



# 基于SOI的窄带物联网射频前端

## NB IoT Front End Based on SOI

More than Moore · More than Innovation

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# NB IoT 提供更好的广域低功耗连接

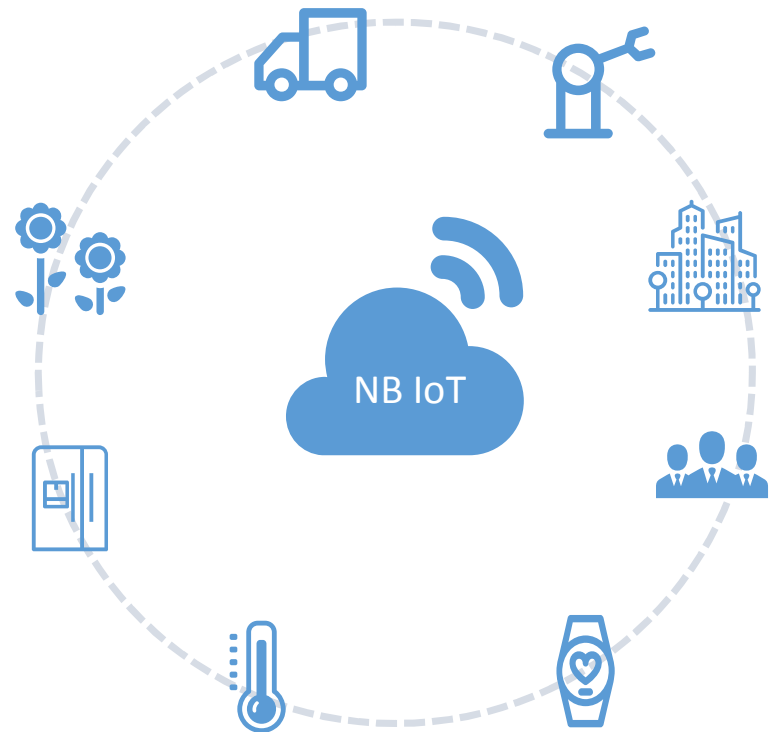
## NB IoT Enables Better Connected Things

