25 nM
Dx Cy7	250 nM
Tube 1	
Mastermix + X_1 2 nM	
Dx Cy7	750 nM
Tube 2	
Mastermix + X_2 2 nM	
Dx Alexa594	75 nM
Tube 3	
Mastermix	
T	40~50 °C (Ext.Data Fig8)
T	45 °C (Fig. 4)

Ext. Data Fig.4	
Buffer	1X
DTT	3 mM
dNTP	100 µM
aTα	30 nM
rTα-FAM	25 nM
$X_1toα$ (cT_p)	1 nM
BSA 9000S	0.2 $mg.mL^{-1}$
Vent(exo-)	30 $u.mL^{-1}$
ttRecJ	23 nM
Nb.BsmI	400 $u.mL^{-1}$
Dx Casc.Blue	200 nM
Dx Alexa594	25 nM
Dx Cy7	250 nM
Tube 1	
Mastermix + X_1 1 nM	
Dx Cy7	750 nM
Tube 2	
Mastermix + dTα 60 nM	
Dx Alexa594	75 nM
Tube 3	
Mastermix	
T	40~50 °C (SI)

Ext. Data Fig.6a	
Buffer	1X
DTT	3 mM
dNTP	25 µM
$rT\alpha_{MV}$-Cy5	50 nM
$Xtoa_{MV}$ (cT_p)	1 nM
X_2toa_{MV} (cT_p)	1 nM
X_3toa_{MV} (cT_p)	1 nM
X_4toa_{MV} (cT_p)	1 nM
X_5toa_{MV} (cT_p)	1 nM
X_6toa_{MV} (cT_p)	1 nM
X_7toa_{MV} (cT_p)	1 nM
X_8toa_{MV} (cT_p)	1 nM
X_9toa_{MV} (cT_p)	1 nM
$X_{11}toa_{MV}$ (cT_p)	1 nM
X_i	2 nM
BSA 9000S	0.2 $mg.mL^{-1}$
Vent(exo-)	70 $u.mL^{-1}$
ttRecJ	23 nM
Nb.BsmI	200 $u.mL^{-1}$

Ext. Data Fig.6b	
Buffer	1X
DTT	3 mM
dNTP	25 µM
rTα$_{MV}$-Cy5	50 nM
X$_1$toα$_{MV}$ (cT$_p$)	0.8 nM
X$_2$toα$_{MV}$ (cT$_p$)	0.7 nM
X$_3$toα$_{MV}$ (cT$_p$)	1 nM
X$_4$toα$_{MV}$ (cT$_p$)	1.9 nM
X$_5$toα$_{MV}$ (cT$_p$)	3 nM
X$_6$toα$_{MV}$ (cT$_p$)	0.5 nM
X$_7$toα$_{MV}$ (cT$_p$)	1.4 nM
X$_8$toα$_{MV}$ (cT$_p$)	0.6 nM
X$_9$toα$_{MV}$ (cT$_p$)	1.4 nM
X$_{11}$toα$_{MV}$ (cT$_p$)	0.2 nM
X$_i$	2 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	70 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	200 u.mL^{-1}
T	48.5 °C

Ext. Data Fig.6d,e	
Buffer	1X
DTT	3 mM
dNTP	25 µM
aTα$_{MV}$	40 nM
dTα$_{MV}$	50 nM
rTα$_{MV}$-Cy5	40 nM
X$_i$toα$_{MV}$ (cT$_p$)	1X
X$_i$	0-5 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	300 u.mL^{-1}
T	48.5 °C

X$_i$ bundle 1X	
X$_1$toα$_{MV}$ (cT$_p$)	0.8 nM
X$_2$toα$_{MV}$ (cT$_p$)	0.7 nM
X$_3$toα$_{MV}$ (cT$_p$)	1.2 nM
X$_4$toα$_{MV}$ (cT$_p$)	1.9 nM
X$_5$toα$_{MV}$ (cT$_p$)	3 nM
X$_6$toα$_{MV}$ (cT$_p$)	0.6 nM
X$_7$toα$_{MV}$ (cT$_p$)	1.2 nM
X$_8$toα$_{MV}$ (cT$_p$)	0.5 nM
X$_9$toα$_{MV}$ (cT$_p$)	1.4 nM
X$_{10}$toα$_{MV}$ (cT$_p$)	0.4 nM

Ext. Data Fig.6f	
Buffer	1X
DTT	3 mM
dNTP	25 µM
aTα$_{MV}$	40 nM
dTα$_{MV}$	50 nM
rTα$_{MV}$-Cy5	40 nM
X$_i$toα$_{MV}$ (cT$_p$)	0.04 ~1X
X$_i$	0-5 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	300 u.mL^{-1}
T	48.5 °C

Ext. Data Fig.7	
Buffer	1X
DTT	3 mM
dNTP	100 µM
aTα	30 nM
dTα	15 nM
rTα-FAM	25 nM
aTβ	30 nM
dTβ	15 nM
rTβ-Cy5	25 nM
X$_1$toα (cT$_p$)	1 nM
X$_1$toβ (cT$_p$)	1 nM
αNORβ gate Atto Rho6G	25 nM
X$_1$	0-1 nM
X$_2$	0-1 nM
BSA 9000S	0.2 mg.mL^{-1}
Vent(exo-)	30 u.mL^{-1}
ttRecJ	23 nM
Nb.BsmI	400 u.mL^{-1}
Dx Casc.Blue	200 nM
Dx Alexa594	25 nM
Dx Cy7	250 nM
T	45 °C

α NOR β gate preparation
Buffer
α NOR β gate unit1 Atto Rho6G 1 µM
α NOR β gate unit2 1 µM
90 °C 10 minutes
Then 90 °C to 25 °C in 10 minutes

Buffer
Tris-HCl (pH 8.9) 20 mM
NaCl 10 mM
KCl 40 mM
$(NH4)_2SO_4$ 10 mM
$MgSO_4$ 10 mM
Netropsin 2 µM
Synperonic 1 mg mL^{-1}