

### **Semiconductors**

# RFFE localization to continue as handset market recovers

Cautious RFFE market outlook since uneven end-markets recovery is likely to persist into 2025.

- We expect mobile RFFE to grow at low single-digit in 2024E-26E, constrained by saturated smartphone shipments, global smartphone shipments to grow by 4.7%/2.7% YoY in 2024/25E) and limited incremental content per device. While AI is driving content growth in other components like SoCs and memory, its impact on RFFE content is relatively modest. We expect mobile RFFE content per smartphone to decline in 2024 and remain stable going forward.
- Auto RFFE, the smallest segment, is forecasted to achieve double-digit growth per Yole, fueled by the rising adoption of advanced safety systems and the acceleration of vehicle electrification trends.

Domestic peers may rise on semiconductor localization trend. The RFFE market is dominated by a few companies (top 4: 62% market share). China's peers are trying to catch up; however, their shares are still relatively small (Maxscend/Vanchip: 3%/2% in 2023).

- Regionally, China's RFFE market has become increasingly crowded fueled by investment hype, particularly in the low-end categories.
- Chinese peers are facing growth challenges in recent quarters and margin erosion (Maxscend/Vanchip/Smarter Micro's GPM down 9ppts/2ppts/15ppts in 3Q24 vs. 3Q23), compounded by intensified competition alongside persistently soft demand.

We maintain HOLD for Maxscend, as the company goes through business model transformation and its LT growth remains intact. Maxscend, a prominent domestic leader in the mobile RFFE market, is currently going through a strategic transition from a fabless to a fab-lite business model, which weighs on the company's margins (GPM was down 4.3ppts sequentially to 37.1% in 3Q24). The unchanged TP of RMB86 corresponds to 45x 2025E P/E (~0.5 SD below historical 5-year average).

#### Peers table

		Mkt Cap	Price	P/E (x)		Rev. growth YoY%	
Company	Ticker	US\$(mn)	(LC)	FY24E	FY25E	FY24E	FY25E
Domestic peers							
Maxscend	300782 CH	6,752	91.36	86.3	47.3	4.7	23.0
Vanchip	688153 CH	2,339	39.34	99.6	44.7	-4.4	41.2
Smarter Micro	688512 CH	815	12.80	-	-	-3.0	84.5
			Average	93.0	46.0	(0.9)	49.6
Global peers							
Qualcomm	QCOM US	173,760	156.40	15.5	14.0	8.7	9.1
Broadcom	AVGO US	745,751	159.67	33.0	25.7	44.0	17.6
Skyworks	SWKS US	13,881	86.80	13.9	16.1	-12.5	-4.7
Qorvo	QRVO US	6,466	68.40	11.3	14.2	5.6	-2.5
Murata	6981 JT	32,440	2489.50	21.3	18.1	7.2	7.2
NXP	NXPI US	57,574	226.53	17.4	17.5	-5.1	1.2
			Average	18.7	17.6	8.0	4.7

Source: Company data, Bloomberg, CMBIGM estimates

## OUTPERFORM (Maintain)

#### **China Semiconductors Sector**

Lily YANG, Ph.D (852) 3916 3716 lilyyang@cmbi.com.hk

Kevin ZHANG (852) 3761 8727 kevinzhang@cmbi.com.hk

#### Related reports:

- Semiconductors Nvidia's 3Q earnings takeaway: Strong demand for Blackwell well into next year (link)
- Semiconductors AMD "Advancing AI" event (link)
- Semiconductors Sector valuation revisit after recent rally; Potential rerating opportunities ahead (<u>link</u>)
- Semiconductors Nvidia 2Q review: A strong beat-and-raise quarter; eyes on Blackwell shipment and margin (link)
- 5. Semiconductors PCB sector: 1H24 earnings preview (link)
- 6. Semi Solid earnings; HBM to drive future growth (link)
- Semi Thematic investing and megatrends: Al exposure update (<u>link</u>)
- 8. Semi Marvell FY1Q25 earnings: Harnessing the AI revenue (link)
- Nvidia: To keep growing for longer (link)
- Semi Global SME investment set to accelerate on tech advancements, China localization; Initiate Naura w/ BUY (<u>link</u>)
- InnoLight (300308 CH) 1Q24 results set stage for accelerated growth in 2024 – 24 Apr 2024 (link)
- Semi Semi Nvidia GTC 2024: A quick take – 20 Mar 2024 (link)
- 13. Semi Nvidia continues to impress 22 Feb 2024 (link)
- 14. Semi Hyperscalers' FY23 results review 7 Feb 2024 (<u>link</u>)
- Innolight (300308 CH) True beneficiary in AI value chain – 26 Jan 2024 (link)
- Semi Market outlook on optical transceivers – 26 Jan 2024 (<u>link</u>)
- Thematic investing and megatrends: AI sales exposure reality check, by the number – 12 Jan 2024 (link)
- 18. CES 2024 wrap up 10 Jan 2024 (link)
- Synopsys eyes on Ansys: a potential software giant in the making – 10 Jan 2024 (<u>link</u>)