- **Narrow Band IoT makes the use of legacy network to address LPWA market.**

  
Billions of  
Connections



  
Low cost



Deep Coverage



Easy Deployment

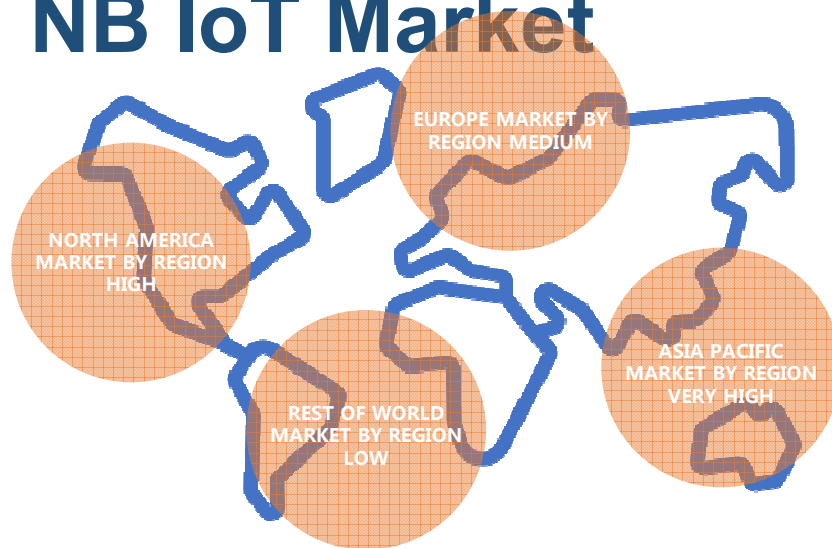


5+ year Battery Life

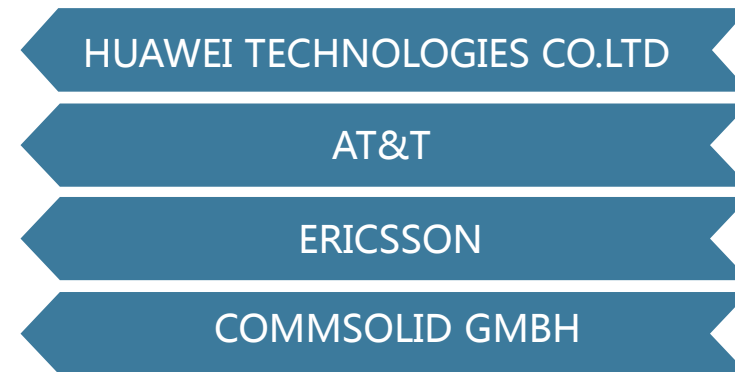


# NB IoT市场

## NB IoT Market



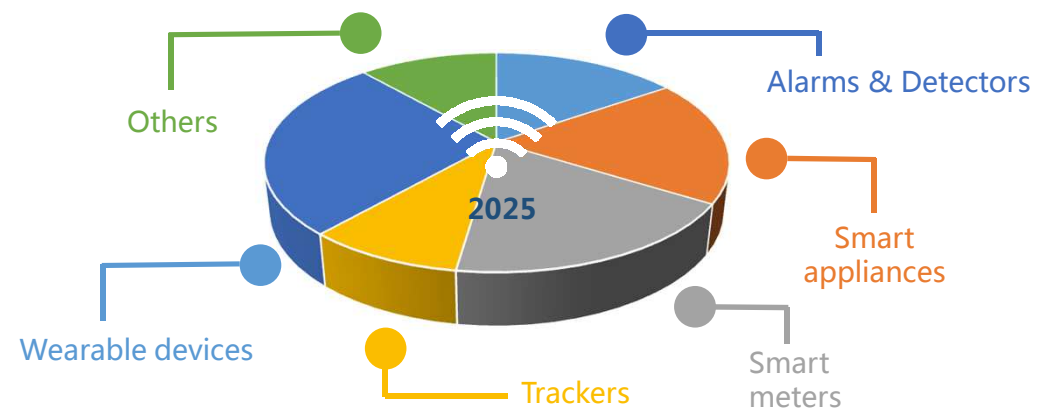
### TOP COMPANIES



#### Attractive Opportunities in NB-IoT Chipset Market



### MARKET BY DEVICES



# 中国市场的NB IoT解决方案

## NB IoT Solutions in China

- Most are dedicated FEM.

Vendor	Product	Release Date	Functionality	Solution
Huawei	Boudica 150	Q4 2017	NB-IoT	Dedicated FEM: Qorvo/Skyworks
Qualcomm	MDM9206	Q2 2017	NB-IoT/eMTC/ GSM/GPS	Dedicated FEM : Qorvo
Qualcomm	MDM9205	Q1 2019	NB-IoT/eMTC/ GSM/GPS	Integrated FEM: Pout 20dBm only
RDA	RDA8910	Q2 2018	NB-IoT/eMTC/ GPRS	Dedicated FEM : RDA
ZTE	Wisefone7100	Q3 2017	NB-IoT	Dedicated FEM
Intel	XMM7315	Q4 2017	NB-IoT/eMTC	Dedicated FEM
Altair	ALT1250	Q2 2017	NB-IoT/eMTC/ GPS	Dedicated FEM
Nordic	nRF91	Q1 2018	NB-IoT/eMTC	SiP FEM
XinYi	--	--	NB-IoT	Integrated FEM: Pout 20dBm only
Eigencomm	EC616	--	NB-IoT	Dedicated FEM

