



东海半导体介绍

Jiangsu Donghai Semiconductor Co.,Ltd Introduction

Jun 2024

- › WXDH was established in 2004, Headquartered is in Wuxi, with a South China sales center in Shenzhen;
- › The company focuses on R&D, manufacturing, and application solution research of advanced power devices;
- › Have a power device R&D center, with over 200 authorized patents;
- › Have self built packaging production lines and four major laboratories for device characteristic testing, reliability testing, application testing, and failure analysis.



8150万

Registered capital



230+

Employees



60+

R&D

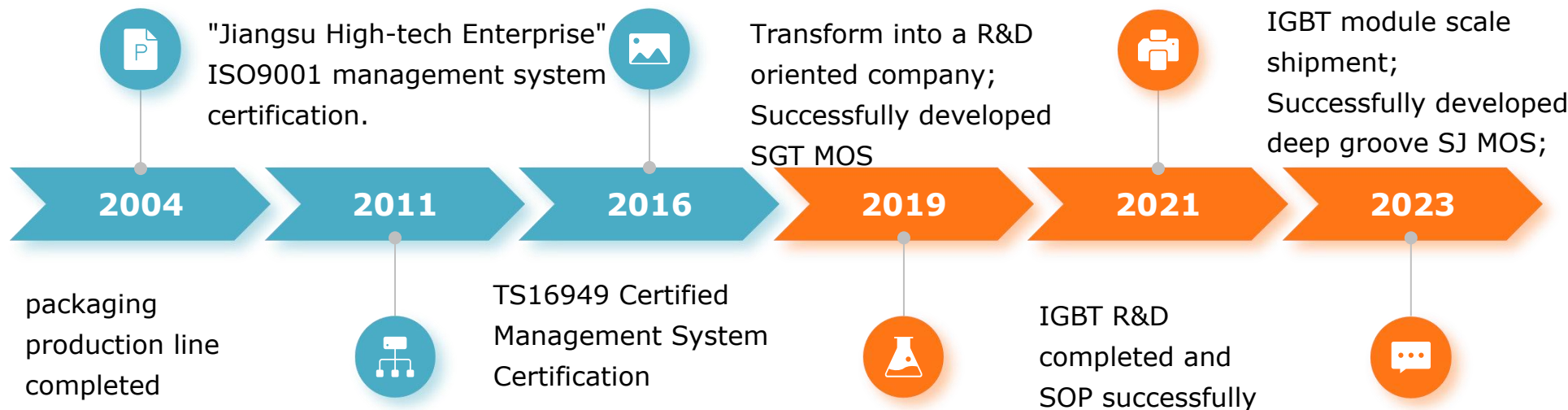
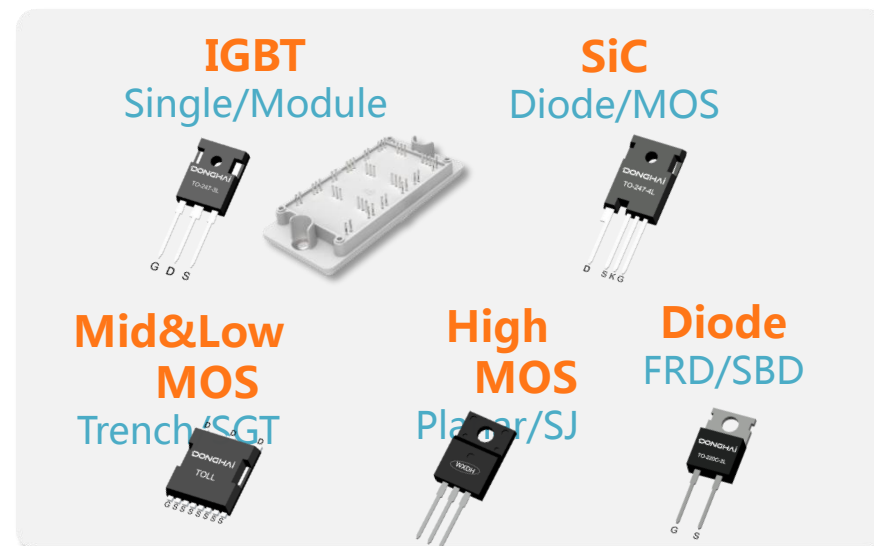


200+

Authorized Patent



- › WXDH transformed from a packaging/sales company to an independent R&D product company in 2019 ;
- › Main product categories are:
- › IGBT single& Module
- › SiC diode and MOS
- › LV&MV MOS
- › HV MOS
- › FRD and SBD, etc;





使命 Mission

Contribute Donghai' Power, for
Better Life, for Green Energy

Outstanding Supplier of Power
Device Product and Solution.



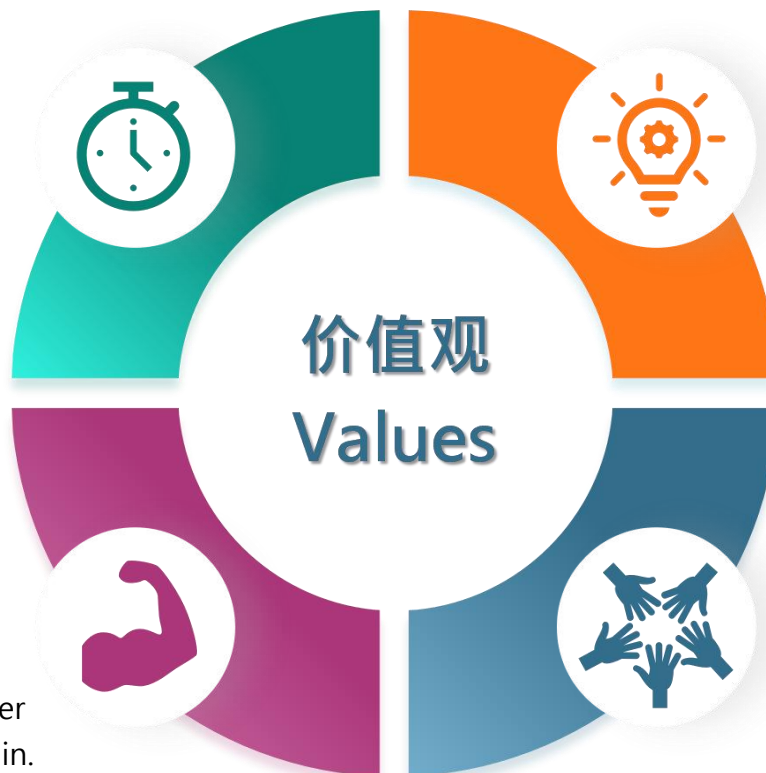
愿景 Vision

Efficiency.

效率致胜
效率存在于所有环节
我们追求极致效率
Efficiency Demonstrates
Efficiency is Everywhere
We Drive for Extreme Efficiency.

Reliable.

我们提供可靠产品
我们是客户的可靠伙伴
我们都是链条上的可靠一环
We Provide Reliable Products
We are Reliable Partners of Customer
We are All a Reliable Link in the Chain.



Innovation.

创新引领未来
创新不拘泥于形式
我们将创新植入基因
Innovation Leads Future
Innovates with no Form Limit
We Implant Innovation into Genes.

Collaboration

团队才能致远
高效源于协同
我们同心·同舟·同向
The Team can Go Far
Efficiency Comes from Collaboration
We are in 1 Heart, 1 Boat, 1 Direction.

Technical R&D - Originating from top enterprises/Strong strength/Advanced and perfect R&D system

Strong R&D team strength



Core technical with over 20 years of experience in device design, R&D and manufacturing; Mainly from both domestic and international companies such as CRM and IFX,

Leading in comprehensive ability and efficiency



Capable of developing whole process from device simulation to application; Chimney style vertical product line+matrix style project management mode, short R&D cycle, high efficiency;