### **Contents**

Cautious outlook: Uneven end-markets recovery likely to persist 2025 3	into
Mobile RFFE market to grow at low-single digit	4
Auto RFFE players to embrace double-digit growth as vehicles are transforming to software-defined	
Competitive landscape: top 4 accounted for 62% of market share	
China RFFE market: domestic players rise on semiconductor localization trend, while broad market challenges and geopolitica risks persist	I
Maxscend (300782 CH, HOLD, TP: RMB86.0)	11



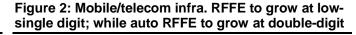
# Cautious outlook: Uneven end-markets recovery likely to persist into 2025

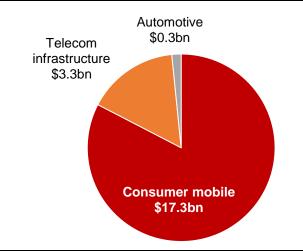
RFFE market grew to US\$21bn in 2023, per Yole. Consumer mobile (US\$17.3bn) remained the largest segment, contributing over 80% of total sales. Telecom infrastructure was US\$3.3bn (16%), and auto was US\$0.3bn (2%).

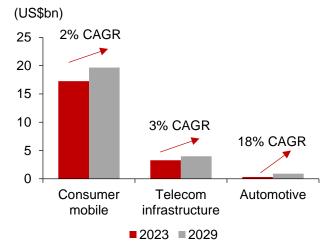
#### Looking forward,

- 1) Mobile RFFE Segment: Growth is expected to remain in low single digit, constrained by saturated smartphone shipments and limited incremental content per device. While AI is driving content growth in other components like SoCs and memory, its impact on RFFE content per smartphone is relatively modest.
- 2) Telecom Infrastructure RFFE Segment: Recovery is anticipated by 2026E, with the segment projected to expand to US\$4bn by 2029, supported by increased investments in 5G networks and infrastructure, per Yole.
- 3) Auto RFFE Segment: Despite being the smallest segment, it is forecasted to achieve double-digit growth, tripling in size to US\$0.9bn by 2029E, per Yole. The expansion will be fueled by the rising adoption of advanced safety systems and the acceleration of vehicle electrification trends.

Figure 1: RFFE revenue breakdown by end markets (2023)







Source: Yole, CMBIGM estimates

Source: Yole, CMBIGM estimates



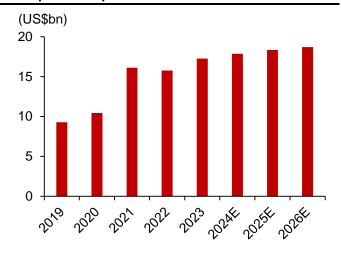
### Mobile RFFE market to grow at low-single digit

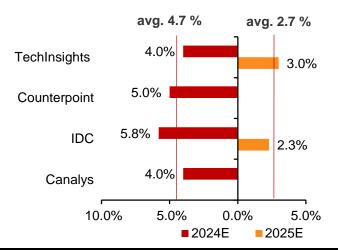
The Mobile RFFE market experienced exceptional growth (est. 40%+) in 2021, driven by the surge in 5G smartphone penetration (from 20% in 2020 to 41% in 2021) and a 6% YoY rebound in smartphone shipments. However, the momentum stalled in 2022, with flattish RFFE sales as smartphone shipments declined by 11% YoY, partially offset by a 12% increase in 5G share. In 2023, growth resumed at approximately 10% YoY, supported by an improved sales mix, as the market shifted toward higher-priced smartphones. Despite a 3% YoY decline in smartphone shipments, the premium-tier segment (ASP of over US\$500) expanded to 30% of the market (up 3ppts), resulting in a 13% rise in RFFE content per device.

