



# 安森美半导体先进的电动/混合动力电动汽车解决方案

2018年6月

安森美半导体  
ON Semiconductor®



# 崭露头角的电动汽车/混合动力汽车领袖

## 车载 充电系统

650 V超结MOSFETs  
650 V硅/碳化硅整流器/FET  
汽车高压模块  
门极驱动器  
650 V IGBTs  
650 V 氮化镓(GaN)晶体管  
运算放大器及电流检测  
DC-DC, LDO, IVN, ASIC

## 电池管理

40 V FETs (最低导通电阻)



## 主驱动

650 V/1200 V整流器  
1200 V碳化硅整流器/FET  
650 V/1200 V IGBT  
650 V GaN 晶体管  
运算放大器及电流检测  
DC-DC, LDO, IVN, ASIC

## 12 V, 48 V DC-DC

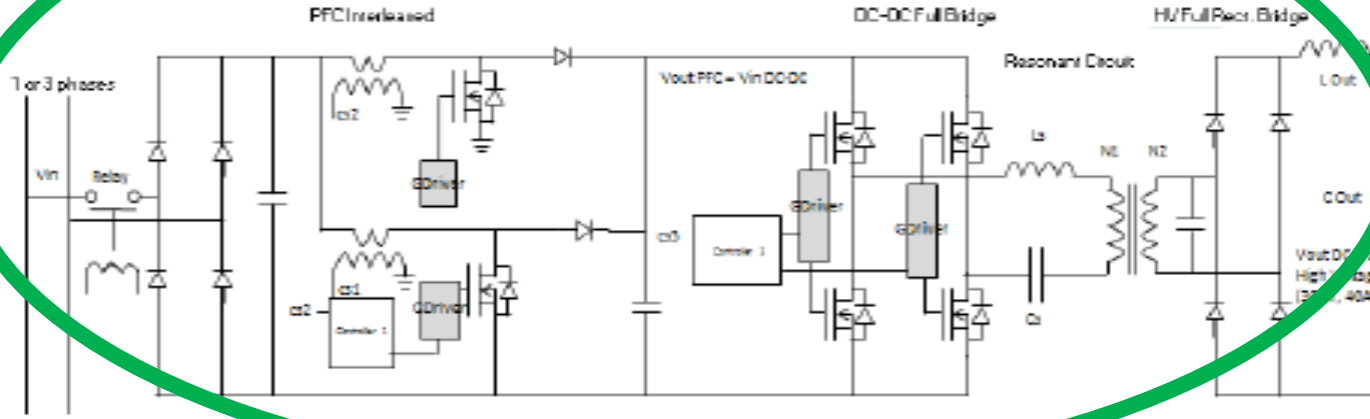
80 V/100 V FET  
半桥驱动器(高速)  
40 V FET  
运算放大器及电流检测  
DC-DC, LDO, IVN, ASIC

## 高压负载

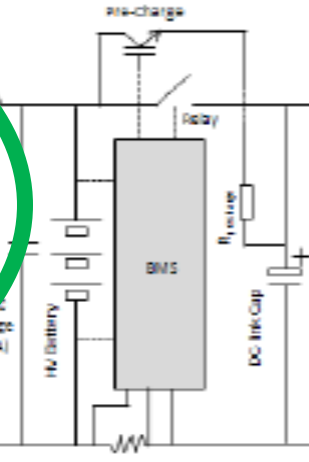
650 V 超结MOSFET  
650 V硅/碳化硅整流器  
/FET  
650V IGBT  
半桥驱动器  
P沟道MOSFET  
650 V GaN 晶体管  
汽车模块  
运算放大器及电流检测  
DC-DC, LDO, IVN, ASIC

