

# China RF front-end market

## RFFE: Ubiquitous Connectivity Opens Up Immense Wireless Opportunity; Initiate BUY on Maxscend

We initiate coverage on China RF front-end (“RFFE”) sector with a positive view, as we see ubiquitous connectivity will be one essential investment theme in the following years. Our world is quickly evolving into a net-working community where everyone and everything are connected all the time, and the pandemic further accelerated the transition. RFFE serves as one of the core components that has direct impact on the performance of connectivity. Top 5 overseas companies now captured ~80% of global market share, and we believe Chinese RFFE players are set to ride the tailwind of localization and 10% CAGR market growth. **Our top pick in domestic RFFE sector is Maxscend (300782 CH). Initiate at BUY with TP of RMB450.0 (43% upside).**

- Global RFFE market to grow to US\$20.7bn in 2025, with 10.4% 2021-25E CAGR supported by mobile, auto, AR/VR applications.** As the worldwide upgrade and adoption of 5G network continues, we think the demand from end-markets such as mobile, IoT, auto and AR/VR (e.g. **V2X communication demand from auto and immersive and interactive requirements for AR/VR**) will push the RF chain to grow as it determines the performance of connectivity (e.g. speed, latency and power efficiency).
- The intricacies of RFFE operations establishes high entry barrier.** With explosive expansion of 5G across both devices and networks, the complexity in RFFE design increases rapidly. Increasing features and functionalities, as well as miniaturization ask for higher degree of integration, which requires “know-how” expertise. The intricacies in design/fabrication have created high entry barrier.
- Chinese RFFE suppliers to ride the tailwind of market expansion and need for localization.** Sino/U.S. trade tension has undoubtedly accelerated the demand for an alternative supply chain for domestic OEMs, especially, key 5G-related components. With 10% CAGR market growth and need for localization, we see a few emerging Chinese players catching up fast in RFFE market. **In certain sub-markets, China players have achieved significant milestones.**
- Top pick in domestic RF chain: Maxscend (300782 CH),** a domestic leader with a broader product offering than its domestic peers and it is now transiting into fab-lite model to complete the product spectrum. The progress of its filter production will be the key earnings driver in the mid-term. **Initiate at BUY with TP of RMB450.0.** Potential risks include 1) slower-than-expected R&D progress, 2) intensified competition and 3) worsened Sino/U.S. trade tension.

### Valuation Table

Name	Ticker	Mkt Cap (US\$ mn)	Price (LC)	Rev. YoY%		NP YoY%		P/E (x)	
				FY21E	FY22E	FY21E	FY22E	FY21E	FY22E
Maxscend	300782 CH	16,657	313.00	72.3%	44.6%	93.5%	42.0%	49.6	34.9
Skyworks	SWKS US	26,669	161.25	28.7%	14.9%	35.4%	19.3%	15.5	13.9
Qorvo	QRVO US	17,685	160.45	21.8%	10.2%	136.1%	3.0%	17.0	13.5
Broadcom	AVGO US	277,005	670.92	15.1%	9.7%	89.4%	22.3%	24.0	20.4
Qualcomm	QCOM US	209,698	187.23	34.0%	13.4%	44.1%	18.8%	22.7	17.8
Murata	6981 JP	55,625	9542.00	11.2%	5.1%	40.0%	na	26.9	21.3
<b>Peers average</b>				<b>30.5%</b>	<b>16.3%</b>	<b>73.1%</b>	<b>21.1%</b>	<b>25.9</b>	<b>20.3</b>

Source: Company data, Bloomberg and CMBIS, as of 5 Jan 2021.

**OUTPERFORM**  
(Initiation)

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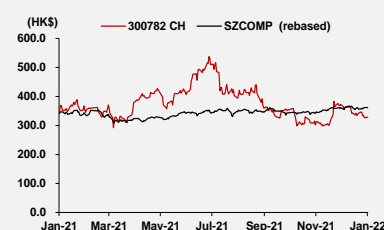
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### Maxscend (300782 CH)

Target Price (RMB)	RMB 450.0
Up/Downside	+43%
Current Price (RMB)	RMB 313.0

Source: Bloomberg, CMBIS

### 12-mth Price Performance



Source: Bloomberg

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## Investment Thesis

**Global RF front-end market is expected to grow to US\$20.7bn in 2025 (10.4% 2021-2025 CAGR)**, according to Yole. The growth is mainly driven by 1) increasing demand for device communication (data traffic), 2) higher number of components needed to cover additional frequency bands (incremental 5G coverage) and 3) greater value per device.

**Demand side: Connectivity in mobile, auto, AR/VR, etc. will drive up the demand for RFFE components with higher quantity and greater ASP.**

**1) Mobile: higher 5G penetration and greater data traffic.** Worldwide, the upgrade and commercialization of 5G network has gradually deployed. In five years, global mobile data traffic is expected to grow at 25% CAGR, while 5G traffic is believed to surge more significantly at 90% CAGR.

**2) Auto: RFFE is required to realize V2X Communications.** According to Skyworks, 50% of new vehicles sold are connected today, while this number is estimated to reach 95% by 2030.

**3) AR/VR: RFFE connectivity will be one of the key components to establish various functional metaverses.**

More connectivity function requires **higher quantity of RFFE components**. However, the miniaturization, thinness and functional diversification drive up the demand for higher degree of integration of RFFE system, which means **greater value of RFFE solutions**. For example, the value of RFFE products has increased to \$25 per 5G device (mobile) from \$18 per 4G device and \$50 for RF content in each autonomous vehicle.

**Supply side: Top players in RFFE market are from U.S. and Japan. Top 5 manufacturers** are Murata (23%), Skyworks (18%), Broadcom (14%), Qorvo (13%) and Qualcomm (11%), **accounting for a total 79% market share**. Given the domestic substitution needs, we see a few emerging Chinese players catching up fast in RFFE sector. **In certain sub-markets, China players have achieved significant milestones**. For example, Maxscend (300782 CH) is an established Chinese player in discrete switch and LNA products (15% of switch/tuner market). Vanchip is currently No.1 in 4G PA shipment in China. The company is expected to be listed on STAR Market in 2022.

**Looking forward, we expect there will be industry consolidation in China** as this is the way for most of the global peers to achieve a full spectrum of product coverage. **However, as the current valuation in China semi industry is not cheap, companies have to invest in R&D to upgrade/expand their product offerings in the meantime.**

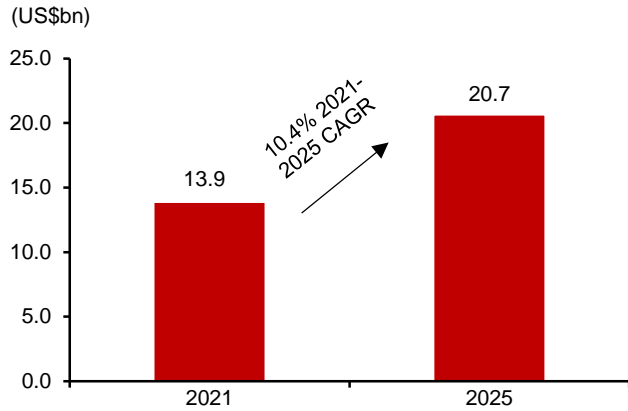
### Top pick: Maxscend (300782 CH, BUY, TP RMB460.0)

Maxscend (300782 CH) is an established Chinese player providing RFFE discrete and modules. We are positive in Maxscend's future growth, given 1) its leading market share in RFFE sub-markets (~15% of switch/tuner market), 2) broader product offerings and increasing module sales and 3) transiting into fab-lite business model to secure filter production and enhance its technology strength compared with its domestic peers. **We initiate at BUY with TP of RMB460.0**, 50x FY22E P/E, less than 1 SD above the 2-year historical forward P/E.

Potential risks include 1) slower-than-expected R&D progress and introduction of new products, 2) intensified competition and prolonged Sino/U.S. trade war and 3) worse-than-expected semi shortage.

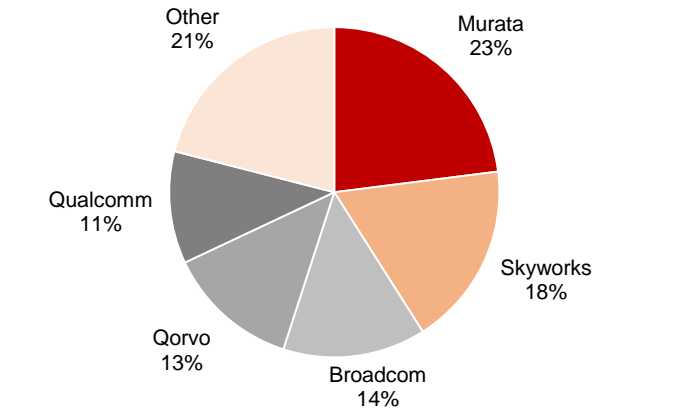
## Focus Charts

**Figure 1: RF front-end market to reach US\$20.7bn market in 2025 with 10.4% 2021-2025 CAGR**



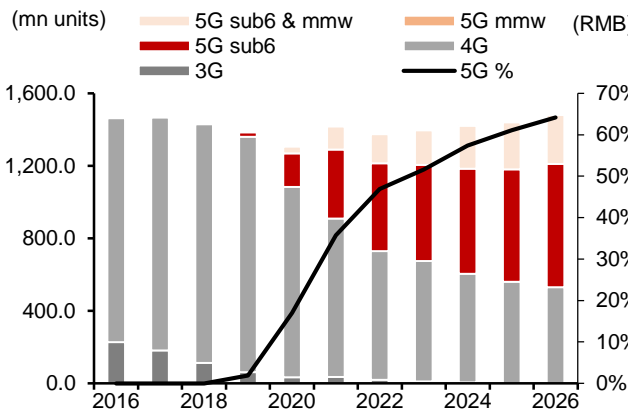
Source: Yole, CMBIS

**Figure 2: Top 5 RF front-end players accounted for ~80% market share (2019)**



Source: Yole, CMBIS

**Figure 3: 2015-2026 global smartphone forecast per air standard: 5G smartphone penetration to exceed 50% in 2020**



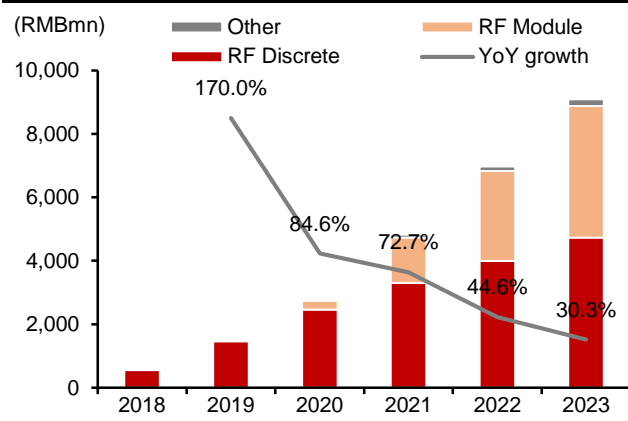
Source: Yole, CMBIS

**Figure 4: Global top 5 vs. domestic players: China peers achieved significant milestone in specific fields/region**

Player	Key clients	Market share
Skyworks	Apple, Samsung, Xiaomi, Oppo, vivo, ZTE, etc.; OEMs, A&D clients.	RFFE: 18%
Qorvo	Apple, ZTE, etc.; A&D clients.	RFFE: 13%
Broadcom	Most of global top 500 companies & multiple government agencies.	RFFE: 14%
Qualcomm	Apple, Samsung, Xiaomi, Oppo, vivo, etc.	RFFE: 11%
Murata	Multiple mobile and RFFE clients.	RFFE: 23%
<b>Maxscend</b>	Samsung, Xiaomi, Oppo, vivo, Lenovo, Meizu, TCL, etc.	<b>Switch/tuner: 15%</b>
<b>Vanchip</b>	Xiaomi, Oppo, vivo, Huaqin, Longcheer, Wingtech, Quectel, etc.	<b>No.1 in 4G PA shipment (China)</b>