Looking forward, the mobile RFFE market is projected to achieve **low-single-digit growth** (~2% YoY) in 2024E and beyond, aligned with the expected **low-single-digit increase in smartphone shipments** and **relatively stable RFFE content per device**. According to multiple forecasts (IDC, Techlnsights, Counterpoint, etc.), global smartphone shipments are expected to grow by 4.7% in 2024E and 2.7% in 2025E, reflecting modest market recovery trends.

Figure 3: Mobile RFFE market is expected to grow at low-single digit in 2024E and 2026E, due to saturated smartphone shipment and stable RFFE content

Figure 4: Smartphone shipment to grow at an average 4.7%/2.7% in 2024/25E according to multiple agencies' forecasts





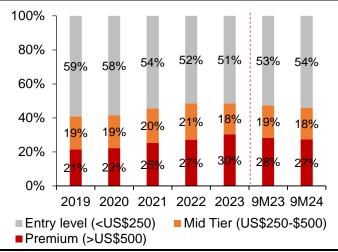
Source: Yole, IDC, Canalys, TechInsights, Counterpoint and CMBIGM estimates

Source: IDC, Canalys, TechInsights, Counterpoint and CMBIGM estimates

In 9M24, entry-level (ASP below US\$250) gained traction with share increasing to 54% (vs. 53%/51% for 9M23/FY23). Premium-tier lost momentum with share falling to 27% (vs. 28%/30% for 9M23/FY23). Mid-tier (ASP between US\$250 and US\$500) held steady with 18% share (vs. 19%/18% for 9M23/FY23). In our view, mobile RFFE content per smartphone will decline in 2024, considering the unfavorable mix. We expect it to remain stable going forward.

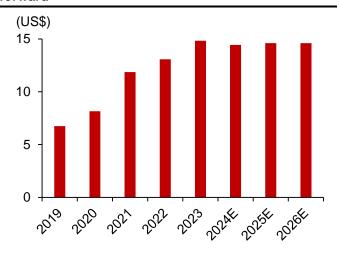


Figure 5: The mix has shifted to premium-tier in 2023 at the expense of mid-tier; however, entry-level gained traction in 6M24



Source: IDC, Bloomberg, CMBIGM estimates

Figure 6: Mobile RFFE content per smartphone is expected to decline in 2024 and remain stable going forward



Source: Yole, IDC, Canalys, TechInsights, Counterpoint and CMBIGM estimates



# Auto RFFE players to embrace double-digit growth as vehicles are transforming to software-defined

Despite near-term headwinds of excess inventory in auto market, we believe auto RFFE segment will see more significant growth compared to mobile and telecom infrastructure RFFE segments. The key driver is the growing needs from advanced safety systems requirements and electrification/software-defined trend.

Qualcomm is the dominant player in the auto RFFE market, offering a comprehensive suite of solutions, including integrated RF front-end modules, antenna tuners, and cellular V2X (Vehicle-to-Everything) connectivity solutions (note: the connectivity solutions are not included in this section). These technologies support advanced communication systems required for connected and autonomous vehicles, enabling seamless integration with 5G and improving safety, reliability, and efficiency in software-defined vehicles.

Figure 7: RFFE applications in auto industry



Source: Qualcomm, CMBIGM

Meanwhile, Qorvo and Skyworks are expanding their portfolios to address the growing demand for auto RFFE, with offerings such as high-performance RF modules, power amplifiers, and filters tailored for auto applications. These products aim to enhance in-car connectivity, advanced driver-assistance systems (ADAS), and infotainment systems. For Chinese peers, their presence in the auto RFFE market remains minimal, reflecting a potential area for future investment and development to compete in this high-growth segment.