# HEV/EV 整体解决方案

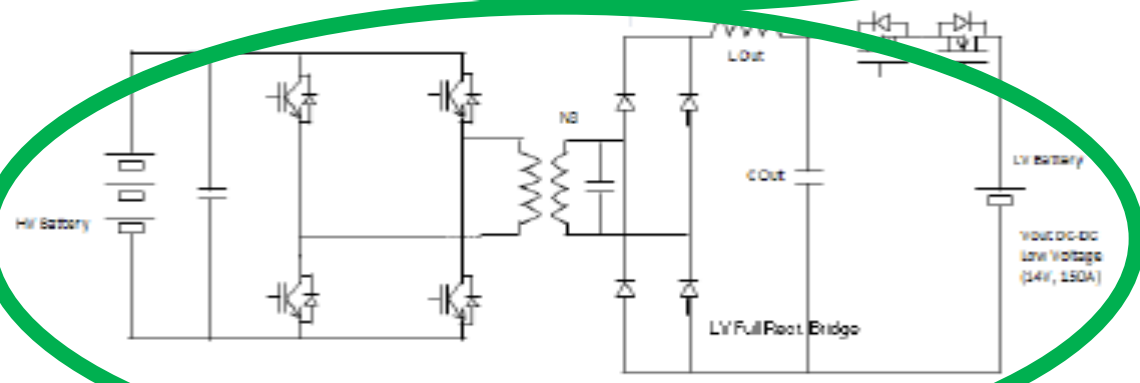
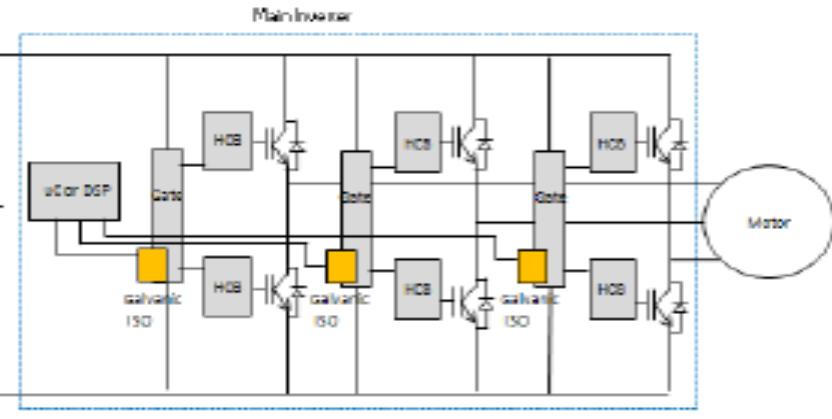
## On-Board Charger (RB + PFC + DC/DC)



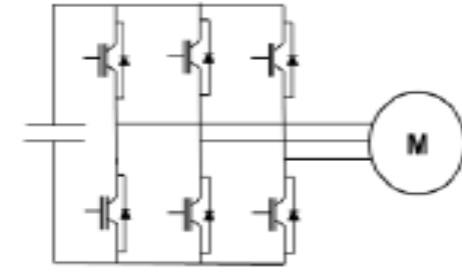
## Pre-charge



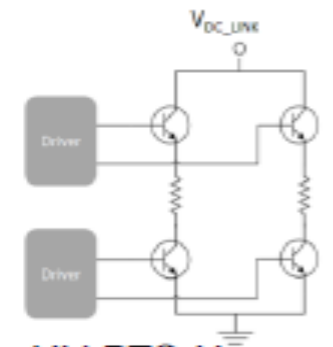
## Main Inverter



HV-LV DC/DC (Auxiliary DC/DC)