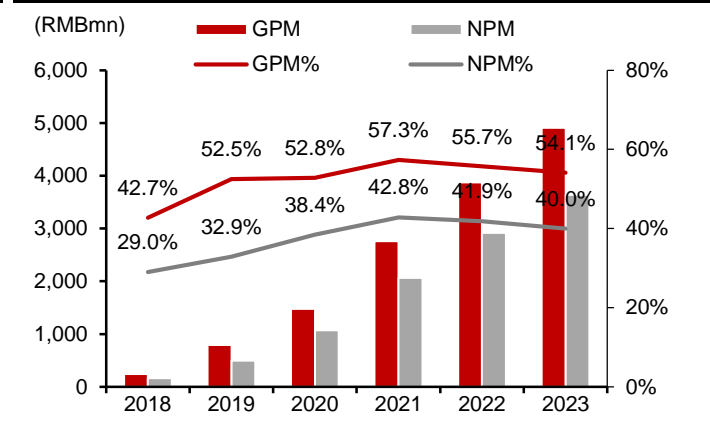
Source: Yole, CMBIS

**Figure 5: Maxscend revenue forecast by segment**



Source: Company data, CMBIS

**Figure 6: Maxscend's GPM is significantly higher than its domestic peers**



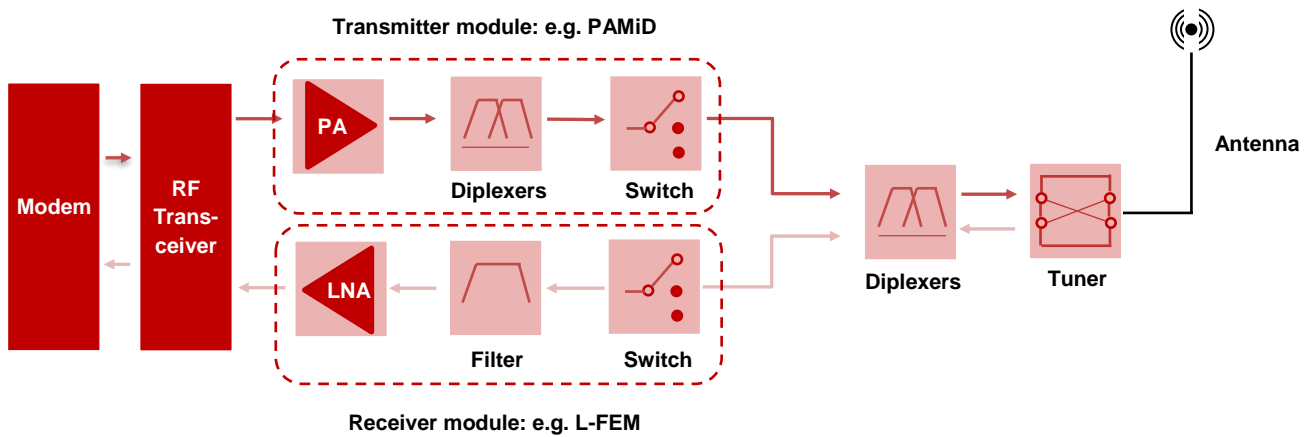
Source: Company data, CMBIS

## RFFE market: US\$20.7bn in 2025, with 10.4% 2021-25 CAGR

RF (“radio frequency”) front-end empowers machine communications. Key components include RF switches, low-noise amplifiers (LNA), power amplifiers (PA), diplexers, and filters.

RF switches is a device to route high frequency signals between different transmission channels or devices. LNA is an electronic amplifier that amplifies a very low-power signal without significantly degrading its signal-to-noise ratio. PA is a type of electronic amplifier that converts a low-power RF signal into a higher power signal. Filters are electronic components that allow or prevent selected signals/frequencies to eliminate noise or pass through unwanted signals.<sup>1</sup>

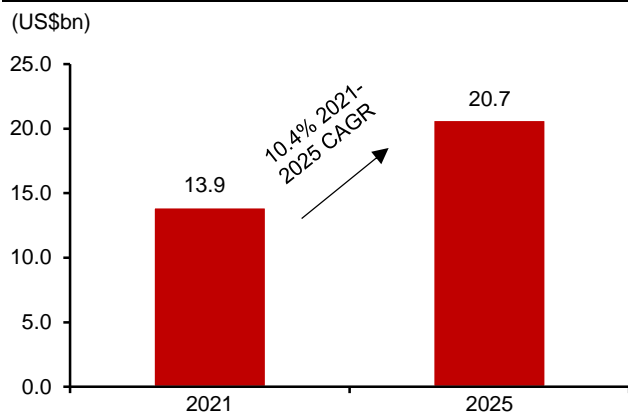
Figure 7: What is RFFE? A simplified example of RF Chain



Source: Vanchip, CMBIS

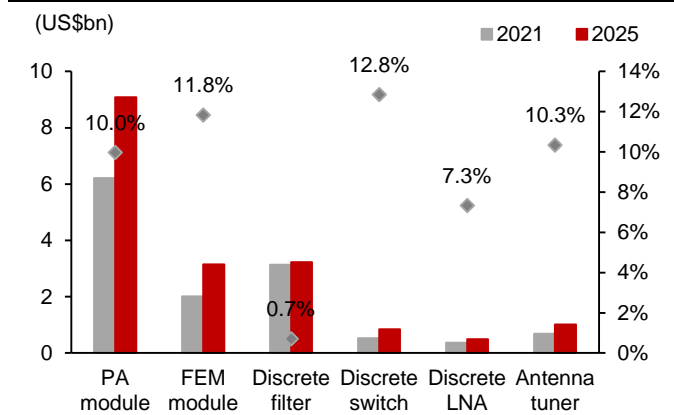
Global RF Front-end market is expected to grow to US\$20.7bn in 2025 (10.4% 2021-2025 CAGR), according to Yole. The largest sub-sectors are PA module, discrete filter and FEM module. The most attractive segment is PA module, which is expected to reach US\$9bn in 2025. Discrete switch/tuner/LNA and FEM module will also experience high growth, with 12.8%/7.3%/10.3%/11.8% 2021-2025 CAGR.

Figure 8: RF front-end market to reach US\$20.7bn market in 2025 with 10.4% 2021-2025 CAGR



Source: Yole, CMBIS

Figure 9: RF front-end market size by segments (2021 vs. 2025)



Source: Yole, CMBIS

<sup>1</sup> Reference: Wikipedia, Infineon, Microsoft and Future electronics.

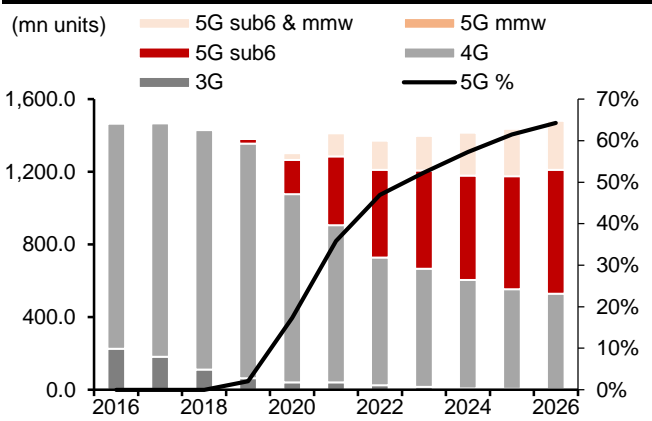
## Surging demand for RFFE solution driven by increasing machine communication (mobile/auto/AR/VR)

Since 2019, the world has entered a 5G era and the upgrade and commercialization of 5G network has been gradually deployed worldwide. Based on Yole's estimates, global 5G smartphone shipments will more than double in 2021 to reach 505mn (226mn in 2020) and reach 804 million by 2025, representing 30% 2020-25 CAGR. By 2025, 5G smartphone is estimated to take 61% market share by 2025 (including 5G sub6 & mmw).

Looking forward, the development of 5G network will not only be driven by Chinese market, an early promoter since 2020, but also driven by accelerated deployment in other countries. According to Yole, "U.S. network providers will have started rolling out C-band networks, spreading the 5G network nationwide. This will make U.S. 5G network one of the fastest and most sophisticated in the world."

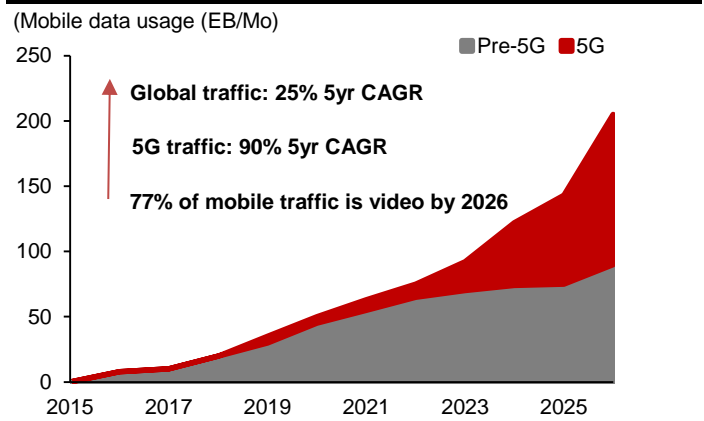
With continuous 5G network construction, demand for greater connectivity (mobile, auto, AR/VR, etc.) will support RFFE market growth. **1) Mobile:** 90%+ of 6bn internet users will be mobile users by 2025, while 45% using 5G. Global mobile data traffic is expected to grow at 25% CAGR in 5 years, while 5G traffic is believed to surge more significantly at 90% CAGR. The data usage is mainly driven by video (77% by 2026). **2) Auto:** RFFE is a necessary part to realize V2X Communications, where "X" stands for cloud, vehicle, infrastructure or pedestrian, will require extensive electronics on board. According to Skyworks, 50% of new vehicles sold are connected today, while this number is estimated to reach 95% by 2030. **3) AR/VR:** RFFE connectivity will be one of the key components to establish various functional metaverses. We see WIFI connectivity function currently being required for Oculus Quest 2. We believe more connectivity solution will be added to VR devices in the future. In 5-years, AR/VR data usage will grow at 63% CAGR.

Figure 10: Smartphone breakdown per air standard (2015-2026)



Source: Yole, CMBIS

Figure 11: Surge in global mobile data traffic: 5G traffic grows at 90% 5yr CAGR



Source: Yole, CMBIS

The new 5G communication technology requires more data usage and higher transmission speed, which depends on the evolution of telecommunication technology and its supporting RFFE system. The increasing frequency band coverage, faster and low-latency communication requirements demand for higher number of components/modules and more complexity in RF front-end design. Meanwhile, miniaturization, thinness and functional diversification requires higher degree of integration of RFFE system, which pushes up the value of RFFE solutions for one device.



## 5G technology required more RFFE components with greater complexity

Compared with 4G, the new 5G communication technology has certain changes, such as communication frequency range, no. of frequency bands, channel bandwidth, complex technology applications, etc. These changes require more sophisticated design in RFFE system and antenna tuner. To support the new 5G service in addition to the 4G for mobile devices, **the number of RF front-end discrete/module in mobile devices has far exceeded that of 4G phones.** Meanwhile, there is surging needs for auto, AR/VR and other device communication. All of these incremental needs will drive the growth of RF front-end market.

Figure 12: Different requirements for RFFE system under 4G and 5G

Item	4G	5G	Key technical challenges for RFFE
Frequency range	600MHz to 2,690MHz	600MHz to 5,000MHz	Need new processes and packaging methods to cope with high frequency application.
No. of frequency bands	~20 common frequency bands	New bands: n77/n78/n79. Some of the original 4G frequency bands are transferred into 5G, such as n1/n3/n5/n7/n8/n28/n40/n41, etc.	New frequency bands have created new RFFE products demands: the n77/n78/n79 frequency bands require new L-PAMiF and L-FEM products (both need to have signal receiving functions).
Channel bandwidth	Maximum 20MHz	Maximum 100MHz	Brings new challenges to the transmitter, especially in the design of the PA module.
MIMO	Limited use, usually 2x2 MIMO. Some high-end models support 4x4 MIMO.	Widely used, among which n1/n3/n41/n78/n79 must apply 4x4 MIMO in the RF receiver chain. Some high-end models support 2x2 MIMO in the RF transmitter chain.	The widely used MIMO requires more complicated design of the RFFE system and the antenna tuner.
Carrier Aggregation	Limited use, mainly for the application in the RF receiver chain.	Widely used with introduction of dual connectivity, requiring 4G and 5G for simultaneous upstream and downstream communications.	Dual connection has extremely stringent requirements for antenna tuner and RFFE linearity and interference controls.