Figure 8: Key players in automotive RFFE market

Company	Recent updates
Qualcomm	<ul> <li>Auto segment sales (9% of 4QFY24 revenue) rose 68%/11% YoY/QoQ.</li> <li>Auto segment to see 50%+ YoY growth while remaining flat on a sequential basis in 1QFY25.</li> <li>Introduced a suite of auto products, including Snapdragon Cockpit Elite and Snapdragon Ride Elite automotive platforms, establishing the company as a performance leader in digital cockpit and ADAS.</li> </ul>
Skyworks	<ul> <li>Industrial and automotive revenue accounted for ~10% of 4QFY24 revenue.</li> <li>Engaging with Mercedes-Benz and is "converting design wins into revenue across connectivity, power isolation, and digital broadcast solutions for the connected car and EV markets".</li> </ul>



Qorvo

- Secured a V2X design win with a US-based automotive Tier 1 in support of an automotive OEM based in Germany.
- Selected to supply a full suite of V2X and network access device RF products in support of an automotive OEM with production volumes expected to ramp up this quarter.

Source: Company data



# Competitive landscape: top 4 accounted for 62% of market share

By competitive landscape, a few companies dominate the RFFE market. Broadcom/ Qualcomm/Qorvo/Skyworks led the market with an aggregated share of 62% in 2023, per Yole. China peers are trying to catch up; however, their shares are still relatively small. Maxscend and Vanchip are the two largest players in this domain with 3% and 2% market presence respectively.

Figure 9: Top 4 Global RFFE players dominated ~62% market share (2023)

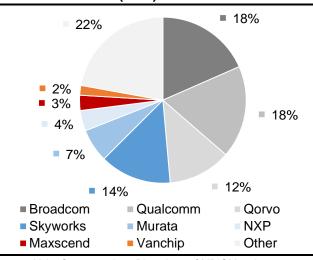
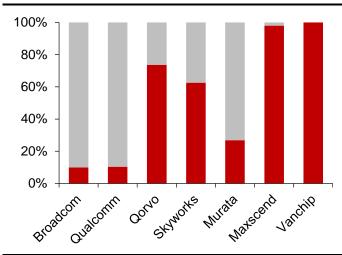


Figure 10: Skyworks, Qorvo, Maxscend, Vanchip's RFFE sales contributed over 50% of total revenue



Source: Yole, Company data, CMBIGM estimates

Source: Yole, Company data, Bloomberg, CMBIGM estimates

#### RFFE peers' inventory declined from peak level but is still above pre-pandemic levels.

Overseas players' inventory is reducing gradually on disciplined management. Domestic peers' inventory level rose in recent one or two quarters, a mixed impact from slow recovery in demand and key components stocking behaviors due to seasonality and geopolitical concerns.

Figure 11: Overseas peers' inventory is still above pre-pandemic levels despite disciplined management

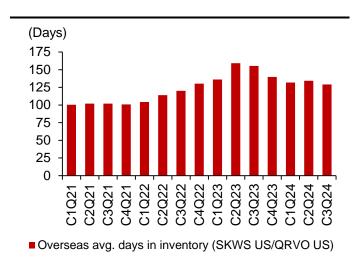
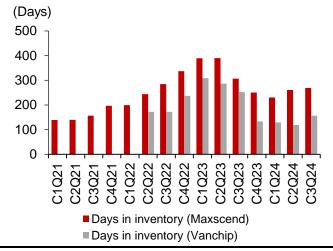


Figure 12: Domestic peers' inventory rose in 2Q/3Q24, reflecting a slow recovery in demand and ongoing geopolitical concerns



Source: Company data, CMBIGM estimates

Source: Company data, CMBIGM estimates

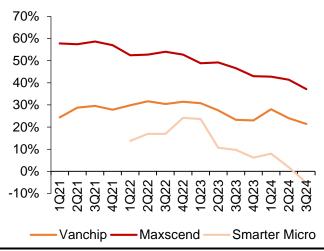


# China RFFE market: domestic players rise on semiconductor localization trend, while broad market challenges and geopolitical risks persist

Domestic RFFE market has become increasingly crowded in recent years fueled by investment hype, particularly in the low-end categories. However, as the smartphone market reached saturation and 5G penetration normalized, Chinese peers are facing growth challenges and margin erosion (Maxscend/Vanchip/Smarter Micro's GPM down 9ppts/2ppts/ 15ppts in 3Q24 vs. 3Q23), compounded by intensified competition alongside persistently soft demand.