Auxiliary Inverter:  
Water coolant, Pump,  
Turbo Charge



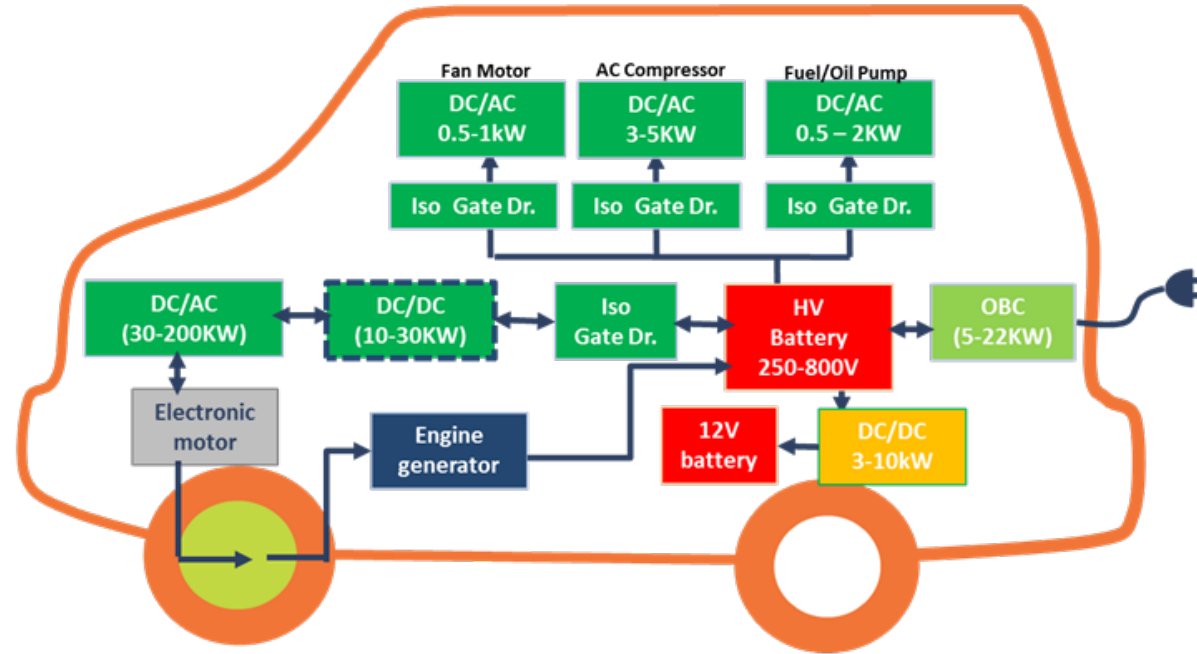
HV PTC Heater



- 车载充电器 (OBC) 及 DC-DC 框图
- **3.3KW - 6.6KW 车载充电器 (OBC) 解决方案**
- **3.3KW 车载充电器 (OBC) 演示板解决方案**
- **SuperFET III MOSFET**
- **汽车碳化硅二极管和 MOSFET**
- **低压至中压MOSFET**
- **汽车电源模块 - MOSFET**
- **高端和低端栅极驱动器**

- HV MOSFET
- MV MOSFET
- HV IGBT / Diode
- SiC / GaN
- AHPM
- Driver
- IPM
- CAN/LIN
- ....