Source: Vanchip, CMBIS

Figure 13: Automotive application with RFFE



Source: Qualcomm, CMBIS

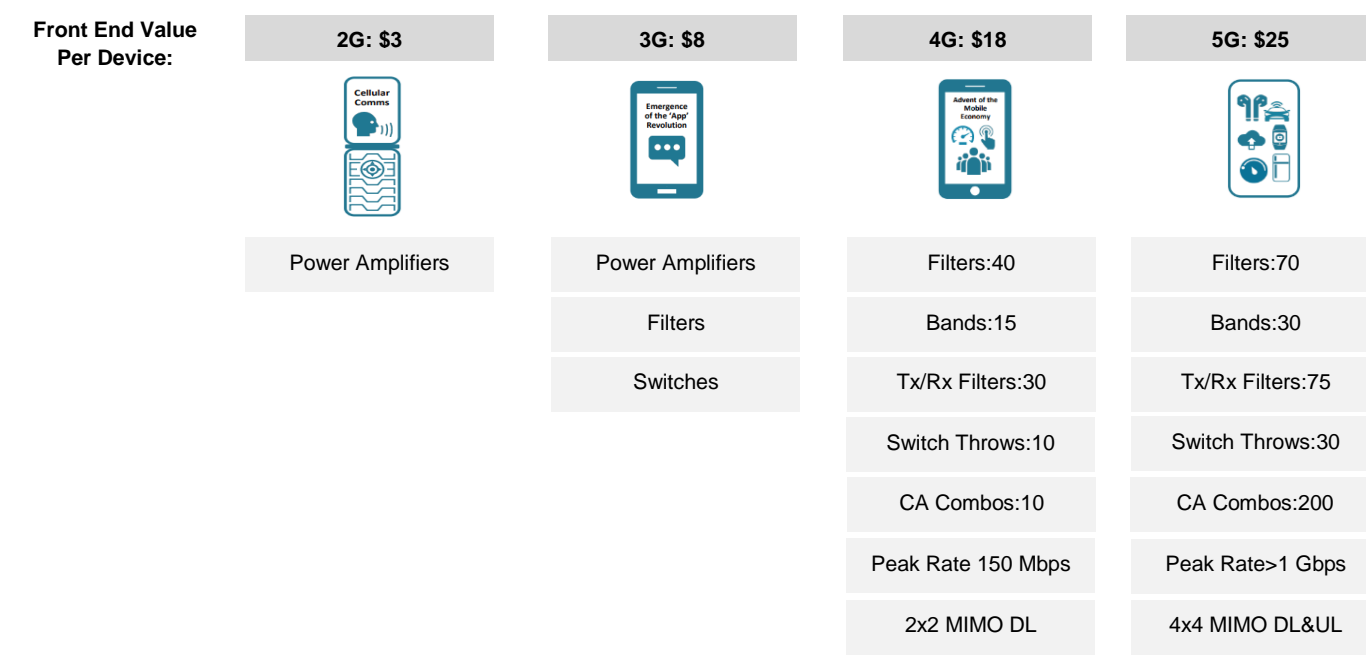
## Greater value per device

**The number of RF front-end components in 5G smartphone is growing; however, the space left is limited.** For example, the number of frequency bands covered is 15 in 4G model vs. 30 in 5G model. Peak rate is 150 Mbps in 4G model vs. 1 Gbps in 5G model. All of these requires increasing number of filters (~40 in 4G model vs. ~70 in 5G model), switch throws (~10 in 4G model vs. ~30 in 5G model), etc. All of these additional components have to fill into a similar size device, which increases the complexity for RFFE designer/manufacturers.

Meanwhile, the miniaturization, thinness and functional diversification of mobile devices are demanding for higher level of integration of RF front-end system. Therefore, **The value of RFFE products has increased to \$25 per 5G device (mobile) from \$18 per 4G device (40% increase) and \$50 for RF content in each autonomous vehicle.**

The BOM will also vary among different models with different frequency band coverages (e.g. the number of 4G/5G band coverages). According to Yole, the BOM will be ~5x difference between an entry-level 5G phone and a flagship 5G phone (only at the RF front-end level).

**Figure 14: 5G Creates a Step Function Increase in Performance**



Source: Skyworks, CMBIS

**In summary, we hold a very positive outlook on RFFE market.** We believe RFFE market will have exceptional growth, driven by 1) increasing demand for device communication (data traffic) from mobile, auto, AR/VR and other markets, 2) higher number of components needed to cover additional frequency bands (incremental 5G coverage) and 3) greater value per device.

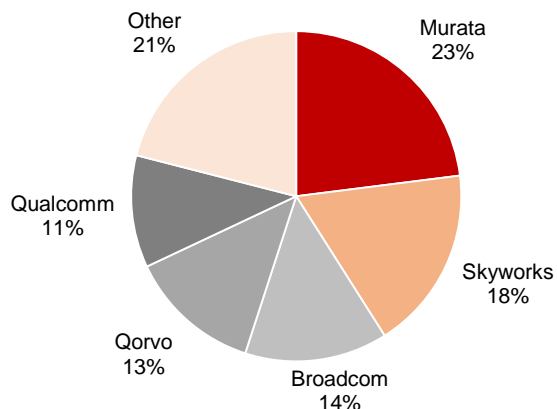


## Competitive landscape

### U.S. and Japan manufacturers take ~80% of RF front-end market share

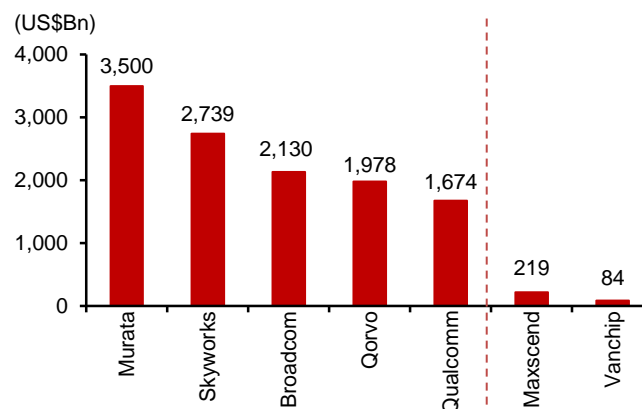
The top players in RFFE market are from U.S. and Japan, accounting for the majority of the market share. Top 5 manufacturers are Murata (23%), Skyworks (18%), Broadcom (14%), Qorvo (13%) and Qualcomm (11%), accounting for a total 79% market share.

Figure 15: Top 5 RF front-end players accounted for ~80% market share (2019)



Source: Yole, CMBIS

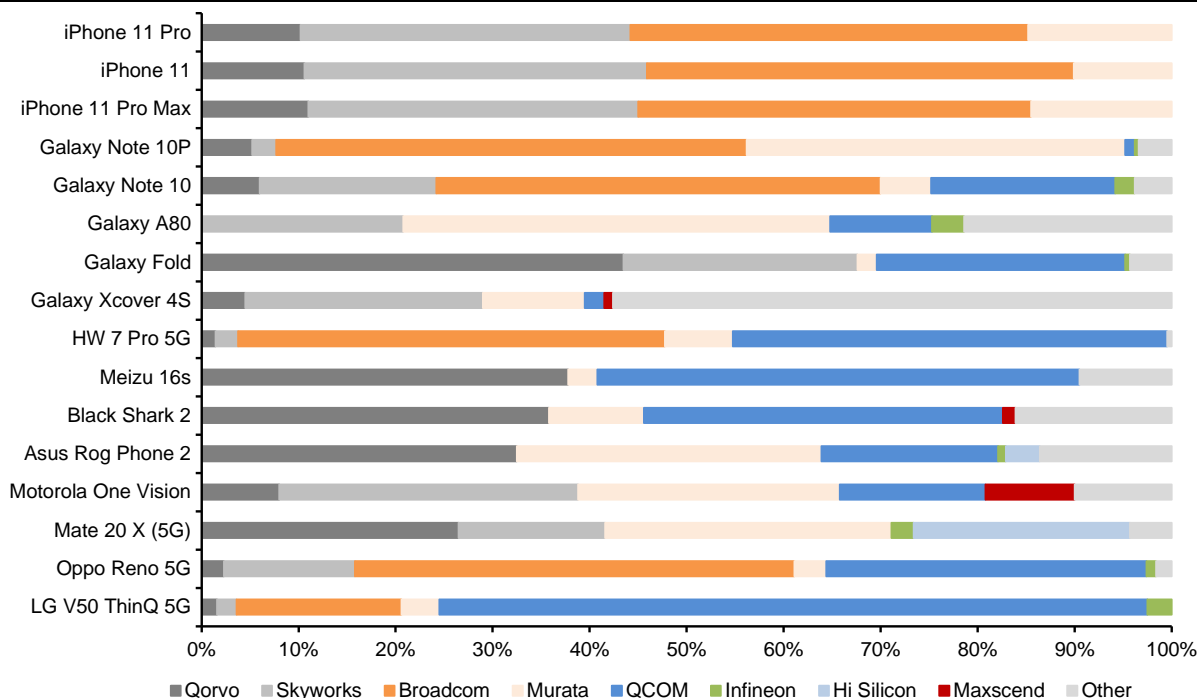
Figure 16: RF revenue: China peers vs. Global top 5 (2019)



Source: Yole, CMBIS

We see a few emerging Chinese players catching up fast in RF front-end market, such as Maxscend, Vanchip, Lansus, Unisoc, OnMicro, Shoulder, etc. However, their revenues/market shares are still relatively small compared with their global peers. We see the top 5 still being the key suppliers for most of the high-end smartphones (based on cost).

Figure 17: Cost distribution per supplier in 17 smartphones (from low-end to high-end): Qorvo, Skyworks, Broadcom, Murata and QCOM accounted for the most shares (2020)



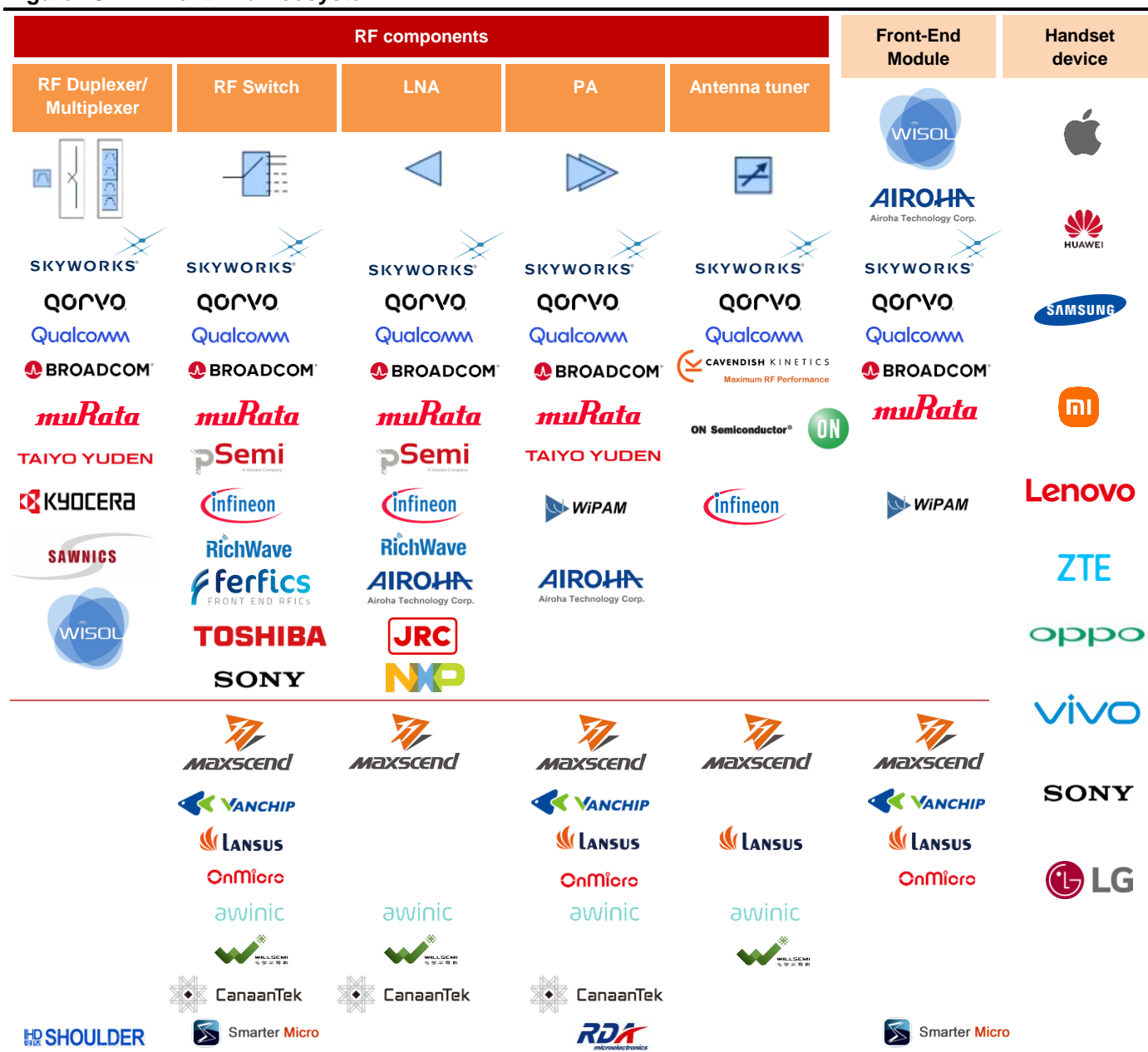
Source: SystemPlus, CMBIS

## The top 5 have full category of RF front-end products through industry consolidations

One of the main reasons for Chinese peers' lagging behind is that they are facing technology bottlenecks in some RF front-end components, such as PA and filter. As the need for integration of RF front-end products grows stronger, having a full offering of RF front-end components are necessary.