Figure 13: Peers' revenue growth slowed down due to soft demand and price war

Figure 14: Intensified competition has weighed on Maxscend and Vanchip's margins

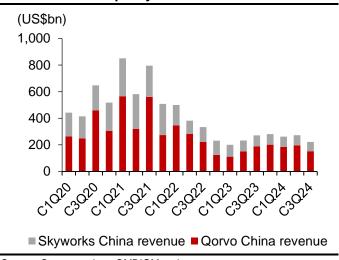


Source: Company data, Bloomberg and CMBIGM estimates

Source: Company data, Wind and CMBIGM estimates

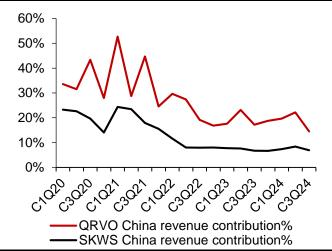
Meanwhile, the overseas players are reducing exposure to China's market. Qorvo and Skyworks' China revenue decreased over the past years. Excluding the impact from a challenging market, we see the percentage contribution dropping to 15%/7% in CY3Q24 from 43%/20% in CY3Q20, mainly due to 1) rising semiconductor localization in China, 2) pricing disciplines, and 3) ongoing geopolitical risks.

Figure 15: Skyworks/Qorvo's China revenue declined over the past years



Source: Company data, CMBIGM estimates

Figure 16: China sales contribution to remain at low level given foreseeable geopolitical risks



Source: Company data, CMBIGM estimates



Based on the peer's valuation, domestic peers trade at a **relatively higher average valuation** compared to their global counterparts. The average 2024/25E P/E of domestic RFFE players (Maxscend, Vanchip, and Smarter Micro) are 93x/46x, while that of global peers (Qualcomm, Skyworks, Qorvo, etc.) are 18.7x/17.6x (per Bloomberg). The disparity reflects a more mature market and stable growth trajectory among global players. However, domestic Chinese companies are expected to outpace their global counterparts in revenue growth, with projected 49.6% YoY growth in 2025E following a flattish movement in 2024E. In contrast, global peers are forecasted to achieve more modest growth of 8.0%/4.7% YoY in 2024E/25E, per Bloomberg consensus.

Figure 17: RFFE peer valuation table

		Mkt Cap	Price	P/E		EPS (US\$)		Rev. growth YoY	
Company	Ticker	US\$(mn)	(LC)	FY24E	FY25E	FY24E	FY25E	FY24E	FY25E
Domestic RFFE peers									
Maxscend	300782 CH	6,752	91.36	86.3	47.3	0.15	0.27	4.7	23.0
Vanchip	688153 CH	2,339	39.34	99.6	44.7	0.05	0.12	-4.4	41.2
Smarter Micro	688512 CH	815	12.80	-	-	-0.12	-0.04	-3.0	84.5
			Average	93.0	46.0	0.0	0.1	(0.9)	49.6
Global RFFE peers									
Qualcomm	QCOM US	174,349	156.93	15.5	14.0	10.08	11.17	8.7	9.1
Broadcom	AVGO US	769,431	164.74	33.0	25.7	4.84	6.22	44.0	17.6
Skyworks	SWKS US	13,798	86.28	13.9	16.1	6.25	5.38	-12.5	-4.7
Qorvo	QRVO US	6,442	68.15	11.3	14.2	6.05	4.82	5.6	-2.5
Murata	6981 JT	32,977	2525.50	21.3	18.1	0.75	0.89	7.2	7.2
NXP	NXPI US	58,115	228.66	17.4	17.5	13.04	12.92	-5.1	1.2
			Average	18.7	17.6	6.8	6.9	8.0	4.7

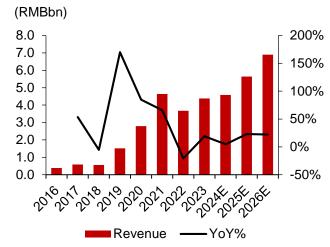
Source: Bloomberg data as of 29 Nov 2024, CMBIGM estimates