ON Contents



SEC Position

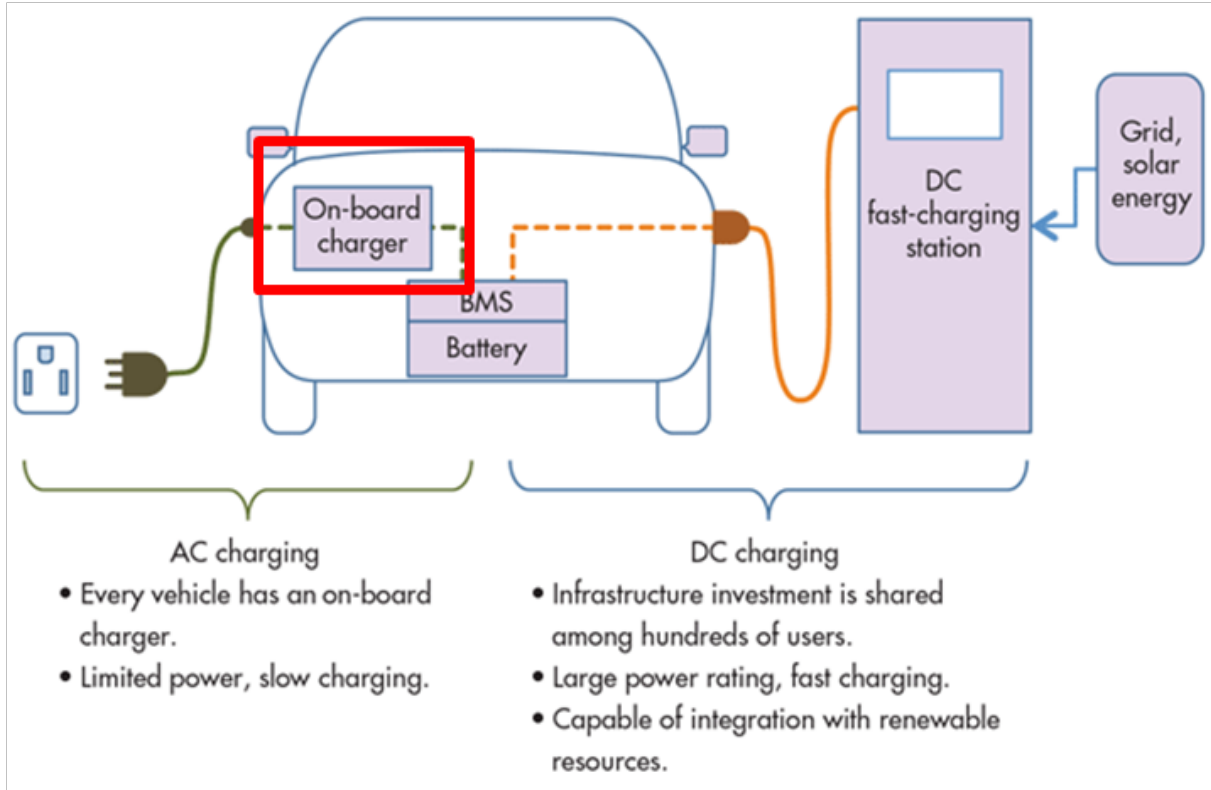
- Power Train System platform
- PCU System Structure
- System technology research
- ON System level demo

## Technology

- High Efficiency PFC
- High Power DC/DC
- Power Management
- Bi-direction DC/DC
- Thermal: water cooling
- Driver technology