We see the top global peers realize full category of RF front-end products offering through industry consolidations. For example, Skyworks was established from Alpha Industries and Conexant Systems's wireless business, focusing on RF applications. Later, the company strengthened its PA and filter products by acquiring Axiom Microdevices/SiGe Semiconductor and a JV with Panasonic. Qorvo was formed following the merger of RFMD and TriQuint, combining their portfolio of RF switch, PA, filters, etc.

Figure 18: RF Front End Ecosystem

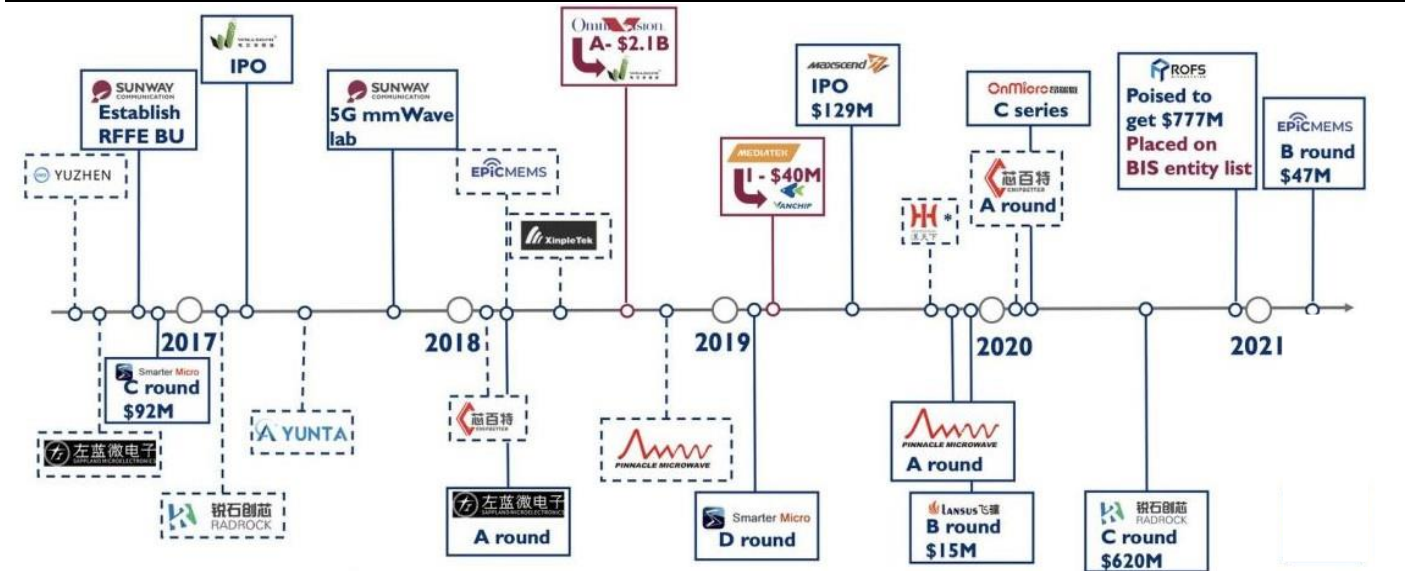


Source: Yole, Company filings and public information, CMBIS

### Chinese peers achieving significant milestones in certain sub-markets

With the rising market share of Chinese smartphone OEMs and the need for domestic supply chain substitution, we have seen a series of funding to RF front-end companies in China since 2018.

**Figure 19: Investments in Chinese RF front-end companies (2017-2021)**



Source: Yole, CMBIS

\* Huntersun changes name to OnMicro and span off the filter business under Huntersun-MEMS.  
Non-exhaustive list of companies.

**In certain sub-markets, China players have achieved significant milestones.** For example, Maxscend (300782 CH) is an established Chinese player in discrete switch and LNA products (15% of switch/tuner market). Vanchip is currently No.1 in 4G PA shipment in China. The company is expected to be listed on STAR Market in 2022.

**Looking forward, we expect there will be industry consolidation in China** as this is the way for most of the global peers to achieve a full spectrum of product coverage. **However, as the current valuation in China semi industry is not cheap, companies have to invest in R&D to upgrade/expand their product offerings in the meantime.**

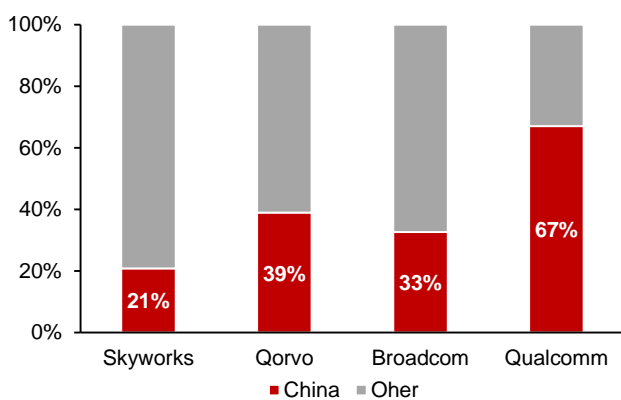
## Chinese players to ride the tailwind of domestic substitution

Although we are still catching up with global peers, we see great potential for domestic players: 1) geographical advantage as a significant share of certain end markets (mobile, auto, etc.) are located in China, 2) China is an early promoter of 5G commercialization and 3) domestic substitution need.

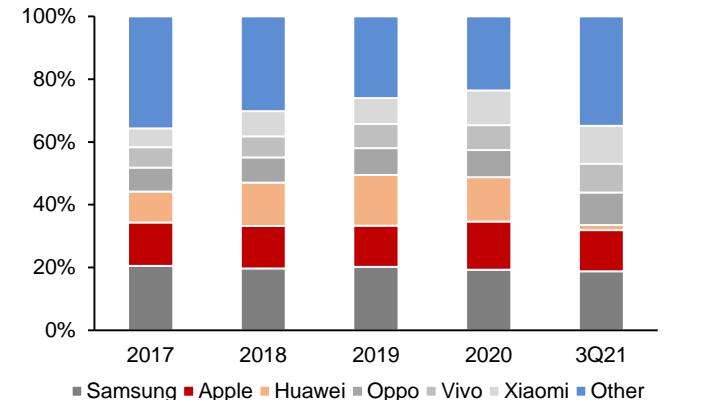
### Great market potential in China

Although the overseas players take the majority of RF front-end market revenue, Skyworks/ Qorvo reported that a significant portion of their FY20/21 revenue were from China. These companies recognized their geographical revenue based upon the location of OEMs' headquarters. We believe this geographical market demand suggests that the domestic RF front-end companies have great potential to grow their market share, taking the advantage of domestic OEM's market positions.

**Figure 20: FY20/21 Peers' revenue contribution\*** **Figure 21: Growing domestic OEMs' share to drive domestic substitution**



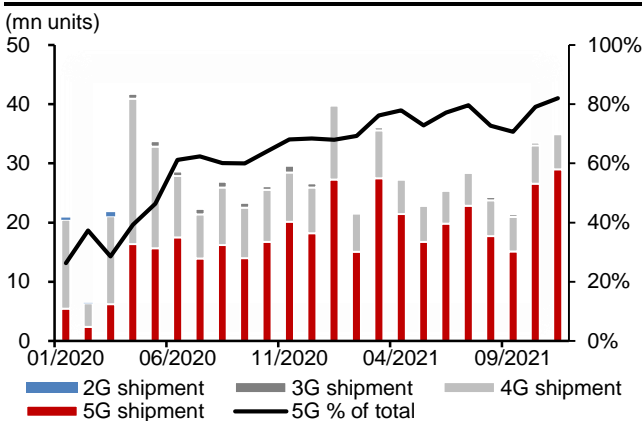
Source: Company data, CMBIS  
\*Skyworks/ Qorvo: based on location of the OEMs.



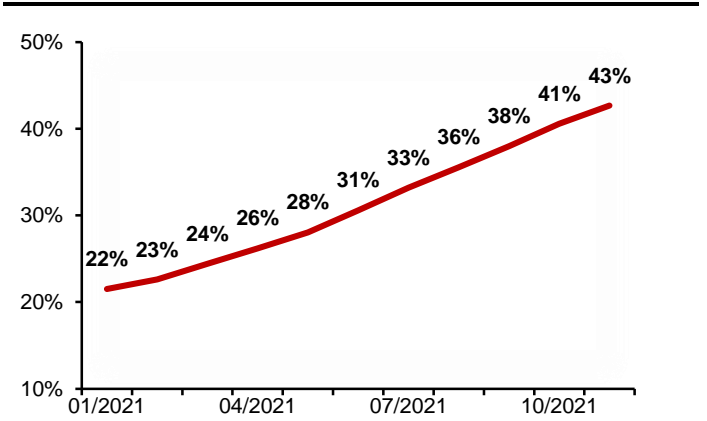
Source: Counterpoint, CMBIS

China is an early promoter of 5G commercialization. Although 4G smartphone is expected to remain a certain market share, the penetration of 5G smartphone has shown a more robust growth. MIIT reported that YTD 5G mobile phone shipments were 239.0mn units, representing 75% penetration rate. China telco's 5G plan adoption rate has continuous increased to 43% in 10/2021, still much room to grow.

**Figure 22: ~82% of new smartphone shipment in China were 5G models (11/2021)** **Figure 23: China telco's 5G plan adoption rate has continuous increased to 43% in 11/2021**



Source: MIIT, CMBIS

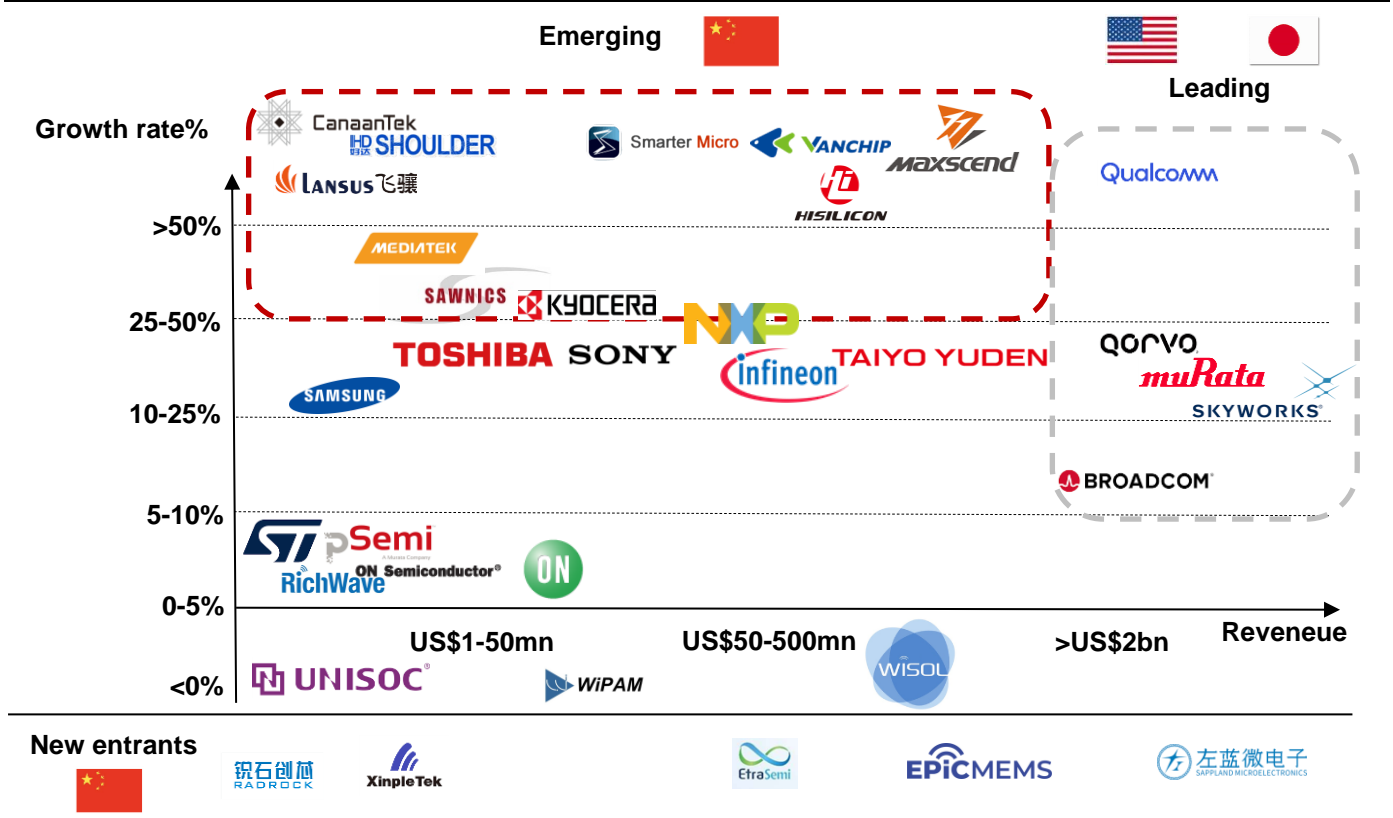


Source: China Mobile, China Unicom, China Telecom, CMBIS

### Domestic substitution needs

Sino/U.S. trade war has undoubtedly accelerated the demand for an alternative supply chain for smartphone OEMs, especially, key 5G-related components. Especially, after the Huawei event, the market has realized the importance of securing certain key components, i.e., 5G-related parts. Therefore, **the need for domestic substitution will push for a domestic supply chain to emerge in China.**