### Maxscend (300782 CH, HOLD, TP: RMB86.0)

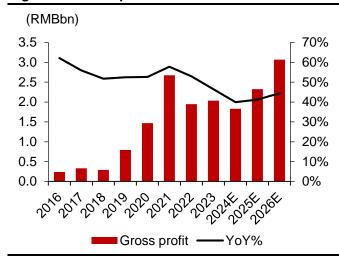
Maxscend, a prominent domestic leader in the mobile RFFE market, is currently going through a strategic transformation from a fabless to a fab-lite business model. This shift, aimed at enhancing production control, has temporarily weighed on the company's profitability, as reflected in its 3Q24 results amid an overall sluggish smartphone shipment recovery. GPM was down 4.3ppts sequentially to 37.1% and NPM dropped to 6.6% from 14.3%/32.1% in 2Q24/3Q23 on lower GPM, higher R&D (up 66% YoY) and asset impairment costs. We expect the company's RFFE module business to become the major revenue driver in the future as its contribution to total revenue increased in the past few quarters. We maintain Maxscend at HOLD, with TP unchanged at RMB86, corresponding to 45x 2025E P/E (~0.5SD below historical 5-year average).

Figure 18: Maxscend's revenue and growth



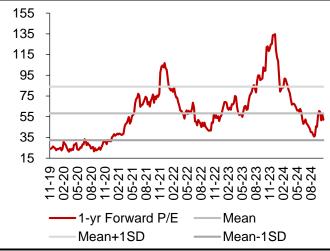
Source: Company data, CMBIGM estimates

Figure 19: Gross profit and GPM



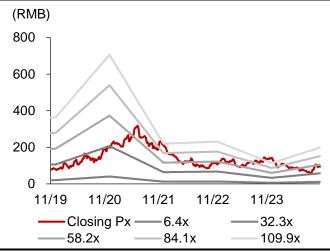
Source: Company data, CMBIGM estimates

Figure 20: 1-yr forward P/E band



Source: Company data, Bloomberg, CMBIGM estimates

Figure 21: 1-yr forward P/E chart



Source: Company data, Bloomberg, CMBIGM estimates



### **Disclosures & Disclaimers**

#### **Analyst Certification**

The research analyst who is primary responsible for the content of this research report, in whole or in part, certifies that with respect to the securities or issuer that the analyst covered in this report: (1) all of the views expressed accurately reflect his or her personal views about the subject securities or issuer; and (2) no part of his or her compensation was, is, or will be, directly or indirectly, related to the specific views expressed by that analyst in this report.

Besides, the analyst confirms that neither the analyst nor his/her associates (as defined in the code of conduct issued by The Hong Kong Securities and Futures Commission) (1) have dealt in or traded in the stock(s) covered in this research report within 30 calendar days prior to the date of issue of this report; (2) will deal in or trade in the stock(s) covered in this research report 3 business days after the date of issue of this report; (3) serve as an officer of any of the Hong Kong listed companies covered in this report; and (4) have any financial interests in the Hong Kong listed companies covered in this report.

#### **CMBIGM Ratings**

BUY : Stock with potential return of over 15% over next 12 months HOLD Stock with potential return of +15% to -10% over next 12 months Stock with potential loss of over 10% over next 12 months

**NOT RATED** : Stock is not rated by CMBIGM

OUTPERFORM : Industry expected to outperform the relevant broad market benchmark over next 12 months MARKET-PERFORM : Industry expected to perform in-line with the relevant broad market benchmark over next 12 months UNDERPERFORM Industry expected to underperform the relevant broad market benchmark over next 12 months

#### CMB International Global Markets Limited

Address: 45/F, Champion Tower, 3 Garden Road, Hong Kong, Tel: (852) 3900 0888 Fax: (852) 3900 0800

CMB International Global Markets Limited ("CMBIGM") is a wholly owned subsidiary of CMB International Capital Corporation Limited (a wholly owned) subsidiary of China Merchants Bank)

#### **Important Disclosures**

There are risks involved in transacting in any securities. The information contained in this report may not be suitable for the purposes of all investors. CMBIGM does not provide individually tailored investment advice. This report has been prepared without regard to the individual investment objectives, financial position or special requirements. Past performance has no indication of future performance, and actual events may differ materially from that which is contained in the report. The value of, and returns from, any investments are uncertain and are not guaranteed and may fluctuate as a result of their dependence on the performance of underlying assets or other variable market factors. CMBIGM recommends that investors should independently evaluate particular investments and strategies, and encourages investors to consult with a professional financial advisor in order to make their own investment decisions.