The R&D system is perfect and advanced

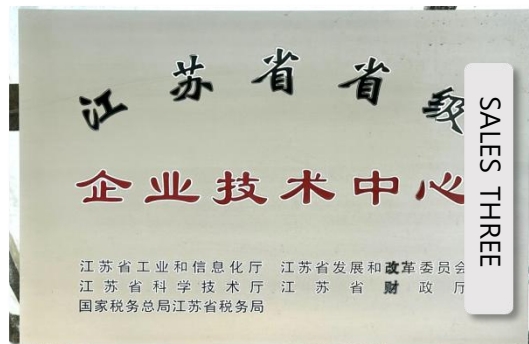


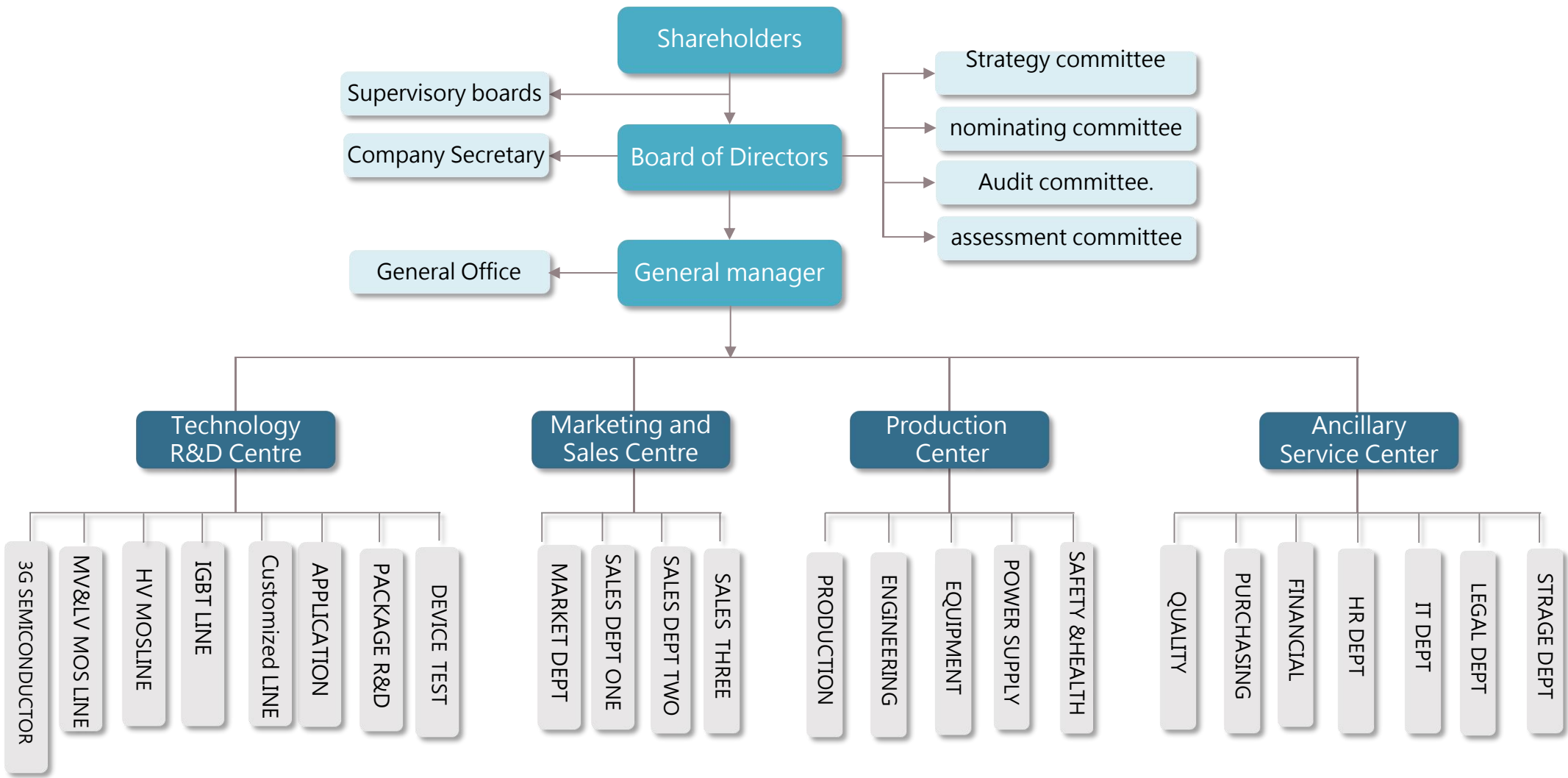
Establish a comprehensive "Advanced Product Quality Planning" (APQP) new product implementation system that implements international standards; Provide PPAP documents for automotive products;

Joint innovation and development between schools and enterprises

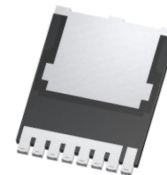
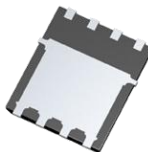
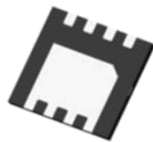
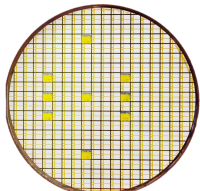


Collaboration with top universities like Southeast and Xi'an Jiaotong University; established the "Enterprise Technology Center" and the "Engineering Technology Research Center for Power Devices for Automotive Electronics"

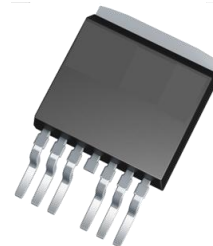
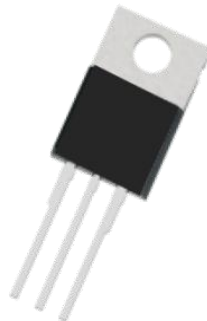
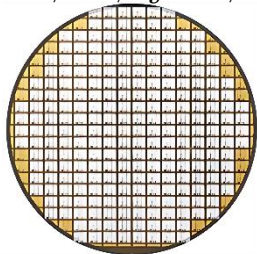




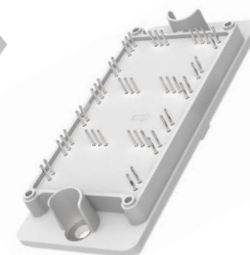
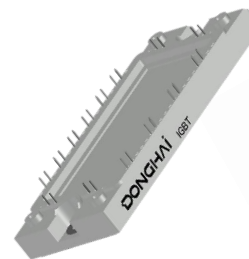
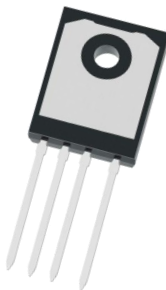
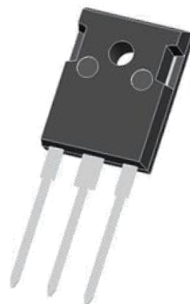
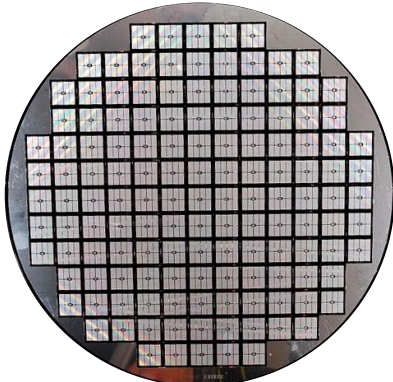
SiC/plannar HV MOS/FRD/SBD



Trench/SGT/SJ MOS/IGBT



SGT MOS/IGBT



E-bike, Power Tool, Garden Tool, Forklift



Welder, UPS



PV, Wind Power



Automotive, xEV, Charging Pile, OBC



Charger, Network Power, Server



Energy Storage , BMS



WXDH relies on traditional fields such as electric tools, electric bicycles, and power sources to vigorously develop emerging green applications such as new energy photovoltaic, energy storage, and new energy vehicles.

阳光电源
SUNGROW

上能电气
SINENG

AOTAI

JASIC佳士
整体焊接解决方案提供商

GROWATT
古瑞瓦特

META
SYSTEM®

Topband 拓邦

瑞凌实业
RILAND

TTI

HIKVISION®

Wunder Kraft

欧陆通
HONOTO

雅迪
电动车

OPPLE
欧普照明

greenworks
格力博

mi

PHILIPS
飞利浦照明

NFA®

东成
Dongcheng

LiHua

- Invest ten millions yuan ;
 - a complete set of industrial/automotive level reliability testing ability ;
- Strong support for qualified products of WXDH.