**Figure 24: RF front-end module market (2020)**



Source: Yole, CMBIS

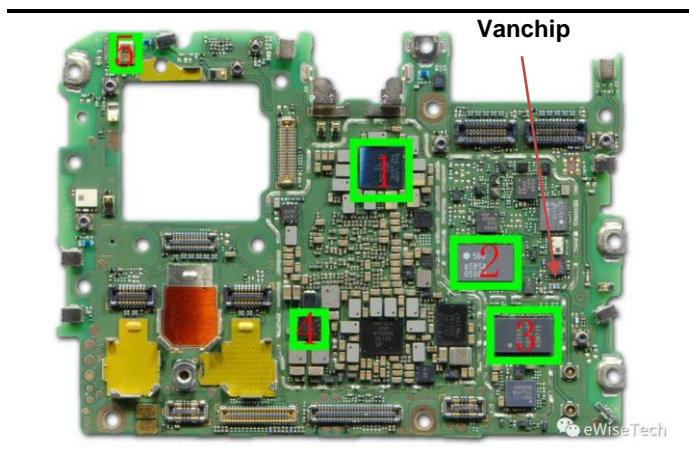
Indeed, China players are catching up fast in recent years. **In certain sub-markets, Chinese players have achieved significant milestones.** For example, **Maxscend** (300782 CH) is an established Chinese player in discrete switch and LNA products (15% of switch/tuner market). **Vanchip** is currently No.1 in 4G PA shipment in China. The company is expected to be listed on STAR Market in 2022.

Although most of Chinese OEMs still use global top players' RFFE products, but the rising Chinese suppliers give them more options. According to eWiseTech, the latest Huawei Nova 9 series (released in 09/2021) used Vanchip's PA products. **We expect Chinese players will experience exceptional growth riding the tailwind of 5G penetration and domestic substitution.**

**Figure 25: Global top 5 vs. domestic players: Maxscend/Vanchip leads in specific fields/region**      **Figure 26: Nova 9 series used Vanchip’s PA products**

	Key clients	Market share
Skyworks	Apple, Samsung, Xiaomi, Oppo, vivo, ZTE, etc.; OEMs, A&D clients.	RFFE: 18%
Qorvo	Apple, ZTE, etc.; A&D clients.	RFFE: 13%
Broadcom	Most of global top 500 companies & multiple government agencies.	RFFE: 14%
Qualcomm	Apple, Samsung, Xiaomi, Oppo, vivo, etc.	RFFE: 11%
Murata	Multiple mobile and RFFE clients.	RFFE: 23%
<b>Maxscend</b>	Samsung, Xiaomi, Oppo, vivo, Lenovo, Meizu, TCL, etc.	<b>Switch/tuner : 15%</b>
<b>Vanchip</b>	Xiaomi, Oppo, vivo, Huaqin, Longcheer, Wingtech, Quectel, etc.	<b>No.1 in 4G PA shipment (China)</b>

Source: Company filings, Yole, CMBIS



Source: SystemPlus, CMBIS



# Maxscend (300782 CH)

## Domestic RFFE leader to enhance “know how” expertise with fab-lite model; Initiate at BUY

Maxscend is a leading RF front-end chip manufacturer in China. Maxscend took ~3% of global RFFE market share in 2020, we expect they will double their market share (>6%) in 3 years (2021-23E) while the global RFFE market to grow at 10% 5-year CAGR (2021-25E). In sub-sectors, the Company has achieved significant milestone, such as reaching 15% share in global switch/tuner products. We view recent correction as an attractive opportunity for investors to gain exposure to quality Chinese semi fabless names that can ride 5G/domestic substitution tailwind. The stock currently trades at attractive valuation of 36.6x FY22 P/E, 1-SD below 2-year historical forward P/E. **We initiate at BUY with 12m TP of RMB450.0 (43% upside).**

- Leading domestic RFFE solution provider, with all self-designed components.** Maxscend is a pure RF front-end/connectivity manufacturer, with ~15% share in switch/tuner market. In 2020, the company began to provide RFFE receiver modules in additional to its legacy discrete RFFE components. In 1H21, its module sales has grew 138% (vs. FY20), accounting for 28% of the total revenue. In 2022, we expect Maxscend will massively produce its new transmitter module, L-PAMiF. Currently, all the components in its RFFE modules are self-designed, enhancing the supply chain reliability.
- Future growth supported by product portfolio expansion (high-end).** Looking forward, the ubiquitous connectivity demand has increased intricacies in RFFE design/fabrication, which builds up the industry barrier. To break through the bottleneck, Maxscend began to transit into fab-lite model and develop its own high-end filter/duplexer to complete the product offerings. We believe this will enhance Maxscend’s “know-how” expertise and drive up its module sales. Its new manufacturing base are now under pilot production and we expect it to initiate small batch production later this year.
- Initiate at BUY with TP of RMB450.0.** We derive our TP of RMB450.0 by applying 50x FY22 P/E, slightly above 2-year historical average forward P/E. Maxscend is currently trading 1-SD below historical P/E, which is very attractive. We believe this valuation is justified given 1) its leading position in China’s RFFE market, 2) broader product offerings, which are all self-designed and 3) transiting into fab-lite model to secure filter production and enhance its technology strength. **Potential risks** include 1) slower-than-expected R&D progress and introduction of new products, 2) intensified competition and 3) worsened Sino/U.S. trade tension.

### Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Turnover (RMB mn)	1,512	2,792	4,811	6,955	9,070
YoY growth (%)	170.0%	84.6%	72.3%	44.6%	30.4%
Gross margin (%)	52.5%	52.8%	57.6%	56.2%	55.1%
Net profit (RMB mn)	497	1,073	2,073	2,945	3,712
YoY growth (%)	206.3%	115.8%	93.2%	42.1%	26.0%
Diluted EPS (RMB)	3.16	3.31	6.31	8.97	11.30
Consensus EPS (RMB)	NA	NA	6.31	8.39	10.76
PE (x)	99.2	94.5	49.6	34.9	27.7
PB (x)	28.9	38.1	22.7	14.5	10.0
Yield (%)	0.3%	0.3%	0.3%	0.3%	0.3%
Roe (%)	29.2%	40.3%	45.7%	41.6%	36.3%
Net gearing (%)	Net cash	Net cash	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

### BUY (Initiation)

Target Price	RMB\$450.0
Up/Downside	+43%
Current Price	RMB\$313.0

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### Stock Data

Mkt Cap (RMB mn)	104,571
Avg 3 mths t/o (RMB\$ mn)	1,377
52w High/Low (RMB\$)	544.68/291.2
Total Issued Shares (mn)	333.6

Source: Bloomberg

### Shareholding Structure

WX HUIZHI UNITED INV ENT	12.8%
Feng Chenhui	7.87%
Tang Zhuang	7.67%

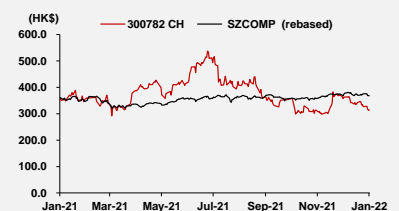
Source: HKEx

### Share Performance

	Absolute	Relative
1-mth	-14.3%	-13.8%
3-mth	-11.1%	-14.2%
6-mth	-36.6%	-38.5%

Source: Bloomberg

### 12-mth Price Performance



Source: Bloomberg

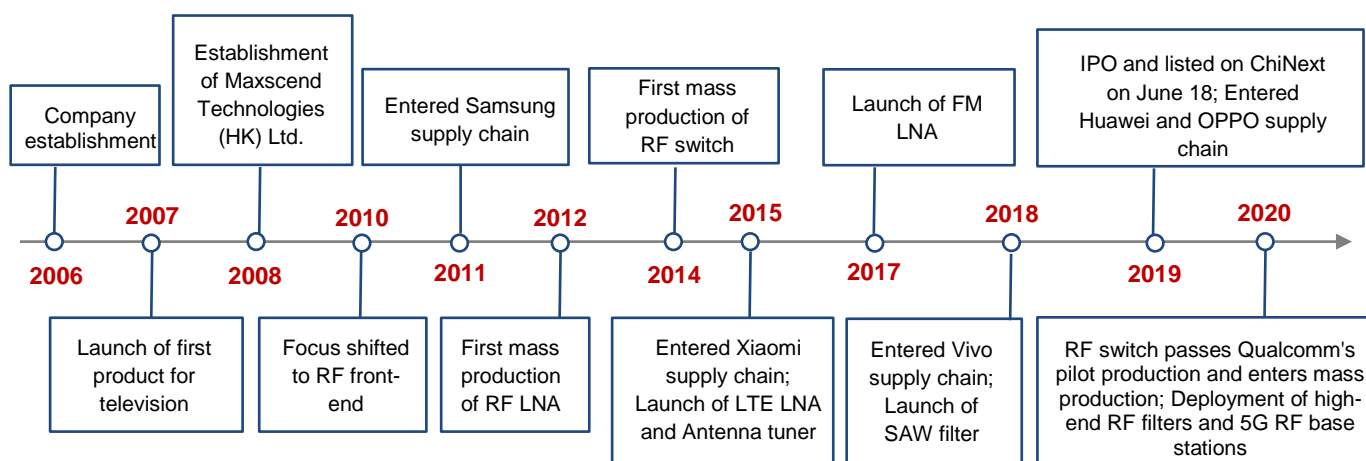
Auditor: BDO

## Company Overview

Maxscend is a leading RF front-end chip manufacturer in China, with 15% market share in RF switch/tuner market

Maxscend is a China-based RF front-end discrete and module manufacturer. The Company produces and sells RF front-end discrete (RF switch/tuner, LNA, etc.), RF front-end modules (LFEM, LNA banks, DiFEM, Wifi-FEM) and BLE chips.

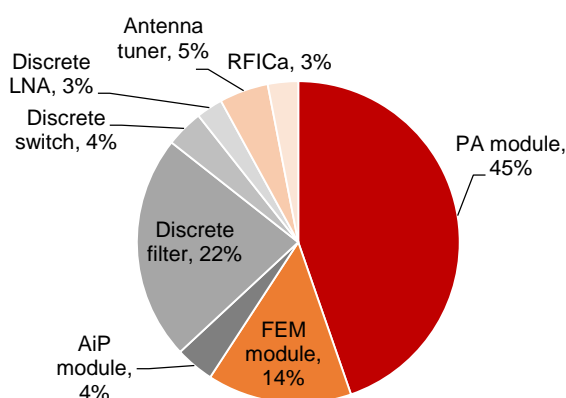
Figure 27: Company milestone



Source: Company filings, CMBIS

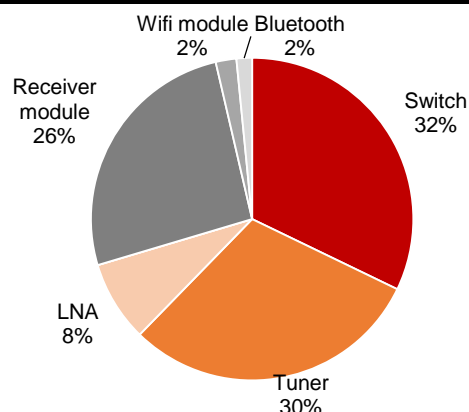
RF front-end market is expected to be US\$20.7bn in 2025, with 10.4% 2021-25 CAGR. Most of RF front-end market sales is from top 5 global peers, accounting for ~80% market share in 2019.