# NB IoT 主要的中国客户

## NB IoT Main Customers in China



中国移动通信  
CHINA MOBILE

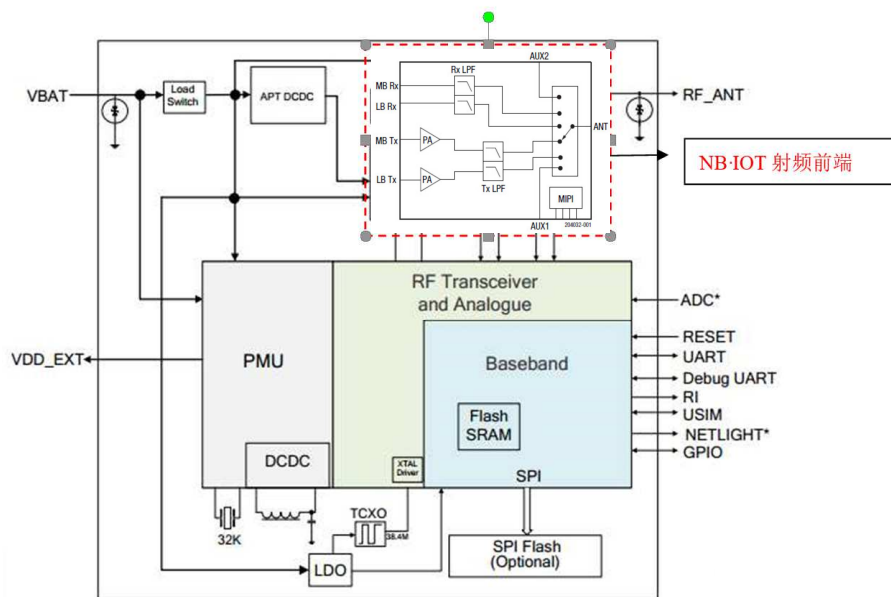
模组厂商	模组	NB-IoT芯片
上海移远通信技术有限公司	BC95-B20/B8/B5/B28	华为海思 Boudica
深圳市中兴物联科技有限公司	ME3612	高通 MDM9206
Ublox	SARA-N201	华为海思 Boudica
利尔达科技有限公司	NB05-01	华为海思 Boudica
深圳市有方科技股份有限公司	N20	高通 MDM9206
上海移柯通信技术有限公司	L700	高通 MDM9206
芯讯通无线科技(上海)有限公司	SIM7000C	高通 MDM9206
龙尚科技(上海)有限公司	A9500	高通 MDM9206
中移物联网有限公司	M5310	华为海思 Hi2110
联想懂的通信	C1100	高通 MDM9206
深圳市广和通无线股份有限公司	Fibocom N51	英特尔 XMM 7115

# 主流的两款分立式射频前端方案

## Two Mainstream Dedicated FEM Solutions

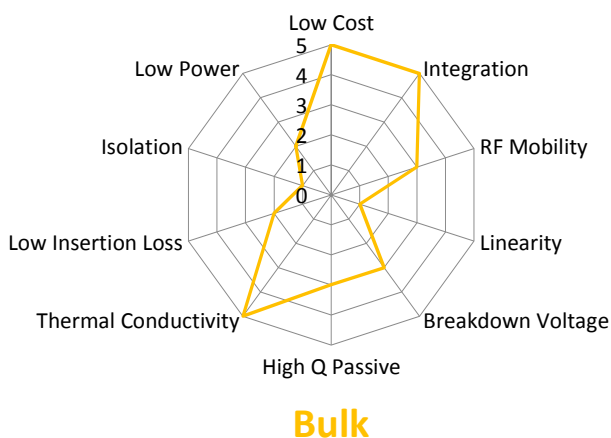
Fully Dedicated	Vendors
PA	Qorvo: RF351X /RF3628
Filter	SMD components
Switch	SmartMicro
Cost	High

SiP	Vendors
FEM: SiP PA Filter and Switch with MIPI control	Skyworks: SKY680XX
Cost	High