ITC57300 Dynamic parameter testing



STI5300HVC Static parameter testing



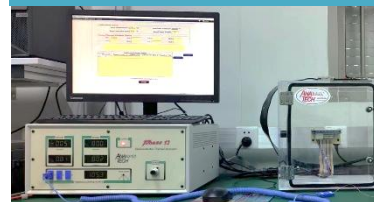
ITC55100 Avalanche test



T342H Gate resistance/capacitance



Phase12 Thermal resistance test



ESDTest/Grapher



Environmental box



T371A Charge test



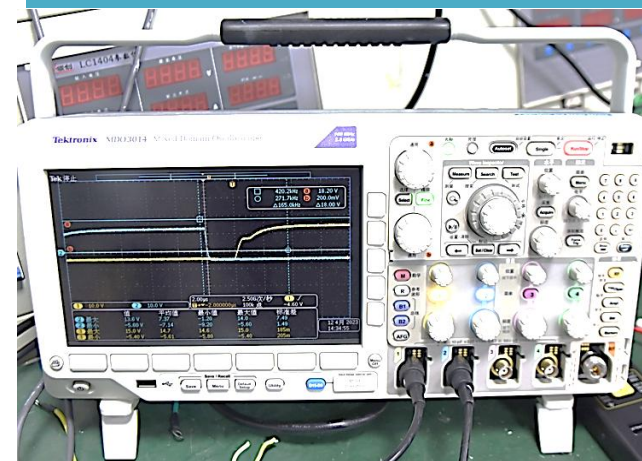
Kewell Photovoltaic IV Array Simulator



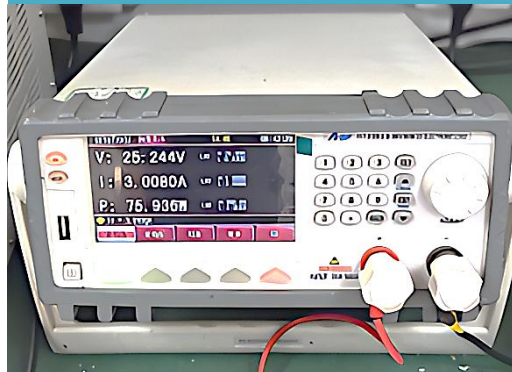
MTS-11 Motor testing system



Tyco MDO3014 oscilloscope



A-BF DC load tester



XTECH Diode recovery time



TOPRIE Data logger



PVA TePla Ultrasonic scanner



Holirock Laser Opener



Nordson X-ray Perspective instrument

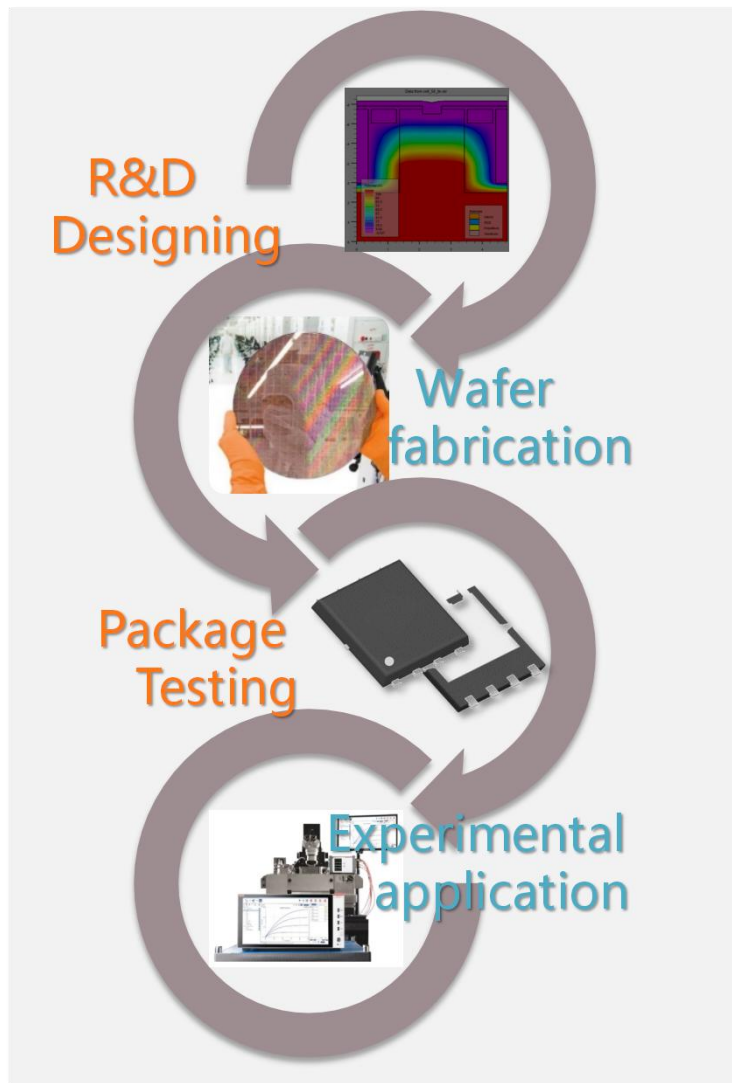


Skyray Plating thickness tester



Elemental composition analyzer





Donghai Power Semiconductor Technology Innovation Center

Cooperate top 5 world famous 8&12 inch wafer foundry (SMIC&Huahong)



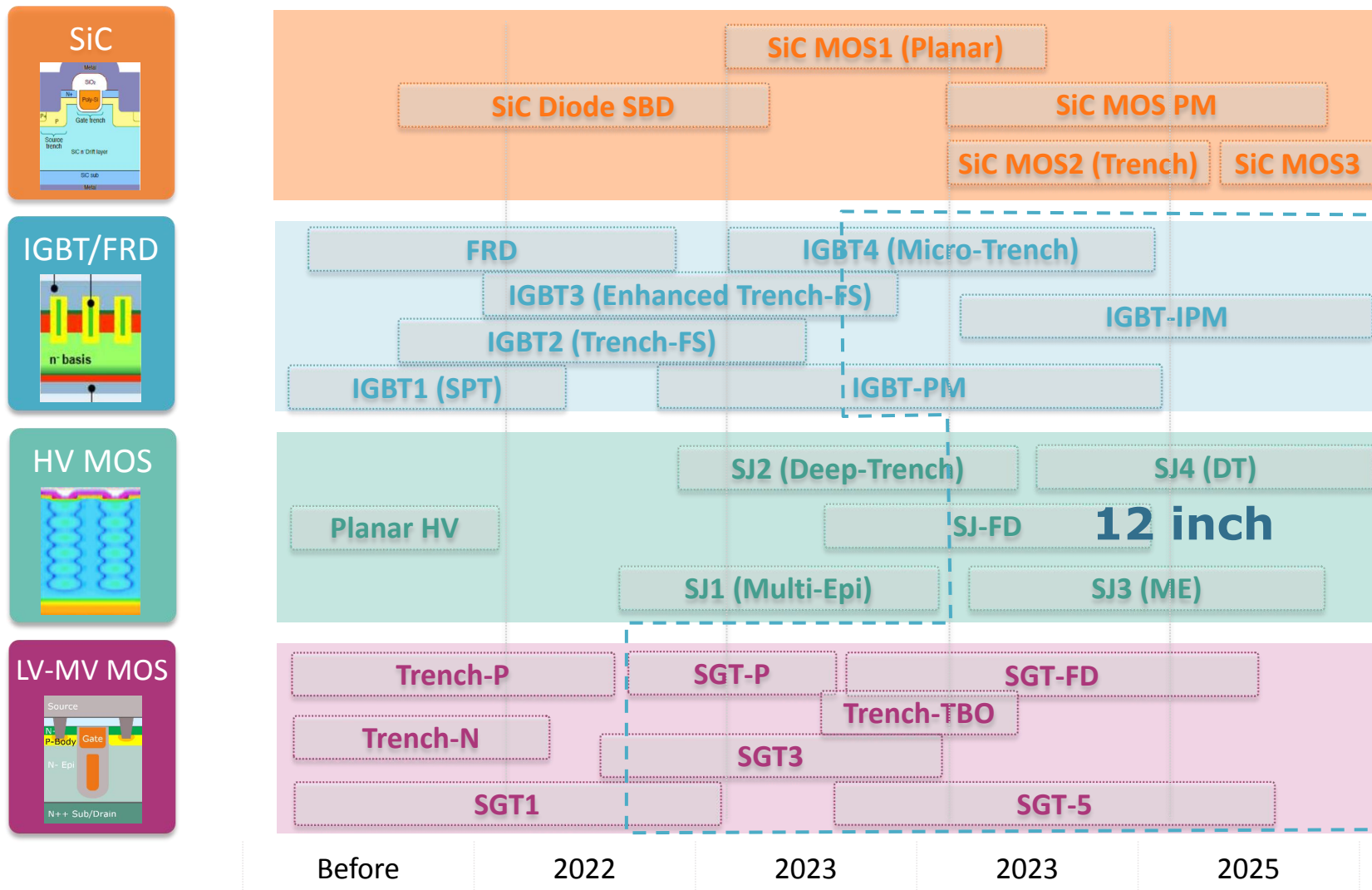
Self-built package line+outsourced package (TF)