Figure 28: RFFE market outlook by segment



Source: Yole, CMBIS

Figure 29: Maxscend revenue breakdown (1H21)

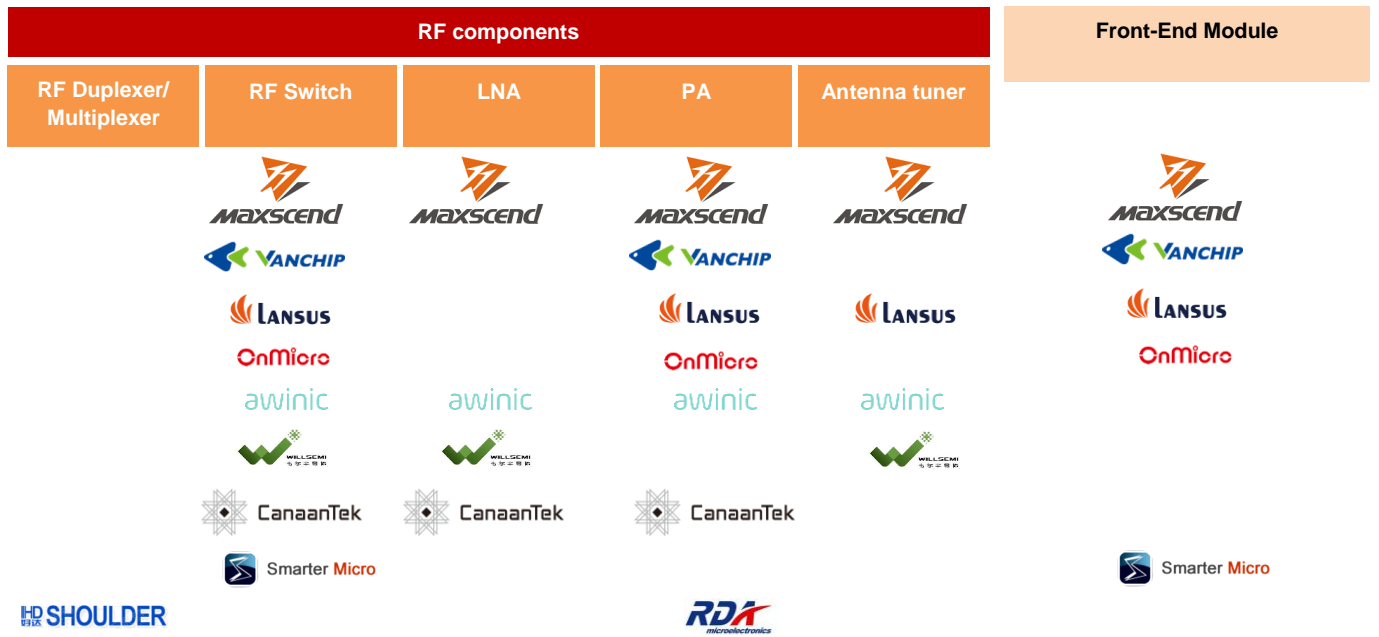


Source: Company data, CMBIS

Although the overseas players take the majority of market revenue, a few Chinese players have emerged and are catching up in certain markets. Maxscend is an established Chinese player in discrete switch and LNA products and has expanded the product's portfolio into RF modules. The Company has a broader product offerings than most of its domestic peers.

Currently, Maxscend takes ~3% of total RF front-end market share. In sub-sectors, Maxscend has achieved significant milestone, including reaching 15% share in switch/tuner market.

Figure 30: Maxscend has a broader RF front-end portfolio than its peers



Source: Yole, Company filings and public information, CMBIS

**The Company's main customers are Android OEMs.** Its RF front-end products are widely used in mobile devices (Samsung, Xiaomi, OPPO, vivo, Honor, etc.), base stations, automotive electronics, drones, headsets, etc. The BLE chips are widely used in smart homes appliances, wearable devices, and wireless charging.

Figure 31: Supply chain

Wafer	OSAT	RFFE design	End Market
TowerJazz (TSEM US) TSMC (2330 TT) TAINET (4905 TT) Win Semi (3105 TT) GlobalFoundries (GFS US)	Suzhou ASEN Semi CARSEM TFME (002156 CH) JCET Group Co (600584 CH) Forehope Electronic	Maxscend (300782 CH) Vanchip	Xiaomi (1810 HK) Samsung (5930 KS) OPPO Vivo Honor Meizu Lenovo (992 HK) TCL (000100 CH)

Source: Company filings, CMBIS

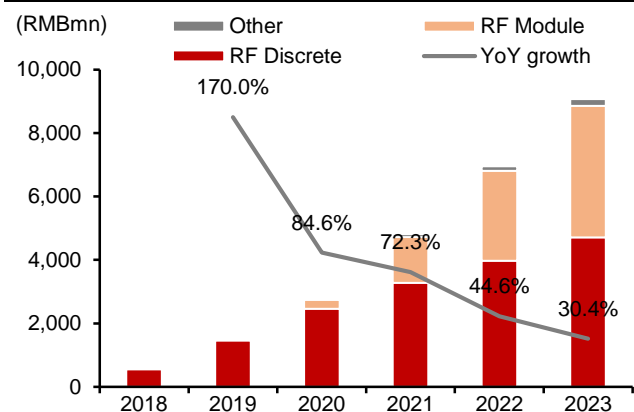
**Maxscend is currently transiting from fabless to fab-lite business model.** The Company purchases wafer from TowerJazz, TSMC, TAINET, etc. and OSAT services from Suzhou ASEN semiconductors, Carsem, TFME, etc. Maxscend has announced to invest RMB3.5bn to add a SAW filter production line, RF module assembly and testing capacity. **We hold a very positive view on Maxscend new fab-lite model and we believe it will strengthen the Company's future competitiveness, especially in the sales of RF front-end module.**

## Financials

### Expect 48%/51% CAGR for revenue/net profit in FY20-23E

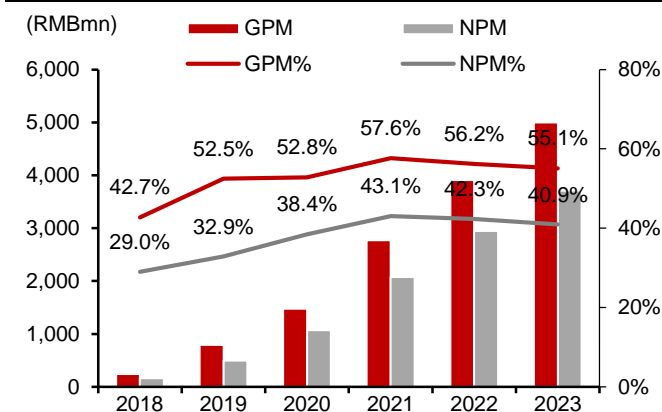
In 2020/9M21, Maxscend's revenue was RMB2.8bn/RMB3.5bn, 85%/77% YoY growth. For 1H21, 28% of Company's revenue was from RF module vs. 10% in 2020. The favorable product mix drove up blended GPM to 58.7% in 3Q21 vs. 52.8% in 2020, as RF module has a higher GPM (65%) than its legacy discrete products (54%).

**Figure 32: Maxscend revenue forecast by segment**



Source: Company data, CMBIS

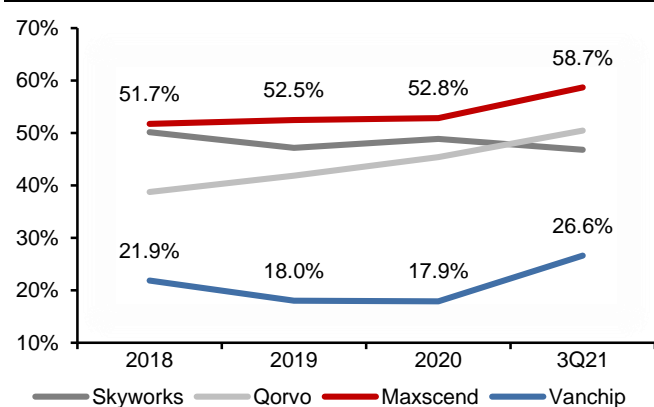
**Figure 33: Maxscend's GPM/NPM forecast**



Source: Company data, CMBIS

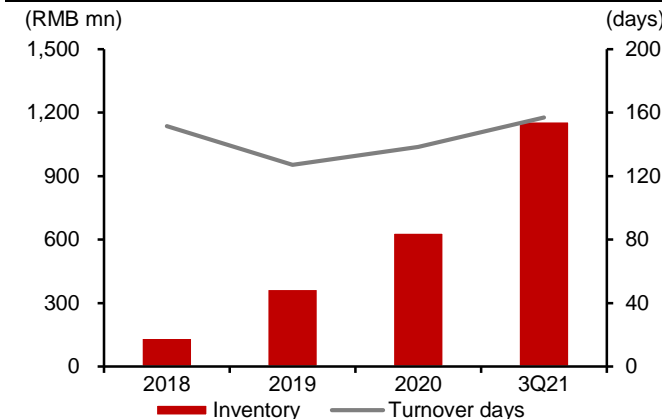
Maxscend's GPM is higher than most of its domestic peers, given Maxscend has a longer relationship with top Android OEMs than its domestic peers, its leading position in switch market and increasing contribution from RF modules helps the Company to maintain a high GPM (58.7%/52.8% in 3Q21/FY20). Looking forward, we expect the Company's overall GPM will have modest decline, falling into the range of its global peers'.

**Figure 34: Maxscend's GPM is significantly higher than its domestic peers**



Source: Company data, CMBIS

**Figure 35: Inventory ending bal. vs. turnover days**



Source: Company data, CMBIS

In 2020, Maxscend achieved 85%/116% YoY growth in revenue/net profit. Looking forward, **we estimate the Company to grow at 48%/51% revenue/earnings CAGR during FY20-23E**, benefiting from 1) exceptional RFFE market growth, 2) expanding product offerings with own fabrication base to secure filter production and enhance its technology strength. and 3) supply chain localization. **We think Maxscend is a compelling proxy for investors to capture opportunity in the fast-growing RF front-end market and the rising demand for domestic substitution.**

**Figure 36: Segment breakdown**

RMB mn	FY18	FY19	FY20	1H21	2H21E	FY21E	FY22E	FY23E
<b>Revenue</b>								
RF Discrete	554	1,463	2,462	1,661	1,622	3,282	3,977	4,714
...YoY	-4%	164%	68%	71%	-37%	33%	21%	19%
RF Module	-	-	278	662	773	1,435	2,832	4,147
...YoY	-	-	-	-	-	417%	97%	46%
Other	7	49	52	37	57	93	146	209
...YoY	-46%	650%	6%	53.3%	25%	78%	57%	43%
<b>Total</b>	<b>560</b>	<b>1,512</b>	<b>2,792</b>	<b>2,359</b>	<b>2,452</b>	<b>4,811</b>	<b>6,955</b>	<b>9,070</b>
...YoY	-5%	170%	85%	136%	-64%	72%	45%	30%
<b>Gross margin</b>								
RF Discrete	51.2%	52.3%	51.2%	54.2%	54.1%	54.1%	53.3%	52.7%
RF Module	-	-	67.2%	65.1%	64.0%	64.5%	59.7%	57.3%
Other	99.6%	56.5%	52.4%	78.0%	73.0%	75.0%	65.0%	65.0%
<b>Total</b>	<b>51.7%</b>	<b>52.5%</b>	<b>52.8%</b>	<b>57.6%</b>	<b>57.6%</b>	<b>57.6%</b>	<b>56.2%</b>	<b>55.1%</b>