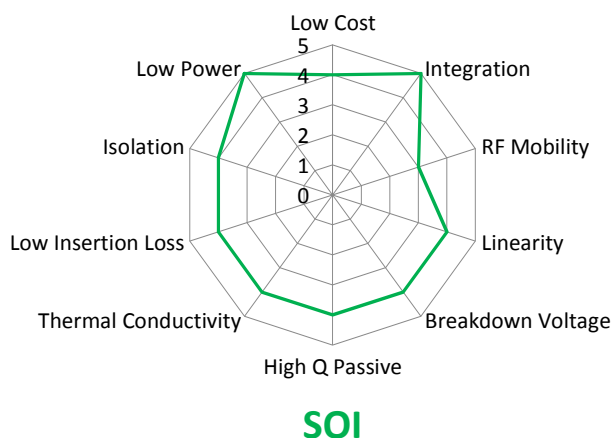


# 体硅、绝缘体上的硅、砷化镓技术比较

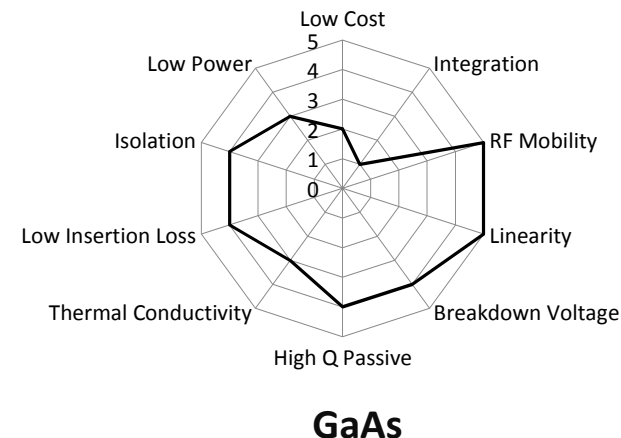
## Bulk vs SOI vs GaAs for FEM Application