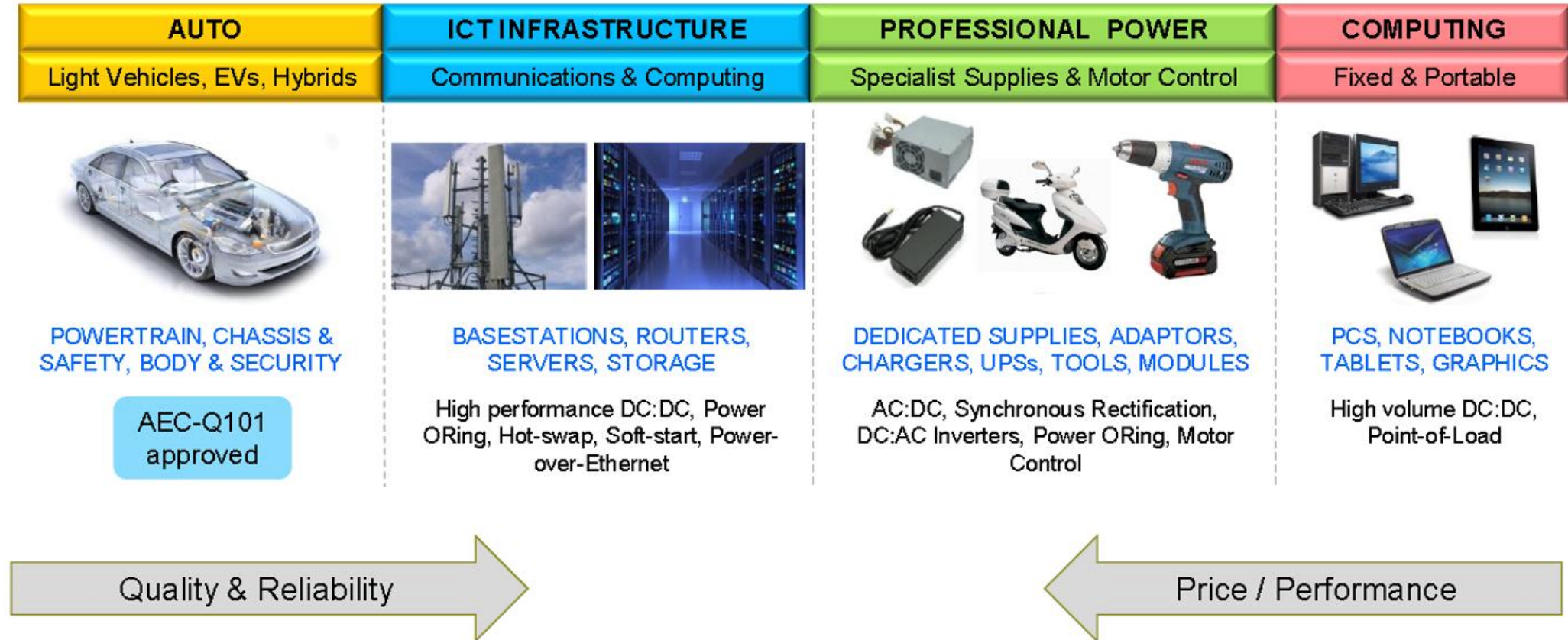


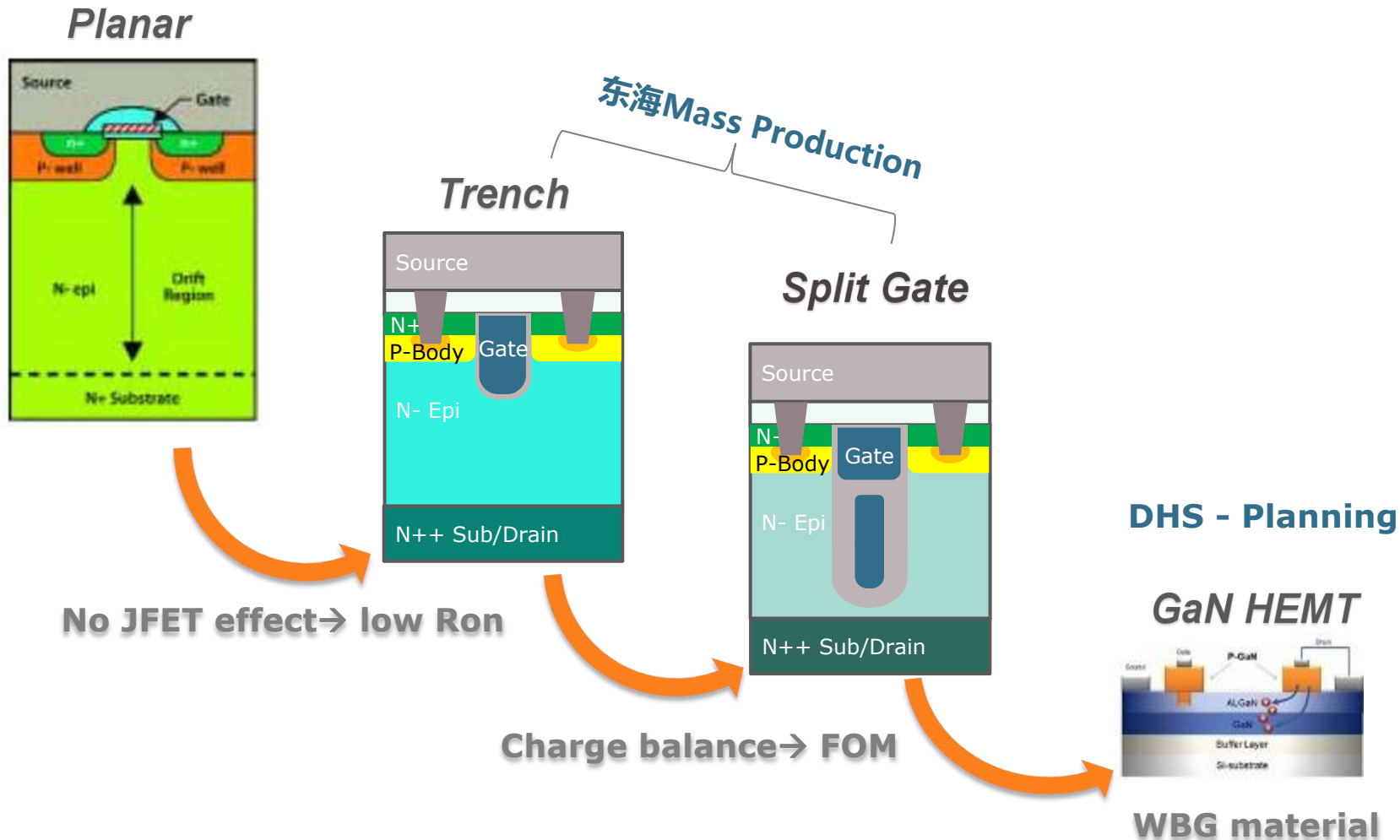
Self-built four big laboratories



Tech Roadmap – from SiC to IGBT to Si MOSFET







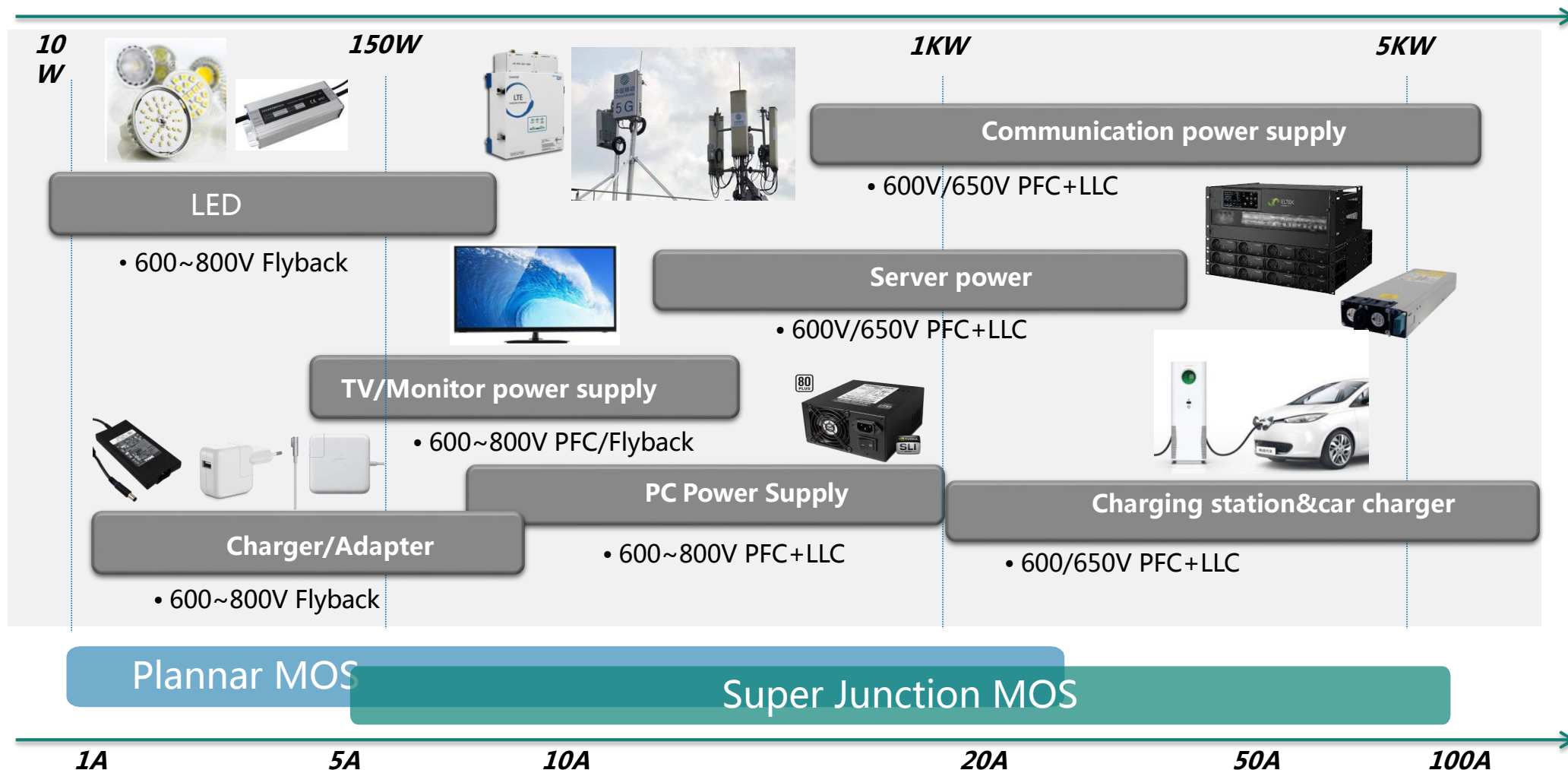
Ron@10V-typ
Developing
Ready

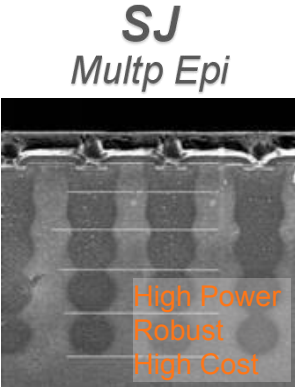
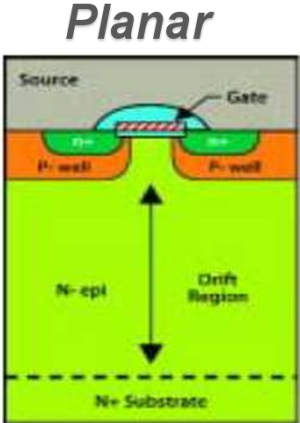


VDS	SOP-8	DFN3*3	DFN5*6	sTOLL
30		3.5mΩ 5.5mΩ	0.60mΩ 1.2mΩ	
40		6.0mΩ	0.55mΩ 0.8mΩ	
60	30mΩ		1.4mΩ	0.9mΩ
80			1.8mΩ 2.5mΩ	
100		26mΩ	2.0mΩ 2.6mΩ	
120				
150			7.0mΩ 9.0mΩ	
200				
-40	16mΩ			
-60	37mΩ	48mΩ	9.5mΩ	
-100	160mΩ			

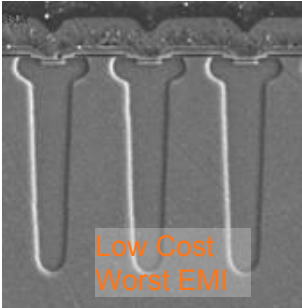


VDS	TO220	TO263	TO263-7	TOLL	TO247
30					
40			0.65mΩ	0.55mΩ 0.8mΩ	
60	1.8mΩ	1.6mΩ		1.1mΩ	
80	2.0mΩ	1.8mΩ		1.0mΩ 1.2mΩ	
100	2.4mΩ	1.8mΩ 2.2mΩ	1.9mΩ	1.3mΩ 1.6mΩ	
120	3.6mΩ	3.4mΩ		2.6mΩ	
150	5.0mΩ 9.3mΩ	4.8mΩ		4.1mΩ	5.0mΩ
200	10.8mΩ	11mΩ			11mΩ
250	15mΩ	15mΩ			



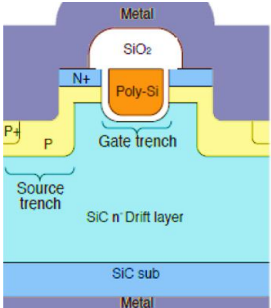


Charge balance
→ FOM

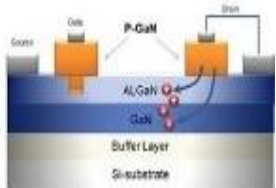