Source: Company data, CMBIS estimates

**Figure 37: P&L forecast**

RMB mn	FY18	FY19	FY20	1Q21	2Q21	3Q21	4Q21E	FY21E	FY22E	FY23E
<b>Revenue</b>	<b>560</b>	<b>1,512</b>	<b>2,792</b>	<b>1,183</b>	<b>1,176</b>	<b>1,124</b>	<b>1,327</b>	<b>4,811</b>	<b>6,955</b>	<b>9,070</b>
...YoY	-5.3%	170.0%	84.6%	162%	115%	15%	62%	72.3%	44.6%	30.4%
Cost of sales	270	719	1,317	499	501	465	574	2,038	3,047	4,073
<b>Gross profit</b>	<b>290</b>	<b>793</b>	<b>1,475</b>	<b>684</b>	<b>676</b>	<b>660</b>	<b>753</b>	<b>2,773</b>	<b>3,908</b>	<b>4,998</b>
...YoY	(12.4%)	173.8%	85.9%	188%	135%	35%	63%	87.9%	41.0%	27.9%
<b>GPM (%)</b>	<b>51.7%</b>	<b>52.5%</b>	<b>52.8%</b>	<b>57.8%</b>	<b>57.4%</b>	<b>58.7%</b>	<b>56.8%</b>	<b>57.6%</b>	<b>56.2%</b>	<b>55.1%</b>
SG&A	55	76	66	18	17	23	31	89	128	167
...% of rev	9.8%	5.0%	2.4%	1.5%	1.5%	2.0%	2.3%	1.8%	1.8%	1.8%
R&D	68	138	182	61	62	72	86	280	405	529
...% of rev	12.1%	9.1%	6.5%	5.1%	5.3%	6.4%	6.5%	5.8%	5.8%	5.8%
<b>Operating profit</b>	<b>176</b>	<b>563</b>	<b>1,218</b>	<b>572</b>	<b>607</b>	<b>566</b>	<b>620</b>	<b>2,366</b>	<b>3,353</b>	<b>4,232</b>
...YoY	-8.9%	219.3%	116.5%	223.7%	163.7%	40.1%	52.4%	94.2%	41.7%	26.2%
OPM (%)	31.5%	37.2%	43.6%	48.4%	51.6%	50.4%	46.7%	49.2%	48.2%	46.7%
<b>Net profit</b>	<b>162</b>	<b>497</b>	<b>1,073</b>	<b>492</b>	<b>522</b>	<b>513</b>	<b>545</b>	<b>2,073</b>	<b>2,945</b>	<b>3,712</b>
...YoY	-4.4%	206.3%	115.8%	224.3%	159.5%	40.7%	53.5%	93.2%	42.1%	26.0%
<b>NPM (%)</b>	<b>29.0%</b>	<b>32.9%</b>	<b>38.4%</b>	<b>41.6%</b>	<b>44.4%</b>	<b>45.6%</b>	<b>41.1%</b>	<b>43.1%</b>	<b>42.3%</b>	<b>40.9%</b>

Source: Company data, CMBIS estimates

**Figure 38: CMBI estimates vs consensus**

US\$ mn	CMBI			Consensus			Diff (%)		
	FY21E	FY22A	FY23E	FY21E	FY22A	FY23E	FY21E	FY22A	FY23E
Revenue	4,811	6,955	9,070	4,859	6,801	8,842	-1%	2%	3%
Gross Profit	2,773	3,908	4,998	2,749	3,711	4,736	1%	5%	6%
Operating Profit	2,366	3,353	4,232	2,337	3,121	4,027	1%	7%	5%
Net profit	2,073	2,945	3,712	2,070	2,776	3,577	0%	6%	4%
EPS (US\$ cents)	6.31	8.97	11.30	6.31	8.39	10.76	0%	7%	5%
Gross Margin	57.6%	56.2%	55.1%	56.6%	54.6%	53.6%	1.1 ppt	1.6 ppt	1.5 ppt
Operating Margin	49.2%	48.2%	46.7%	48.1%	45.9%	45.5%	1.1 ppt	2.3 ppt	1.1 ppt
Net Margin	43.1%	42.3%	40.9%	42.6%	40.8%	40.5%	0.5 ppt	1.5 ppt	0.5 ppt

Source: Company data, CMBIS estimates

## Valuation

### Initiation at BUY with TP of RMB450.0 (43% upside)

We derive our TP of RMB450.0 by applying 50x FY22 P/E, slightly above 2-year historical average forward P/E. Maxscend is currently trading 1-SD below historical P/E, which is very attractive. We believe this valuation is justified given 1) its leading position in China's RFFE market, 2) broader product offerings, which are all self-designed and 3) transiting into fab-lite model to secure filter production and enhance its technology strength.

We take the recent volatility as an attractive opportunity for investors to gain exposure to quality Chinese semi fabless names that can ride strategic trends.

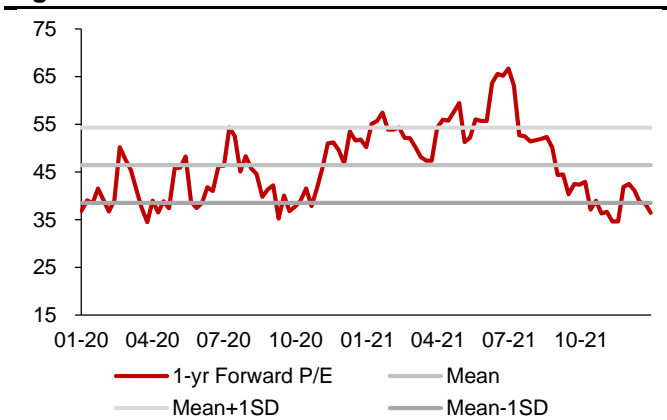
Potential risks include 1) slower-than-expected R&D progress and introduction of new products, 2) intensified competition and 3) worsened Sino/U.S. trade tension.

Figure 39: Peers valuation

Company	Ticker	Mkt Cap US\$(mn)	Price (LC)	Rev. YoY%		NP YoY%		P/E (x)		ROE (%)	
				FY21E	FY22E	FY21E	FY22E	FY21E	FY22E	FY21E	FY22E
<b>Global peers</b>											
Maxscend	300782 CH	16,657	313.00	72.3%	44.6%	93.5%	42.0%	49.6	34.9	45.7	41.6
Skyworks	SWKS US	26,669	161.25	28.7%	14.9%	35.4%	19.3%	15.5	13.9	36.5	32.2
Qorvo	QRVO US	17,685	160.45	21.8%	10.2%	136.1%	3.0%	17.0	13.5	24.4	28.6
Broadcom	AVGO US	277,005	670.92	15.1%	9.7%	89.4%	22.3%	24.0	20.4	50.8	50.8
Qualcomm	QCOM US	209,698	187.23	34.0%	13.4%	44.1%	18.8%	22.7	17.8	113.5	87.9
Murata	6981 JP	55,625	9542.00	11.2%	5.1%	40.0%	na	26.9	21.3	12.7	14.4
<b>Avg.</b>				<b>30.5%</b>	<b>16.3%</b>	<b>73.1%</b>	<b>21.1%</b>	<b>25.9</b>	<b>20.3</b>	<b>47.3</b>	<b>42.6</b>
<b>Median</b>				<b>25.2%</b>	<b>11.8%</b>	<b>66.8%</b>	<b>19.3%</b>	<b>23.4</b>	<b>19.1</b>	<b>41.1</b>	<b>36.9</b>
<b>Domestic IC designer</b>											
Maxscend	300782 CH	16,657	313.00	72.3%	44.6%	93.5%	42.0%	49.6	34.9	45.7	41.6
Willsemi	603501 CH	39,329	286.00	23.4%	34.7%	72.1%	32.7%	54.8	41.3	29.1	26.0
Gigadevice	603986 CH	16,591	158.30	68.9%	32.4%	146.0%	23.9%	46.7	38.0	18.4	19.5
SG Miceo	300661 CH	10,544	284.50	48.9%	49.0%	82.7%	42.8%	111.6	78.2	31.0	31.8
<b>Avg.</b>				<b>53.4%</b>	<b>40.2%</b>	<b>98.6%</b>	<b>35.4%</b>	<b>65.7</b>	<b>48.1</b>	<b>31.0</b>	<b>29.7</b>
<b>Median</b>				<b>58.9%</b>	<b>39.6%</b>	<b>88.1%</b>	<b>37.4%</b>	<b>52.2</b>	<b>39.6</b>	<b>30.0</b>	<b>28.9</b>

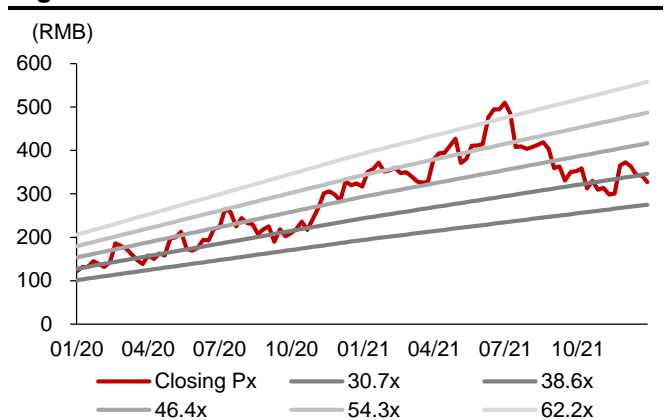
Source: Bloomberg and CMBIS, as of 6 Jan 2022.

Figure 40: 12M forward P/E



Source: Company data, CMBIS

Figure 41: 12M forward P/E band



Source: Company data, CMBIS



## Key Investment Risk

### Industry development fluctuation

The Company's main RF front-end chips are mainly used in mobile smart terminals such as smartphones, therefore are inevitably affected by macroeconomic fluctuations. If the macroeconomic situation fluctuates drastically in the future and the demand for downstream consumer electronic products decreases, especially mobile smart terminals, it will lead to a reduction in the demand for chips. If the national industrial policy for the IC design industry changes significantly, it will result in a gradual slowdown in the growth momentum of the IC design industry, which exposes the IC design enterprises, including the Company, to certain industry fluctuation risks.

### Intensified competition

The RF front-end chip design industry is developing rapidly and the market competition is increasing. Internationally, Skyworks, Qorvo, Broadcom and other peers have strong financial and technical strength, high brand awareness and market influence. There is still a gap in the overall strength and brand awareness of the Company compared with them. Domestically, the chip products provided by local competitors tend to homogenize, leading to a decline in market prices and shrinking profits in the industry. Also, as the performance differences of smartphones and tablet PCs gradually narrow, the downstream market is highly competitive and the gross profit margin of downstream enterprises is on a downward trend, which may also lead to a reduction in the profit margin of design companies in the industry, thus affecting the profitability of the company.

### 5G domestic substitution

5G commercialization has started to land gradually in the world. 5G is a major change in mobile communication technology, which brings new growth opportunities to the RF front-end industry. The company has developed and launched a series of products applicable to 5G communication mode sub-6GHz band. If the commercial progress of 5G slows down or the domestic replacement is not as expected, it will affect the Company's product shipment and performance growth.

### US-China trade tension

Changes in U.S. trade policies and the U.S.-China trade friction have brought a certain degree of uncertainty to the global business environment. Any future changes in U.S.-China trade may lead to uncertainty in the demand of the domestic IC industry and may adversely affect the Company's ongoing operations such as product development, sales and procurement. In addition, if the Company or its customers' products are affected by international trade policies in the future, it may have an adverse impact on the Company's operations and continued performance growth.

### COVID-19 impact

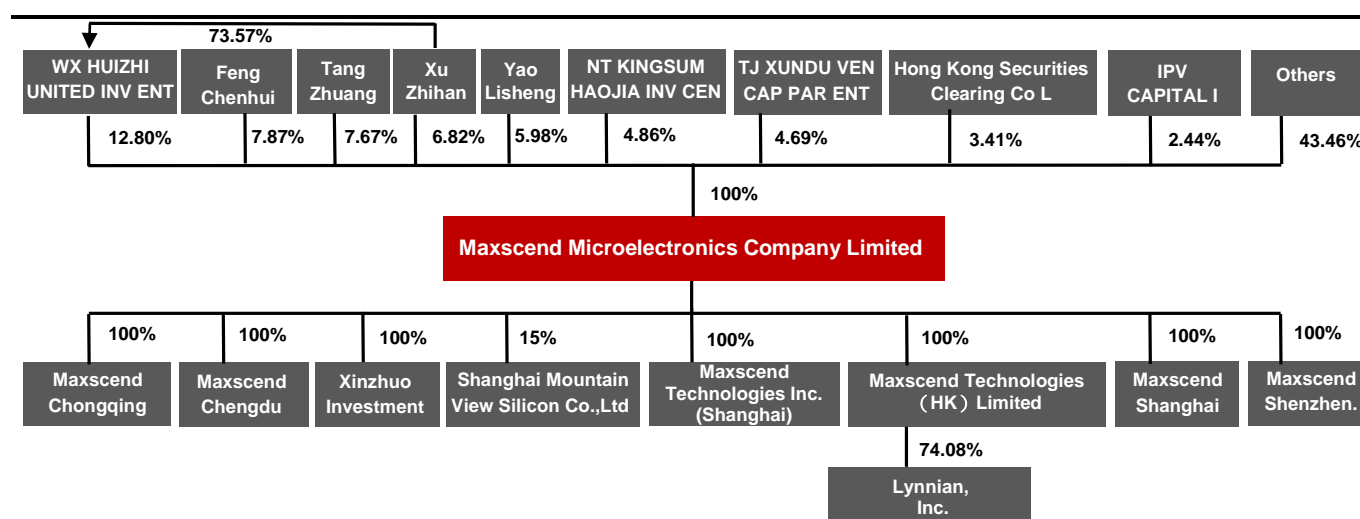
Although the world has suppressed the spread of the pandemic to a great extent, there is risk that the pandemic has a longer impact on our lives. If the pandemic cannot be effectively controlled in the future, the Company's supply and sales will face challenges and greater uncertainty.