# 车载充电器 (OBC) 是什么?

## CAR Charging Types



## Charge Level

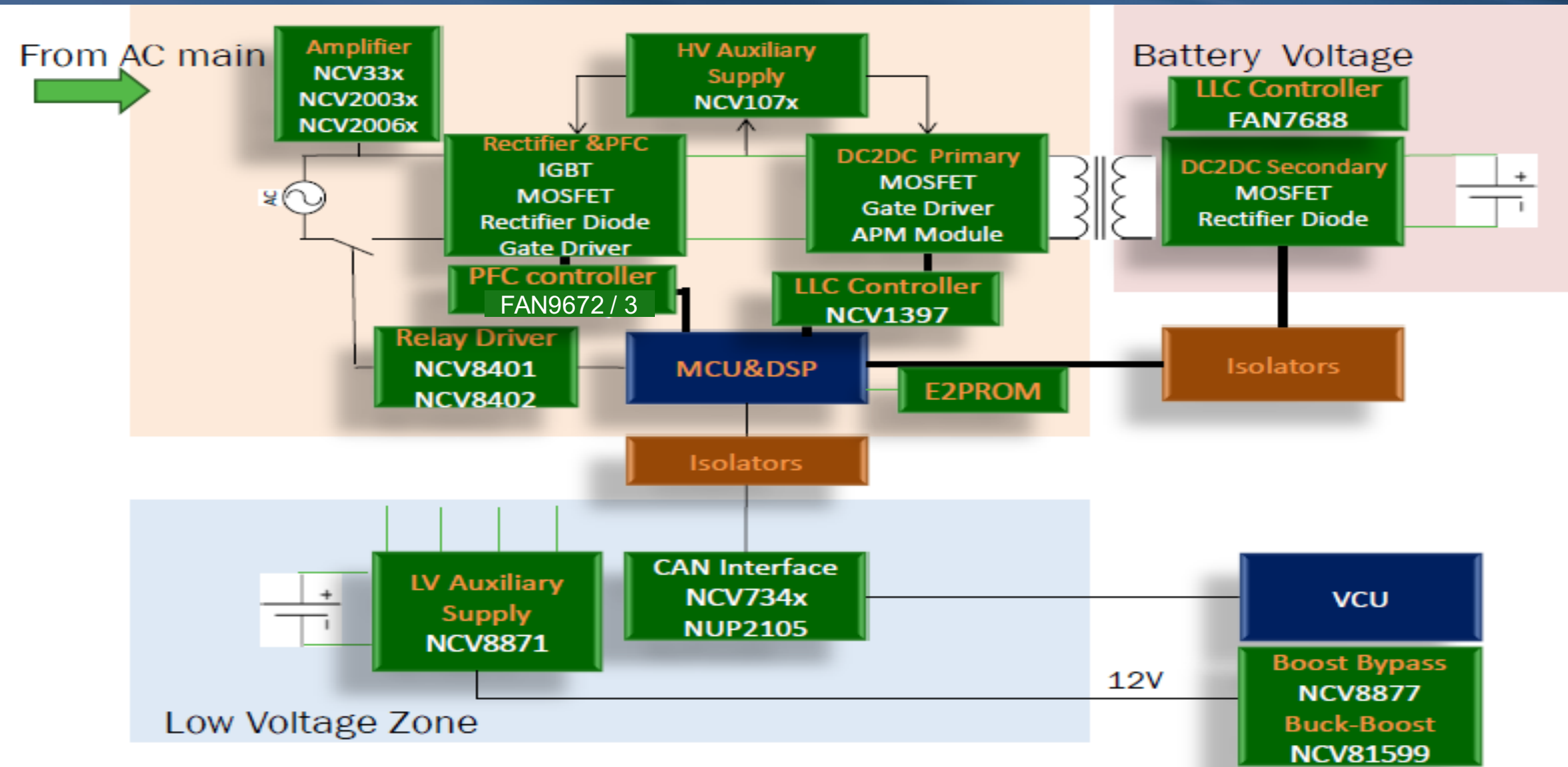
Charge Level	Power Level	Charge Time	Description
<b>AC Level 1</b> Basic, "slow," "trickle" charging	110-120V AC (alternating current)	Full charge: 10-20 hrs	The power level is equivalent to plugging into a household electrical outlet. It is best suited for smaller battery sizes such as those in PHEVs or when longer charging time is available.
<b>AC Level 2</b> Fast, or "quick" charging	208-240V AC	Full charge: 4-8 hrs	The power level is equivalent to plugging into a household electric clothes dryer socket. This is the most common public charging level.
<b>DC Level 3</b> Very fast charging	Converts 3-phase AC to DC	Full charge: 20-30 minutes	Best-suited for fast turnaround locations and fleet vehicle charging. DC Level 3 requires significant panel and service upgrades and consequently is the most expensive to deploy.