SJ
Deep Trench

SiC
Planar/Trench



High Power



High Freq

WBG material

GaN HEMT

Plannar MOSFET

Have 400-1500V series products

SJ MOSFET

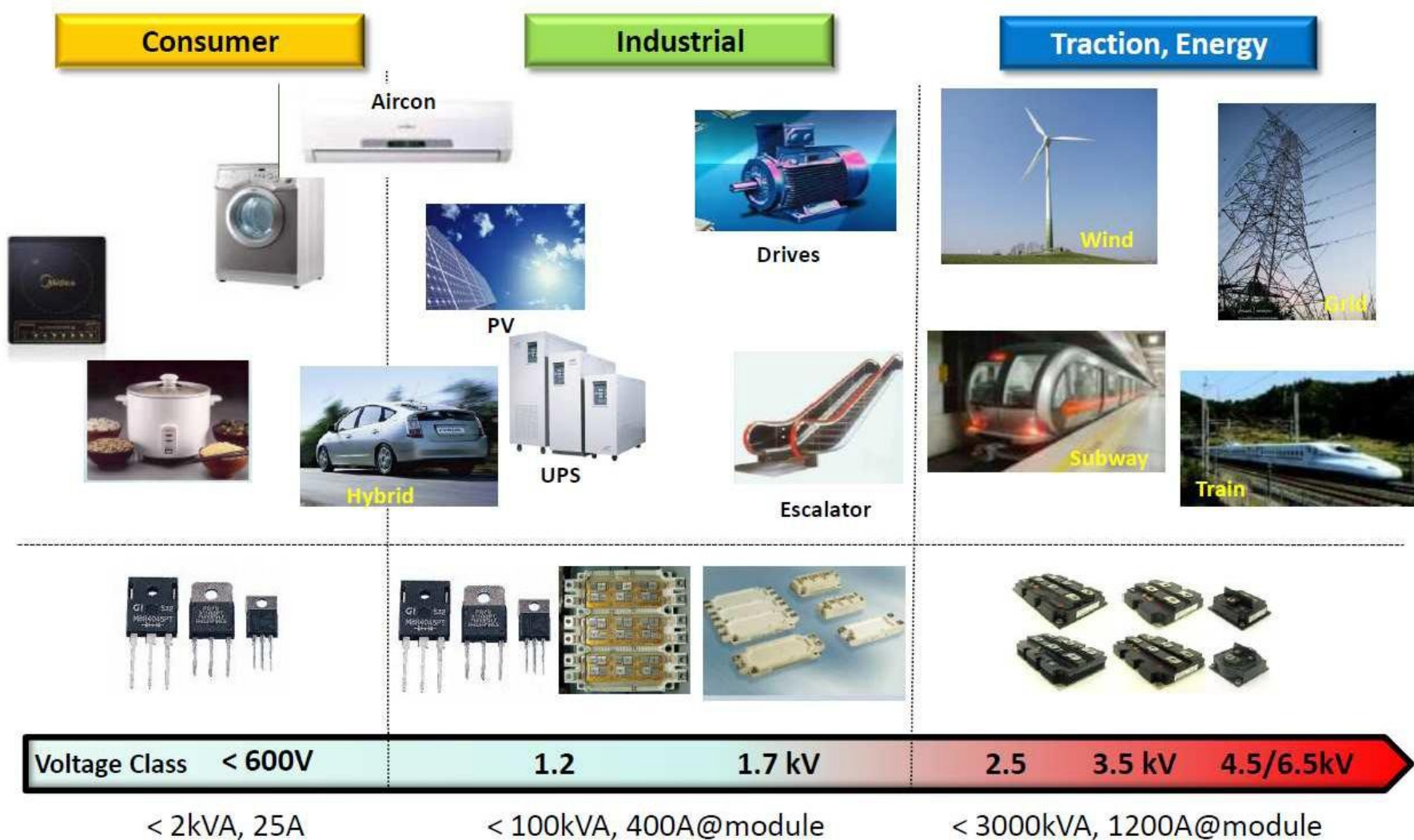


VDS (V)	TO251	TO252	DFN8x8	TO220	TO220F	TO262	TO263	TO263-7	TO247	TO247-4
900	1220mΩ	1220mΩ			1220mΩ					
800		330mΩ 580mΩ		330mΩ 580mΩ	250mΩ 380mΩ		220mΩ 330mΩ		220mΩ	
700	520mΩ 620mΩ	315mΩ 365mΩ			155mΩ 200mΩ					
650	330mΩ 870mΩ	280mΩ 330mΩ	99mΩ	40mΩ 96mΩ	40mΩ 96mΩ		40mΩ 330mΩ	40mΩ	39mΩ 68mΩ	
600	305mΩ	250mΩ 305mΩ		86mΩ 100mΩ	86mΩ 100mΩ	165mΩ 250mΩ	130mΩ 165mΩ		35mΩ 61mΩ	
500		1300mΩ								

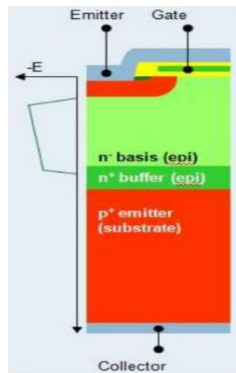
Developing
Ready

Ron10V - typ

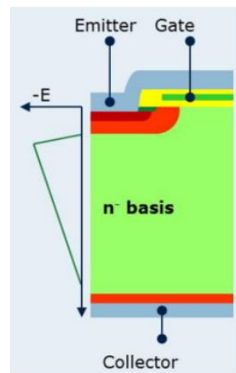
Have 500-900V series products



Punch Through

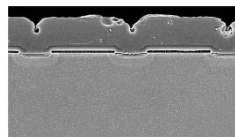


Non Punch Through

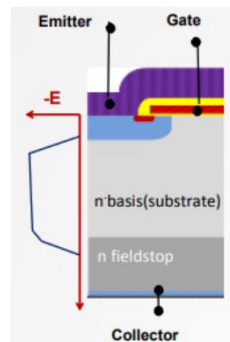


- Adjustable implanted back-collector;
- Lower switching loss;
- Robustness.