Good for Wifi/Blu etc



Good Balance between Price and Performance for NB Application



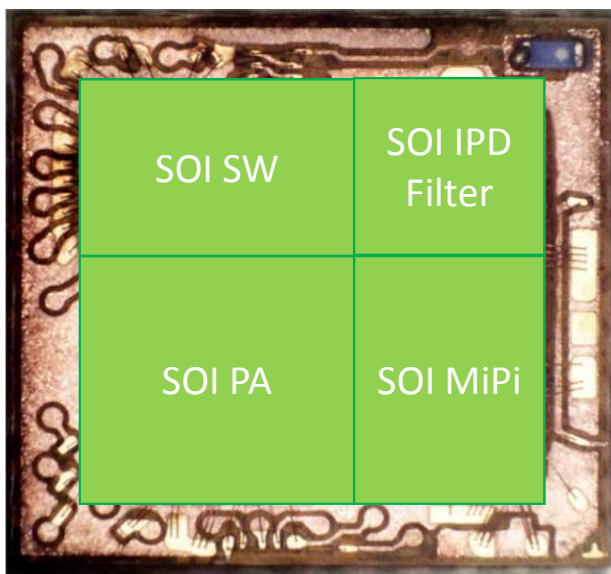
Good for Mobile



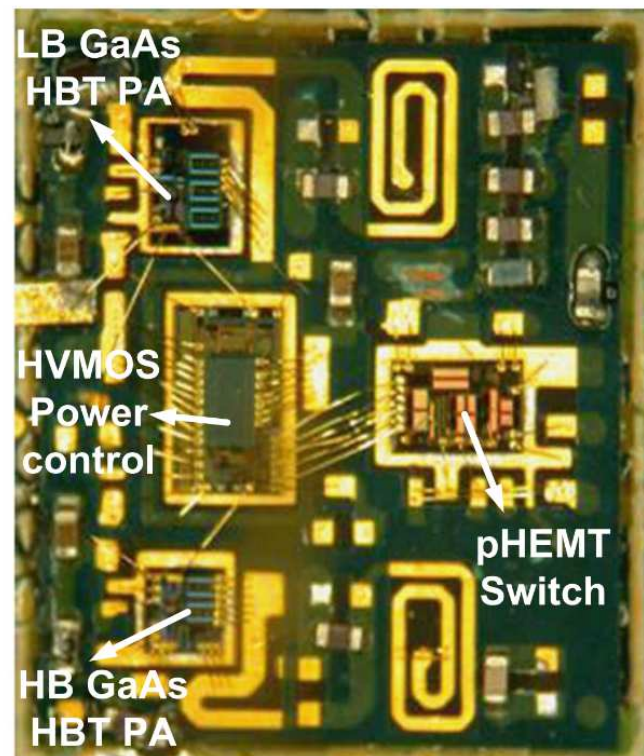
# 单芯片SOI集成方案 vs.传统GaAs方案

## SOI Single Die vs. Traditional GaAs Solution

Our SOI Solution  
single die solution  
Die size ~ 0.9mm x 2.3mm



GaAs+SOI FEM

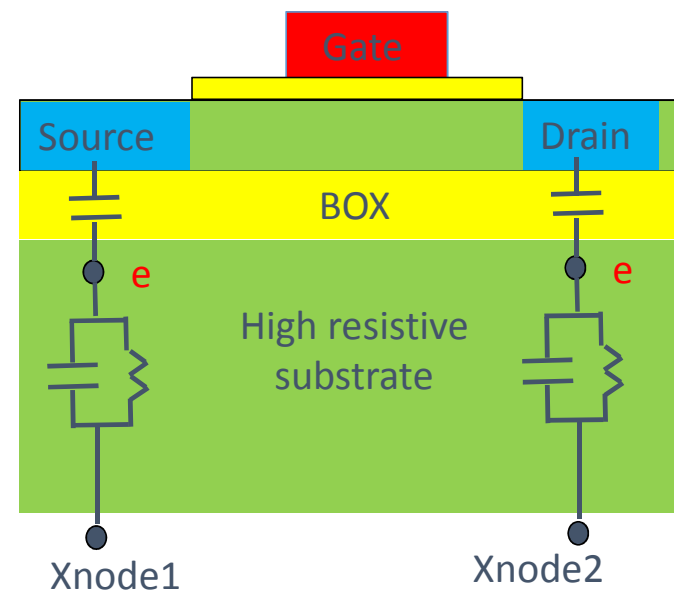




# 代工厂SOI设计支持

## Foundry SOI PDK Well Supported

- **Suitable SPICE models for different devices are provided to balance RF features and convenience:**
  - HiSIM HV model for PA devices to predict drift region well;
  - PSP model for switch/LNA devices for precise Gummel symmetry and Harmonic balance prediction;
  - BSIMSOI model for baseband for fast convergence in simulation;
- **Parasitic extraction considering substrate impact (HR+TR) accurately:**
  - Virtual isolation in lateral due to high resistive characteristic of handle wafer;
  - Vertical parasitic components are included to predict RF insertion loss well;





# 重点 Highlights

- **For RF FEM product, we pay attention to PPPA:**
  - Performance Power Package Area
  - Package cost is over 30%
  
- **Our SOI solution advantages:**
  - 3.5, 2.4, 1.8V, flexible voltage choice due to SOI structure
  - One-stop solution, single die
  - Better RF performance

# 总结

## Summary

- It is no doubt that NB will be dominant in China for IoT application.
- NB IoT FEM can take advantage of SOI technology.
- Our product is the first commercial SOI-based NB IoT front end solution.
- SITRI will continuously invest on SOI technology and its application.
- SOI will be SITRI's MtM key strategy.

# THANKYOU

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