\*Level 1 & 2 need OBC

### Key Spec:

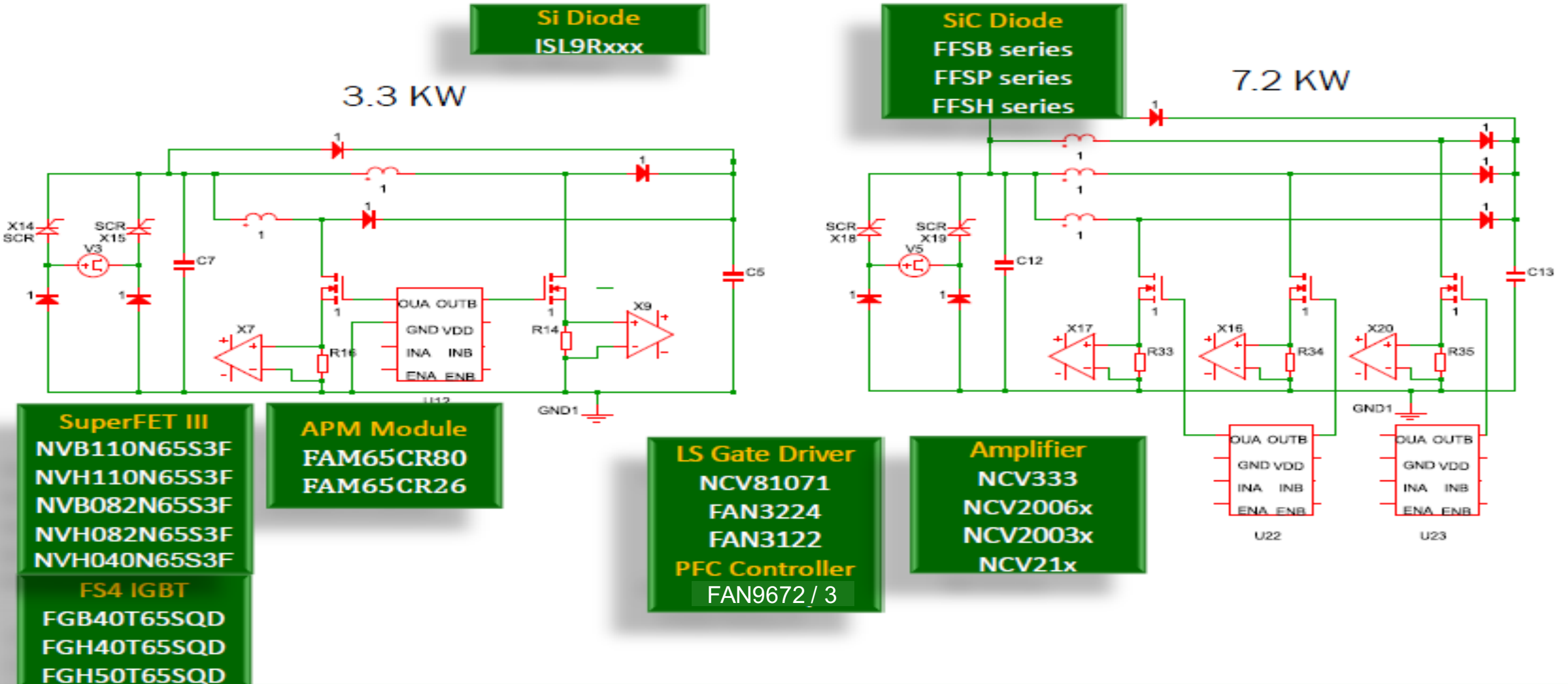
- AC input, DC output
- Power rating: ~1~20KW, 3.3KW, 6.6KW, 11KW are main models
- Need CAN communication with CAR & Connector
- Liquid cooling (-40°C~70°C) / Fan cooling (-40°C~105°C)
- Need water proof class(IP67, IP54)