DH G1 – SPT

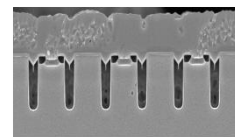


Soft Punch Through

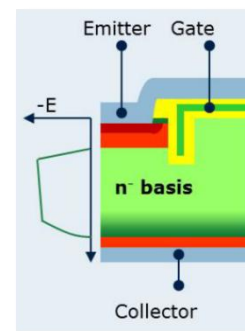


- Back buffer layer;
- Thin base region;
- Low V_{CEsat} ;
- Lower switching loss;

DH G2 – Trench FS

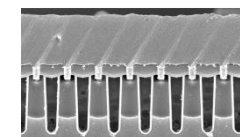


Trench Field Stop

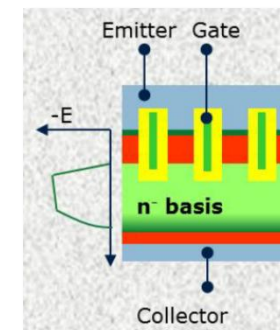


- Trench gate, thinner base region;
- Lower V_{CEsat} ;
- Lower switching loss;

DH G3 – Enhanced Trench FS



Micro Pattern Trench



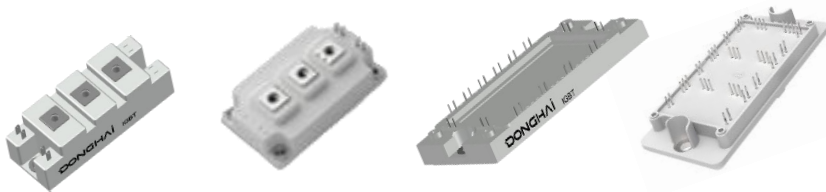
- Smaller pitch, increased carrier storage;
- Very low V_{CEsat} ;
- Very low switching loss.

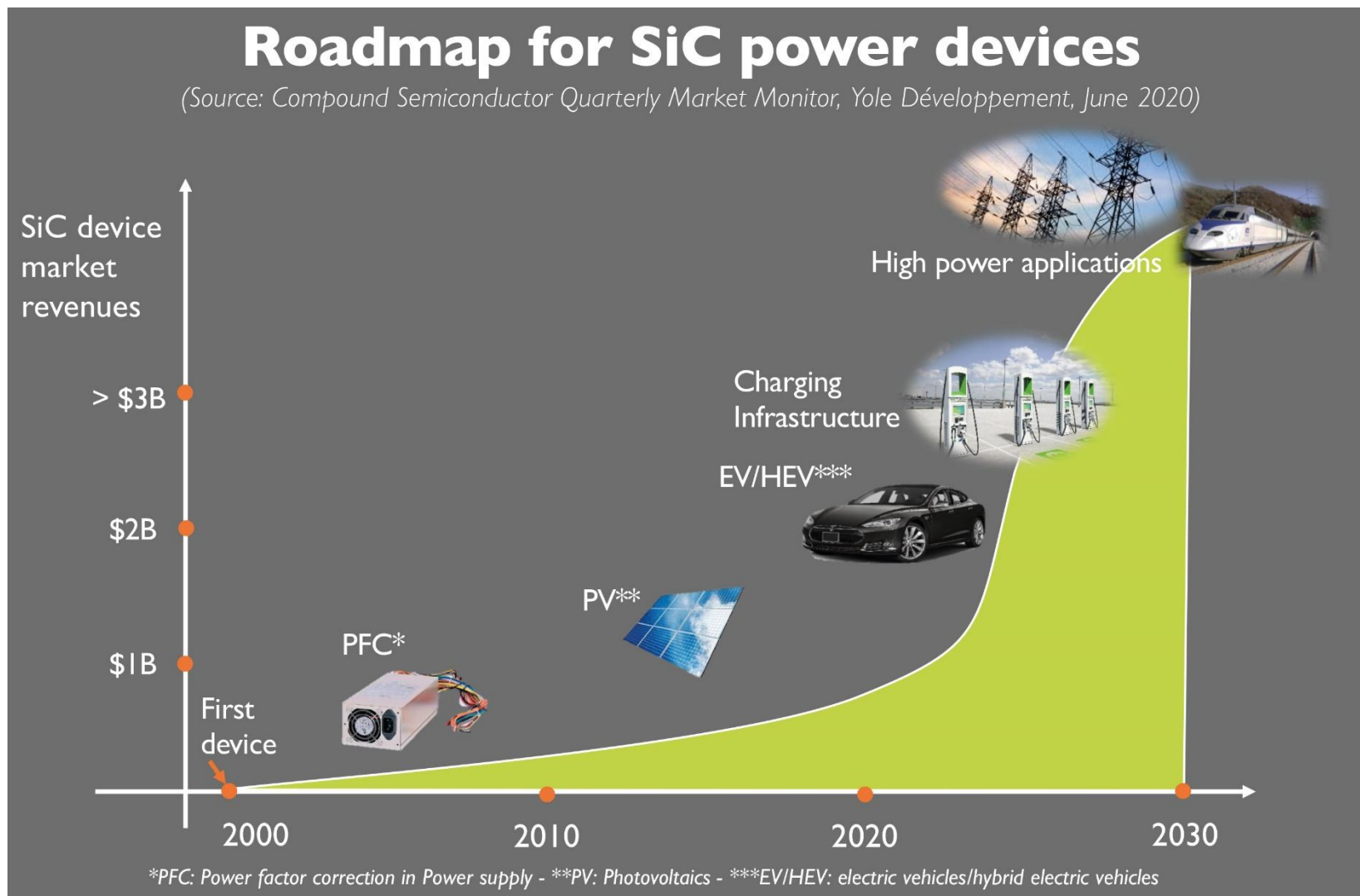
IGBT Single

成品名	电压	IC (100°C)	VCE (sat)	封装	推荐 频率	应用领域
G20T65D	650	20	1.90	TO-220F	10-30k	电机驱动,IPM
DGF30F65M	650	30	1.85	TO-220F	10-50k	电机驱动,IPM
DGN30F65M	650	30	1.95	TO-3P	10-50k	焊机,变频,光伏
DGN40F65M	650	40	1.85	TO-3P	10-50k	焊机,变频,光伏
G50T65D	650	50	1.95	TO-3P	10-50k	焊机,变频
G50T65LBBW	650	50	1.85	TO-247	10-40k	焊机,变频,光伏
DGC50F65M	650	50	1.85	TO-247	10-40k	焊机,变频,光伏
DGC60F65M	650	60	1.90	TO-247	20-40k	焊机,变频,光伏
DGC75F65M	650	75	1.70	TO-247	20-40k	焊机,变频,光伏
DGCP120F65M2	650	120		TO-247P		
DGCP160H65L2	650	160		TO-247P		
DAGC75H65M	750	75	1.70	TO-247	20-40k	OBC
G15N120D-RC	1200	15	1.75	TO-247	10-30k	电磁炉
G40N120D	1200	40	1.75	TO-247	10-30k	变频,UPS,光伏,焊机
G50N120D	1200	50	1.85	TO-264	10-30k	变频,UPS,光伏,焊机
DGC75F120M2	1200	75	1.90	TO-247P	10-30k	变频,UPS,光伏,焊机
DGCP120F120L2	1200	120		TO-247P		
DGCP150F120L2	1200	150		TO-247P		