This report or any information contained herein, have been prepared by the CMBIGM, solely for the purpose of supplying information to the clients of CMBIGM or its affiliate(s) to whom it is distributed. This report is not and should not be construed as an offer or solicitation to buy or sell any security or any interest in securities or enter into any transaction. Neither CMBIGM nor any of its affiliates, shareholders, agents, consultants, directors, officers or employees shall be liable for any loss, damage or expense whatsoever, whether direct or consequential, incurred in relying on the information contained in this report. Anyone making use of the information contained in this report does so entirely at their own risk.

The information and contents contained in this report are based on the analyses and interpretations of information believed to be publicly available and reliable. CMBIGM has exerted every effort in its capacity to ensure, but not to guarantee, their accuracy, completeness, timeliness or correctness. CMBIGM provides the information, advices and forecasts on an "AS IS" basis. The information and contents are subject to change without notice. CMBIGM may issue other publications having information and/ or conclusions different from this report. These publications reflect different assumption, point-of-view and analytical methods when compiling. CMBIGM may make investment decisions or take proprietary positions that are inconsistent with the recommendations or views in

CMBIGM may have a position, make markets or act as principal or engage in transactions in securities of companies referred to in this report for itself and/or on behalf of its clients from time to time. Investors should assume that CMBIGM does or seeks to have investment banking or other business relationships with the companies in this report. As a result, recipients should be aware that CMBIGM may have a conflict of interest that could affect the objectivity of this report and CMBIGM will not assume any responsibility in respect thereof. This report is for the use of intended recipients only and this publication, may not be reproduced, reprinted, sold, redistributed or published in whole or in part for any purpose without prior written consent of CMBIGM. Additional information on recommended securities is available upon request.

#### For recipients of this document in the United Kingdom

This report has been provided only to persons (I) falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (as amended from time to time) ("The Order") or (II) are persons falling within Article 49(2) (a) to (d) ("High Net Worth Companies, Unincorporated Associations, etc.,) of the Order, and may not be provided to any other person without the prior written consent of CMBIGM.

#### For recipients of this document in the United States

CMBIGM is not a registered broker-dealer in the United States. As a result, CMBIGM is not subject to U.S. rules regarding the preparation of research reports and the independence of research analysts. The research analyst who is primary responsible for the content of this research report is not registered or qualified as a research analyst with the Financial Industry Regulatory Authority ("FINRA"). The analyst is not subject to applicable restrictions under FINRA Rules intended to ensure that the analyst is not affected by potential conflicts of interest that could bear upon the reliability of the research report. This report is intended for distribution in the United States solely to "major US institutional investors", as defined in Rule 15a-6 under the US, Securities Exchange Act of 1934, as amended, and may not be furnished to any other person in the United States. Each major US institutional investor that receives a copy of this report by its acceptance hereof represents and agrees that it shall not distribute or provide this report to any other person. Any U.S. recipient of this report wishing to effect any transaction to buy or sell securities based on the information provided in this report should do so only through a U.S.-registered broker-dealer.

#### For recipients of this document in Singapore

This report is distributed in Singapore by CMBI (Singapore) Pte. Limited (CMBISG) (Company Regn. No. 201731928D), an Exempt Financial Adviser as defined in the Financial Advisers Act (Cap. 110) of Singapore and regulated by the Monetary Authority of Singapore. CMBISG may distribute reports produced by its respective foreign entities, affiliates or other foreign research houses pursuant to an arrangement under Regulation 32C of the Financial Advisers Regulations. Where the report is distributed in Singapore to a person who is not an Accredited Investor, Expert Investor or an Institutional Investor, as defined in the Securities and Futures Act (Cap. 289) of Singapore, CMBISG accepts legal responsibility for the contents of the report to such persons only to the extent required by law. Singapore recipients should contact CMBISG at +65 6350 4400 for matters arising from, or in connection with the report.