## Appendix 1 – Business milestone

Year	Milestone
2006	Founding of Maxscend Cayman and establishment of Maxscend Technologies Inc. (Shanghai).
2007	Launch of first product MXD0120 for DMB/DAB/DAB+ television.
2008	Establishment of Maxscend Technologies (HK) Ltd.
2010	Focus shifted to RF front-end.
2011	Establishment of Maxscend Microelectronics Co., Ltd., based in Wuxi. Acquisition of Maxscend Technologies Inc. (Shanghai) and Maxscend Technologies (HK) Ltd. Entered Samsung supply chain.
2012	First mass production of RF LNA.
2014	First mass production of RF switch.
2015	Entered Xiaomi supply chain. Launch of LTE LNA and Antenna tuner.
2017	Establishment of Lynnian, Inc. Launch of FM LNA.
2018	Entered Vivo supply chain. Launch of SAW filter.
2019	IPO and listed on ChiNext on 18 June. Entered Huawei and OPPO supply chain.
2020	RF switch passes Qualcomm's pilot production and enters mass production. Deployment of high-end RF filters and 5G RF base stations.

Source: Company filings

## Appendix 2 – Shareholding structure



Source: Company data, Bloomberg and CMBIS

## Appendix 3 – Key management & Directors

Name	Date of joining	Age	Position Title	Experience
Xu Zhihan	2006/07	49	General Manager; Chairman of the Board	Mr. Xu worked as an engineer at Toshiba U.S. (1998-2000). He was the chief engineer at ATOGA Systems (2000-2001) and served as the vice general manager at C-Sky Microsystems, Ltd. (2002-2004). He served as the vice general manager at Hangzhou Saian Microsystems. (2004-2006). Mr. Xu obtained bachelor/master degree in CS from Tsinghua University and a master's degree in EE from Santa Clara University, and an EMBA from China Europe International Business School.
Tang Zhuang	2006/07	48	Vice General Manager; Board member	Mr. Tang served as the chief scientist at WJ Communications (2000-2006). Mr. Tang holds a bachelor's degree of physics from Peking University, and he obtained master/PhD degree in electrical & computer engineering from UIUC.
Feng Chenhui	2006/04	55	Vice General Manager; Board member; Board Secretary	Mr. Feng worked as a software engineer at Beijing StarPoint Tech. (1992-1994). He served as the manager of software verification and validation department at Stream Machine (1997-2001) and the chief engineer at Broadcom Co. (2001-2005). He served as the chief director of video technology at Magnum Semiconductor (2005-2006). Mr. Feng obtained bachelor/master degree in EE from Tsinghua University.
Zhu Huayan	2014/06	39	CFO	Ms. Zhu served as the finance manager at Zhenqiu Group Ltd. (2006-2010) and the finance manager at Wuxi Contemporary Petroleum Enterprise Conference & Exhibition Service. MS. Zhu holds a bachelor's degree of accounting from Nanjing Institute of Technology.
Yao Lisheng	2017/08	51	Director	Mr. Yao worked for Lenovo (Beijing) Co., Ltd. (1996-2000). He founded Beijing Chinasys Technologies, Flyfot Technology (Beijing), Xiaoshitou Software (Beijing) and served as Chairman/President/CEO. Mr. Yao served as the executive director and general manager of Flyfot Venture Capital (Beijing) and Huohua Venture Capital (Beijing). Mr. Yao obtained a bachelor's degree in CS from Tsinghua University and a master's degree in CS from Chinese Academy of Sciences.
Wang Xuefeng	2017/08	43	Director	Mr. Wang worked at BearingPoint Mgmt. Consulting (Shanghai) (2002-2005) and at Accenture (China) (2005-2008). He served as the Investment Manager at Co-Bridge Capital (2008-2009). Mr. Wang served as Chairman and general manager of Wuxi Ferry VC Investment since 2011. He held various positions at Yuandu Equity Management (Shanghai). He served as the Chairman of Wuxi Yuandu Equity Investment Management Co. and Managing partner of Shanghai Tiyang Information Technology Partnership since 2017. Mr. Wang obtained bachelor/master degree in accounting from School of Economics and Management, Tsinghua University.
Song Jian	2017/08	55	Independent Director	Dr. Song served as professor in the Department of Electronic Engineering of Tsinghua University. He worked at Hughes Network Systems (1998-2005) and served as Director of Sichuan Changhong Electronics (since 2015) and independent director of Suzhou Sifo Smart Automation (2017-2019), Certusnet (since 2019), GalaxyCore (since 2020) and MEGAHUNT (since 2020). He serves as Chairman of the Board of Minhua Intelligence (Tianjin) Tech. (since 2018). Dr. Song obtained bachelor/master/Ph.D degree in EE from Tsinghua University.
Xu Yixing	2017/08	77	Independent Director	Ms. Xu worked at Shanghai Normal University (1964-1979). She served as an associate professor at Shanghai University of Finance and Economics (1979-2004), a deputy director and a partner at Moore Global Accounting Firm, and a partner at Ernst and Young Dahua CPA. Ms. Xu served as a consultant of BDO Shu Lun Pan (2005-2013), an independent director of Ningbo Shanshan (2014-2020), Shanghai Ailu Packaging (2017-2020), Siche Elevator (since 2015) and Shanghai Fortune Techgroup (since 2018). Ms. Xu obtained a bachelor degree in accounting at Shanghai University of Finance and Economics. She is a CPA.
Xu Wei	2020/08	64	Independent Director	Mr. Yao worked at Jiangsu Wuxi 742 Factory (1982-1991), China Resources Microelectronics (1991-1996), Shanghai Huahong (Group) (1996-1997) and Shanghai Huahong NEC electronics (1997-2013). He served as Secretary of the Party Committee and Executive VP of Shanghai Hua Hong Hongli Semiconductor Manufacturing (2013-2019) and served as the Secretary-general of SICA (since 2019). Mr. Xu obtained a bachelor's degree in Semiconductor Physics and Devices at Xi'an Jiaotong University, and is a senior engineer in Microelectronics Department, Institute of Microelectronics, Tsinghua University.

Source: Company data, CMBIS

## Financial Summary

### Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
<b>Revenue</b>	<b>1,512</b>	<b>2,792</b>	<b>4,811</b>	<b>6,955</b>	<b>9,070</b>
Cost of sales	(719)	(1,317)	(2,038)	(3,047)	(4,073)
<b>Gross profit</b>	<b>793</b>	<b>1,475</b>	<b>2,773</b>	<b>3,908</b>	<b>4,998</b>
Selling exp	(43)	(34)	(34)	(49)	(64)
Admin exp	(33)	(32)	(55)	(79)	(103)
R&D exp	(138)	(182)	(280)	(405)	(529)
Finance costs	12	(19)	6	8	16
Other operating inc./exp.	(30)	10	(44)	(30)	(86)
<b>Operating profit</b>	<b>563</b>	<b>1,218</b>	<b>2,366</b>	<b>3,353</b>	<b>4,232</b>
Other non-oper exp.	0	(1)	(7)	(7)	(11)
<b>Pre-tax profit</b>	<b>563</b>	<b>1,217</b>	<b>2,358</b>	<b>3,346</b>	<b>4,220</b>
Income tax expense	(68)	(147)	(287)	(405)	(512)
Minority interests	(3)	(2)	(1)	(4)	(4)
<b>Net profit to shareholders</b>	<b>497</b>	<b>1,073</b>	<b>2,073</b>	<b>2,945</b>	<b>3,712</b>

### Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
<b>Net profit</b>	<b>494</b>	<b>1,071</b>	<b>2,071</b>	<b>2,941</b>	<b>3,708</b>
Depreciation/amortization	19	28	45	104	205
Change in working capital	(481)	(103)	(973)	(234)	(964)
Others	23	9	(442)	110	(347)
<b>Net cash from operating</b>	<b>56</b>	<b>1,005</b>	<b>702</b>	<b>2,921</b>	<b>2,602</b>
Capex	(96)	(153)	(490)	(775)	(1,081)
Other	(486)	284	(841)	(35)	(35)
<b>Net cash from investing</b>	<b>(582)</b>	<b>130</b>	<b>(1,331)</b>	<b>(810)</b>	<b>(1,116)</b>
Share issuance	841	0	0	0	5
Dividend paid	(100)	(100)	(185)	(387)	(551)
Other	(11)	(1)	(1)	(6)	(4)
<b>Net cash from financing</b>	<b>730</b>	<b>(101)</b>	<b>(186)</b>	<b>(393)</b>	<b>(549)</b>
<b>Net change in cash</b>	<b>204</b>	<b>1,035</b>	<b>(816)</b>	<b>1,718</b>	<b>937</b>
Cash, beg	265	477	1,475	651	2,361
Exchange adj.	7	(37)	(8)	(8)	(8)
<b>Cash, end</b>	<b>477</b>	<b>1,475</b>	<b>651</b>	<b>2,361</b>	<b>3,290</b>

### Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
<b>Current assets</b>	<b>1,784</b>	<b>2,652</b>	<b>3,531</b>	<b>5,824</b>	<b>7,683</b>
Cash & equivalents	477	1,475	737	2,447	3,375
Account receivables	378	338	1,021	943	1,619
Inventory	366	632	868	1,408	1,649
Prepayment	32	32	62	84	110
Other current assets	531	175	844	941	929
<b>Non-current assets</b>	<b>139</b>	<b>439</b>	<b>1,414</b>	<b>2,110</b>	<b>3,491</b>
PPE	72	103	319	695	1,214
Deferred tax assets	7	10	10	21	27
Other non-current assets	60	326	1,084	1,393	2,250
<b>Total assets</b>	<b>1,923</b>	<b>3,090</b>	<b>4,945</b>	<b>7,933</b>	<b>11,174</b>
<b>Current liabilities</b>	<b>209</b>	<b>403</b>	<b>386</b>	<b>794</b>	<b>867</b>
ST borrowings	0	0	0	0	0
Account payables	130	224	190	428	398
Tax payable	43	116	136	257	335
Other current liabilities	36	64	60	108	135
<b>Non-current liabilities</b>	<b>17</b>	<b>35</b>	<b>33</b>	<b>71</b>	<b>88</b>
LT borrowings	0	0	0	0	0
Deferred tax liability	14	33	31	67	82
Other non-current	2	2	2	4	5
<b>Total liabilities</b>	<b>226</b>	<b>438</b>	<b>419</b>	<b>865</b>	<b>955</b>
Share capital	100	180	328	328	328
Reserve	940	860	731	731	731
Retained earnings	610	1,556	3,236	5,499	8,289
Other	53	65	241	523	888
Minority interest	-6	-8	-9	-13	-17
<b>Total equity</b>	<b>1,698</b>	<b>2,652</b>	<b>4,526</b>	<b>7,068</b>	<b>10,219</b>
<b>Total liabilities and</b>	<b>1,923</b>	<b>3,090</b>	<b>4,945</b>	<b>7,933</b>	<b>11,174</b>

### Key ratios

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
<b>Revenue by segment</b>					
RFFE discrete	1,463	2,462	3,282	3,977	4,714
RFFE module	0	278	1,435	2,832	4,147
Other	49	52	93	146	209
<b>Growth (%)</b>					
Revenue	170.0%	84.6%	72.3%	44.6%	30.4%
Gross profit	173.8%	85.9%	87.9%	41.0%	27.9%
Operating profit	219.3%	116.5%	94.2%	41.7%	26.2%
Net profit	206.3%	115.8%	93.2%	42.1%	26.0%
<b>Profit &amp; loss ratio (%)</b>					
Gross margin	52.5%	52.8%	57.6%	56.2%	55.1%
Operating margin	37.2%	43.6%	49.2%	48.2%	46.7%
Net profit margin	32.9%	38.4%	43.1%	42.3%	40.9%
<b>Balance sheet ratio</b>					
Net debt/total equity (%)	Net cash	Net cash	Net cash	Net cash	Net cash
Current ratio (x)	8.5	6.6	9.2	7.3	8.9
Receivable turnover days	51	47	52	52	52
Inventory turnover days	(127)	(138)	(146)	(146)	(146)
Payable turnover days	(41)	(49)	(37)	(37)	(37)
<b>Profitability (%)</b>					
ROE	29.2%	40.3%	45.7%	41.6%	36.3%
ROA	25.9%	34.7%	41.9%	37.1%	33.2%
<b>Per share data (RMB)</b>					
EPS	3.16	3.31	6.31	8.97	11.30
DPS	1.00	1.00	1.00	1.00	1.00
BPS	10.81	8.21	13.81	21.57	31.17

Source: Company data, CMBIS estimates

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