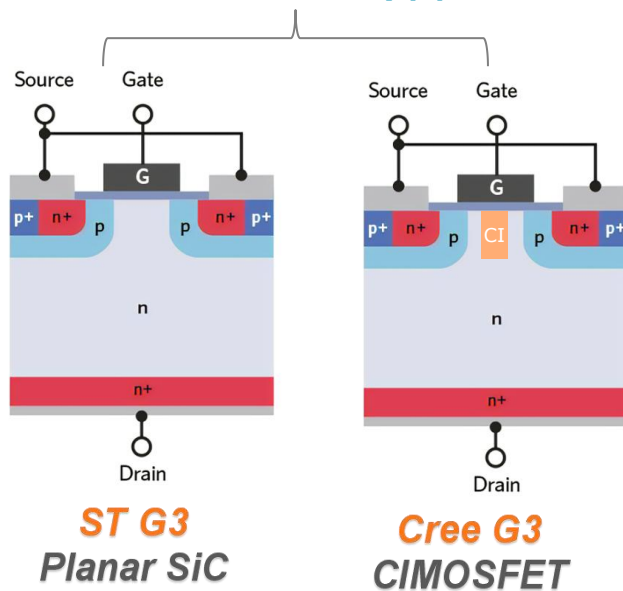
IGBT Module

VCE(V)	34mm	62mm	Econo2	Flow2
1700				
1200	50A HB 75A HB 100A HB	600A HB 800A HB	40A 3-phase 75A 3-phase	
650	50A HB 75A HB 100A HB 150A HB			450A 3-level NPC



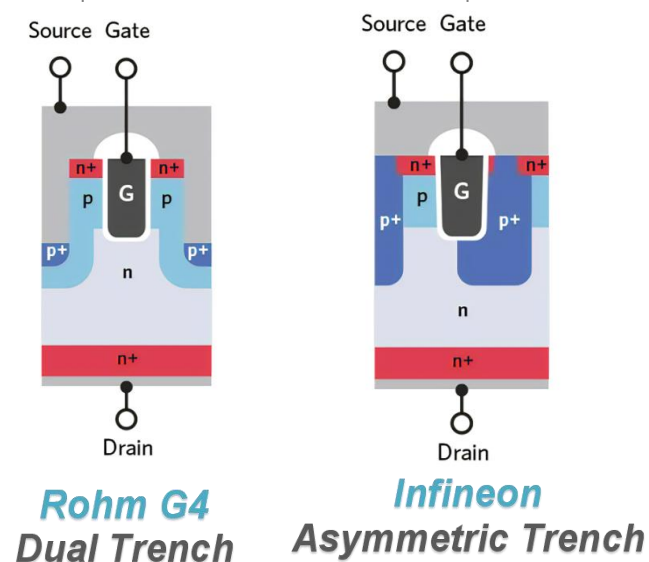


SiC Planar平面

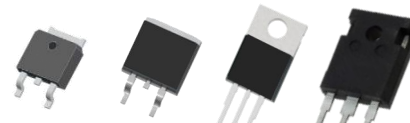


东海 - 平面Gen2技术

SiC Trench沟槽

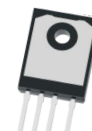


SiC Diode - SBD



VR (V)	IF (A)	Package
1700		
1200	2/5/10/15/20/30/50	TO252/TO220/TO263/TO247
650	4/6/8/10/12/16/20	TO252/TO220/TO263/TO247

SiC MOSFET



VDS (V)	TO247	TO247-4
1700		
1200	16mΩ 40mΩ 80mΩ	16mΩ 40mΩ 80mΩ
650		

Developing
Ready

质量方针

1. Achieve customer satisfaction, meet customers needs
2. Strict control and continuous improvement
3. To make qualified products



IATF16949



ISO9001



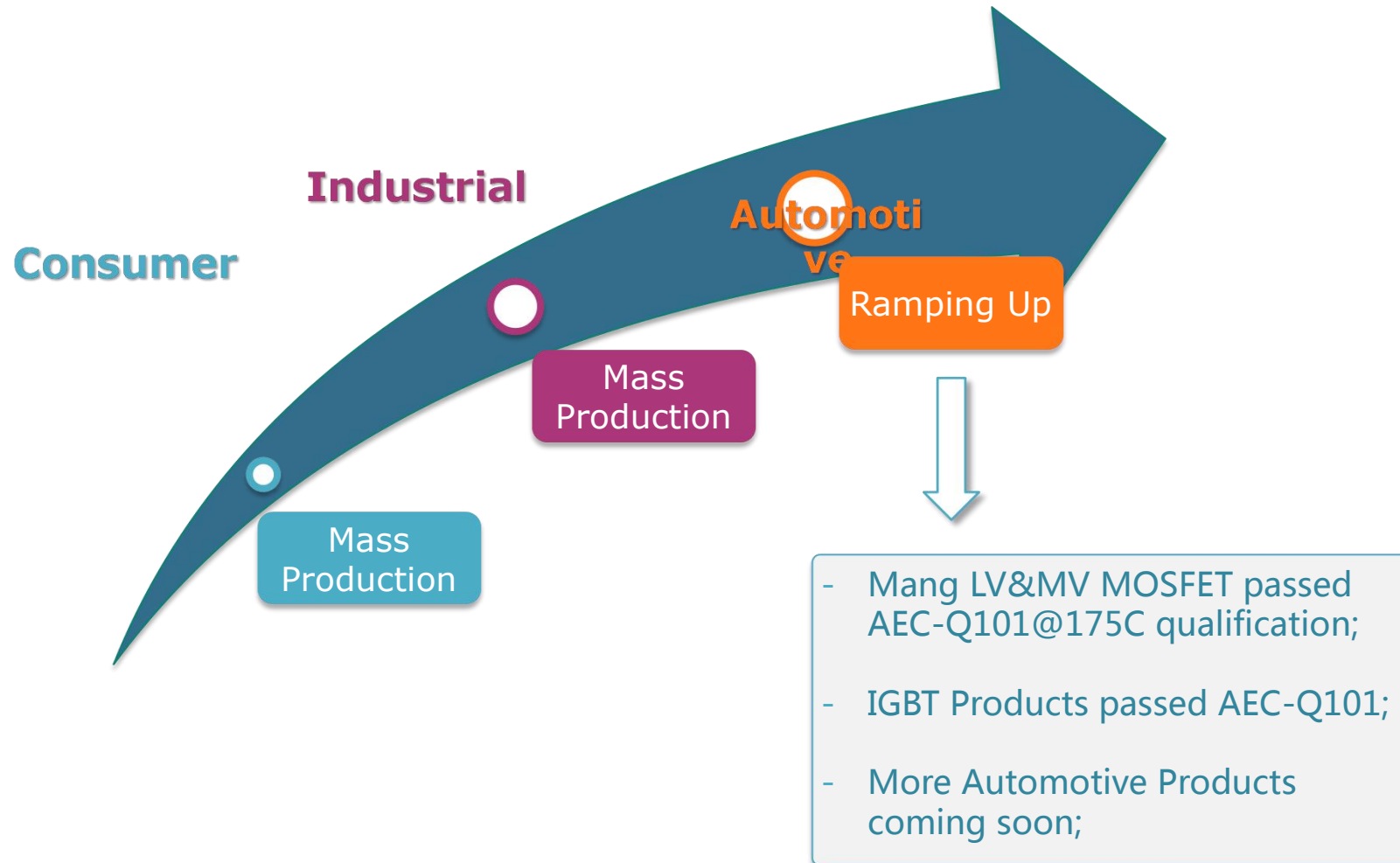
ISO14001



RoHS Compliant

WXDH Reliability Standard – strictly follow JEDEC/AEC-Q101 standard

NO.	Test Item	Description	Failure Mode	工业级-Industrial						汽车级-Automotive				Reference	Inhouse Capability
				Test Condition	Duration	Sample size	Criteria	Acc/Rej	Must/Optional	Test Condition	Duration	Sample size	Must/Optional		
1	Pre-Con	Pre-Condition, (SM D & M SL only) 预处理	SM D 封装抗湿气能力	Bake:24hrs@ 125℃ 60%RH/60℃40hrs (M SL3) Reflow :260℃*3cycles	-	-	-	-	SM D only H3TRB/HAST/ AC/UHAST/TC	Bake:24hrs@ 125℃ 85%RH/85℃168hrs (M SL1) Reflow :260℃*3cycles	-	-	SM D only H3TRB/HAST/ AC/UHAST/TC	JESD 22-A113 & AEC-Q101	Yes
2	HTGB	High Temp Gate Bias 高温栅极偏压	芯片栅氧 离子沾污	100%VGS@ Tj max	1000hrs 1bt2000hrs	77*3bt	DS Spec	0/1	m ust	100%VGS@ Tj max	1000hrs 1bt2000hrs	77*3bt	m ust	JESD 22-A108 & AEC-Q101	Yes
3	HTRB	High Temp Reverse Bias 高温反向偏压	芯片耐压/钝化 芯片/封装可动离子沾污 封装EM C/应力	80%Vrating or 90%Vrating@ Tj max	1000hrs 1bt2000hrs	77*3bt	DS Spec	0/1	m ust	100%Vrating@ Tj max	1000hrs 1bt2000hrs	77*3bt	m ust	JESD 22-A108 & AEC-Q101	Yes
4.a	H3TRB	High Hum idity High Temp Reverse Bias 高温高湿偏压	封装密封 芯片钝化 芯片被侵蚀/沾污	85℃, 85%RH, Vds=80%Vds	1000hrs	77*3bt	DS Spec	0/1	m ust	85℃, 85%RH, Vds=80%Vds	1000hrs	77*3bt	m ust	JESD 22-A101 & AEC-Q101	Yes
4.b	HAST	Highly Accelerated Stress Test 加速的高温高湿偏压	封装密封 芯片被侵蚀/沾污	130℃, 85%RH ; Vds=80%Vds. For ≤200V, Vds max of 42V For>200V, Vds max of 100V	96hrs	77*3bt	DS Spec	0/1	低压可以H3TRB/HAST 2选1	130℃, 85%RH ; Vds=80%Vds. For ≤200V, Vds max of 42V For>200V, Vds max of 100V	96hrs	77*3bt	低压可以H3TRB/HAST 2选1	JESD 22-A110 & AEC-Q101	No
5.a	AC	AutoClave (又名PCT) 高压锅	封装密封 芯片被侵蚀/沾污	121℃, 100%RH	96hrs	77*3bt	DS Spec	0/1	m ust	121℃, 100%RH	96hrs	77*3bt	m ust	JESD 22-A102 & AEC-Q101	Yes
5.b	UHAST	Un-biased Highly Accelerated Stress Test 未加电压的HAST	封装密封 芯片被侵蚀/沾污	130℃, 85%RH	96hrs	77*3bt	DS Spec	0/1	AC/UHAST 2选1	130℃, 85%RH	96hrs	77*3bt	AC/UHAST 2选1	JESD 22-A110 & AEC-Q101	No
6	TC	Temperature Cycling 高低温循环	封装耐热膨胀 封装焊接/引线	-55℃ to 150℃, 30m ins/cycle	700cycles	77*3bt	DS Spec	0/1	m ust	-55℃ to 150℃, 30m ins/cycle	1000cycles	77*3bt	m ust	JESD 22-A104 & AEC-Q101	Yes
7.a	PCsec	Power Cycling second 秒级功率循环	封装打线 芯片钝化开裂	Delta Tj>= 100℃, Tj@ Tj max ton = 2s, toff=15s	10000cycles s	77*3bt	DS Spec	0/1	optional	Delta Tj>= 100℃, Tj@ Tj max ton = 2s, toff=15s	10000cycles s	77*3bt	optional	JESD 22-A122 & AEC-Q101	
7.b	DL	Intermittent Operational Load (又名Pcm in) 间歇功率循环	封装焊接 芯片钝化开裂	Delta Tj>= 100℃ ton / toff= 2 m in/2 m in	15000cycles	77*3bt	DS Spec	0/1	m ust	Delta Tj>= 100℃ ton / toff= 2 m in/2 m in	15000cycles	77*3bt	m ust	JESD 22-A122 & AEC-Q101	Yes
8	HTSL	High Temperature Storage Load 高温存储寿命	封装 芯片缺陷	Ta>= Tstg max	1000hrs	77*3bt	DS Spec	0/1	optional	NA	NA	NA	NA	JESD 22-A108 & AEC-Q101	
9	LTSL	Low Temperature Storage Load 低温存储寿命	封装 芯片缺陷	Ta<= Tstg min (-55℃)	1000hrs	77*1bt	DS Spec	0/1	optional	NA	NA	NA	NA	JESD 22-A108 & AEC-Q101	
10	LTO L	Low Temperature Operation Load 低温反向偏压	芯片耐压(低温) 封装EM C/应力	-55℃, Vds=80%Vds max	1000hrs	77*1bt	DS Spec	0/1	optional	NA	NA	NA	NA	JESD 22-A108 & AEC-Q101	
11.a	ESD-HBM	Electro-Static Discharge - Human Body Mode 抗静电-人体模式	芯片ESD	G (±)-S, D (±)-S, C (±)-D	NA	30*1bt	Based on application	0/1	m ust	G (±)-S, D (±)-S, C (±)-D	NA	30*1bt	m ust	AEC-Q101 & MIL-STD-883J/Method 3015.8	Yes
11.b	ESD-CDM	Electro-Static Discharge - Charged Device Mode 芯片抗静电-器件模式	芯片ESD	NA	NA	NA	NA	NA	NA	G (±)-S, D (±)-S, G (±)-D	NA	30*1bt	m ust	AEC-Q101 & MIL-STD-883J/Method 3015.8	Outsourcing
12	SD	Solderability 管脚可焊性	封装管脚电镀	Pb free:245±5℃, 5±0.5s	NA	10*1bt	≥95% solder	0/1	封装数据	Pb free:245±5℃, 5±0.5s	NA	10*1bt	封装数据	JESD 22-B102E & AEC-Q101	Yes
13	RSH	Resistance to Solder Heat 耐焊接	封装耐剧烈升温能力	260±5℃, 10±s/3 times	NA	30*1bt	DS Spec & C-SAM	0/1	SM D only?	Pb free:270±5℃, 7+2/-0s	NA	30*1bt	SM D only	JESD 22-B106D & AEC-Q101	Yes
14	VVF	Vibration Variable Frequency 变频震动	封装抗变频震动	NA	NA	NA	NA	NA	NA	displacement 0.06" 20Hz to 100Hz and 50g peak acceleration 100Hz to 2KHz	NA	Sequence from M S	Cavity package only	JESD 22-B103 & AEC-Q101	Outsourcing
15	M S	Mechanical Shock 机械冲击	封装抗机械冲击	NA	NA	NA	NA	NA	NA	V1 plane only, 5 pulses, 0.5m s duration, 1500 g peak acceleration.	NA	10*1bt	Cavity package only	JESD 22-B104 & AEC-Q101	Outsourcing
16	DPA	Destructive Physical Analysis 破坏性物理分析	封装 芯片钝化层	NA	NA	NA	NA	NA	NA	PostH3TRB orHAST and TC	-	2*1bt	m ust	GJB4027A	Outsourcing



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PPAP capable and supported with PPAP documentation

Change Ctrl

Supported with automotive change management and extended validation window

Mfg Control

Mfg Control

Manufactured in compliance with IATF 16949 requirements

PPAP

Change Ctrl

AEC-Q101

AEC-Q101

Qualified to meet minimum AEC Q101 / 006 requirements

IGBT : 650V

P/N	Package	IC	VCE	VGE	Vth	Vcesat
DAGEQ50F65M2	TO-263-7	50	650	±30	4-7	1.8
DAGEQ40F65M2	TO-263-7	40	650	±30	4-7	1.9
DAGC75H65	TO-247-3	75	650	±30	4-7	1.7
DGCP160H65L2	TO-247P	160	650	±30	4-7	1.8

MOSFET : 30-60V

P/N	Package	VDS	Rdson (mΩ)	Vth	Tech
DSP007N03LA	DFN5*6	30	0.6	1.5	SGT
DSU007N04NA	TOLL	40	0.55	3.0	SGT
DSEQ008N04NA	TO263-7	40	0.7	3.0	SGT
DSU010N04LA	TOLL	40	0.8	1.5	SGT
DSP010N04LA	DFN5*6	40	0.8	1.5	SGT
DTE015N04NA	TO263	40	1.4	3.0	Trench
DSE017N04LA	TO263	40	1.4	1.5	SGT
DTE025N04NA	TO263	40	2.0	3.0	Trench
DSP060N04LA	DFN5*6	40	5.0	1.5	SGT
DSR070N04LA	DFN3*3	40	6.0	1.5	SGT
DSP018N06NA	DFN5*6	60	1.4	3.0	SGT
DSE026N06NA	TO263	60	2.2	3.0	SGT
DTE050N06NA	TO263	60	4.2	3.0	Trench
DATP057N06N	DFN5*6	60	5.0	3.0	Trench
DATD063N06N	TO252	60	5.6	3.0	Trench

MOSFET : 80-150V

P/N	Package	VDS	Rdson (mΩ)	Vth	Tech
DSU012N08N3A	TOLL	80	1.0	3.0	SGT
DSP032N08NA	DFN5*6	80	2.4	3.0	SGT
DSE038N08N3A	TO263	80	3.2	3.0	SGT
DSD040N08N3A	TO252	80	3.4	3.0	SGT
DSU015N10N3A	TOLL	100	1.3	3.0	SGT
DSU021N10NA	TOLL	100	1.6	3.0	SGT
DSE026N10NA	TO263	100	2.2	3.0	SGT
DSE030N10N3A	TO263	100	2.5	3.0	SGT
DSP031N10N3A	DFN5*6	100	2.7	3.0	SGT
DSE037N10N3A	TO263	100	3.2	3.0	SGT
DSP070N10L3A	DFN5*6	100	6.0	1.6	SGT
DSU047N15NA	TOLL	150	4.2	3.0	SGT
DHS042N15E	TO263	150	4.8	3.0	SGT
DSE058N15NA	TO263	150	5.0	3.0	SGT
DSE060N15NA	TO263	150	5.1	6.0	SGT
DSP105N15NA	DFN5*6	150	9.0	3.0	SGT

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