# 车载充电器框图



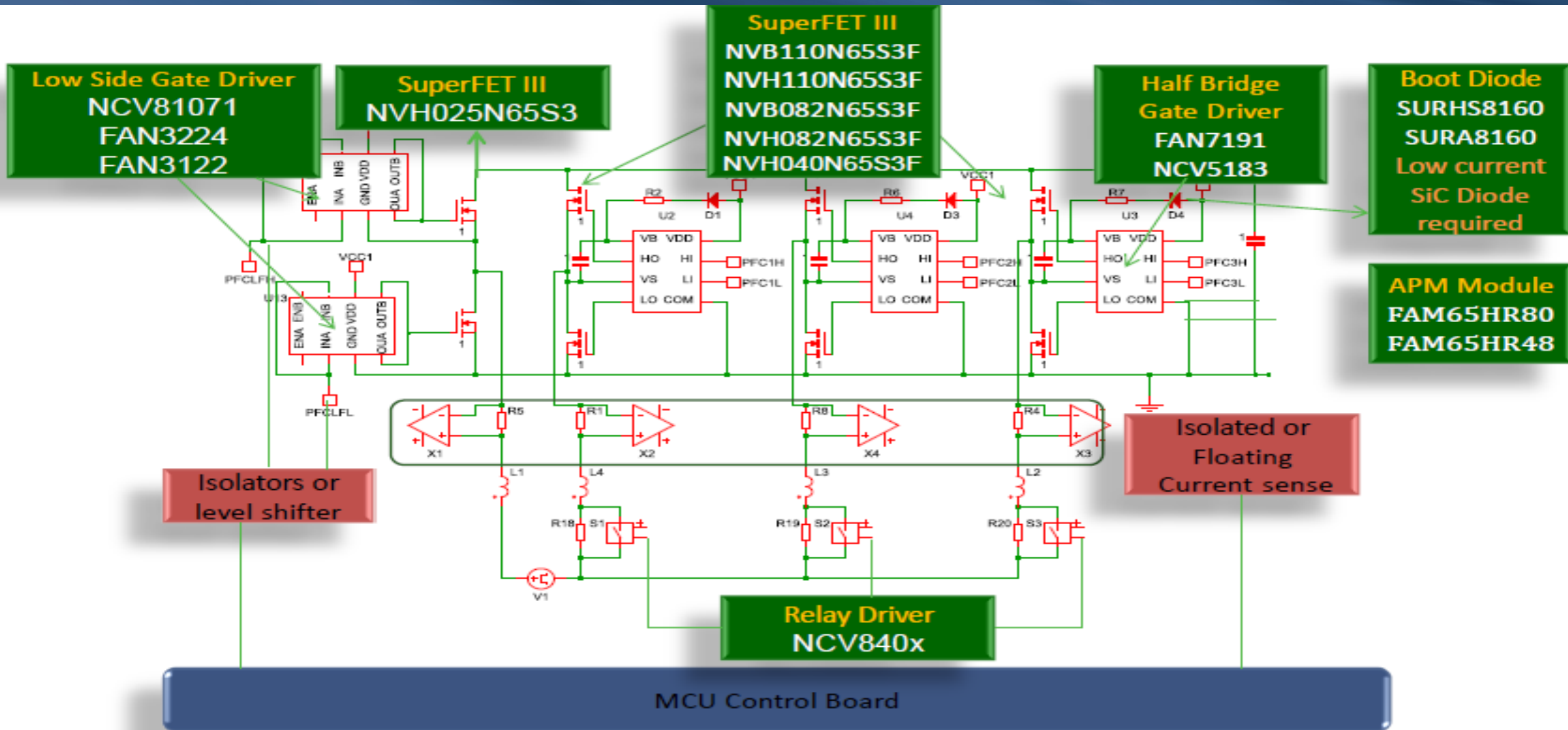
# Singe Phase OBC PFC 框图

## Uni-Direction PFC





# 3 Phase OBC PFC 框图



# OBC DC/DC 框图

3.3KW with one set, 6.6 KW with 2 sets

Battery Voltage  
250V to 470V

**Si Diode**  
ISL9Rxxx

**SiC Diode**  
FFSB series  
FFSP series  
FFSD Series

Battery Voltage  
550V to 800V

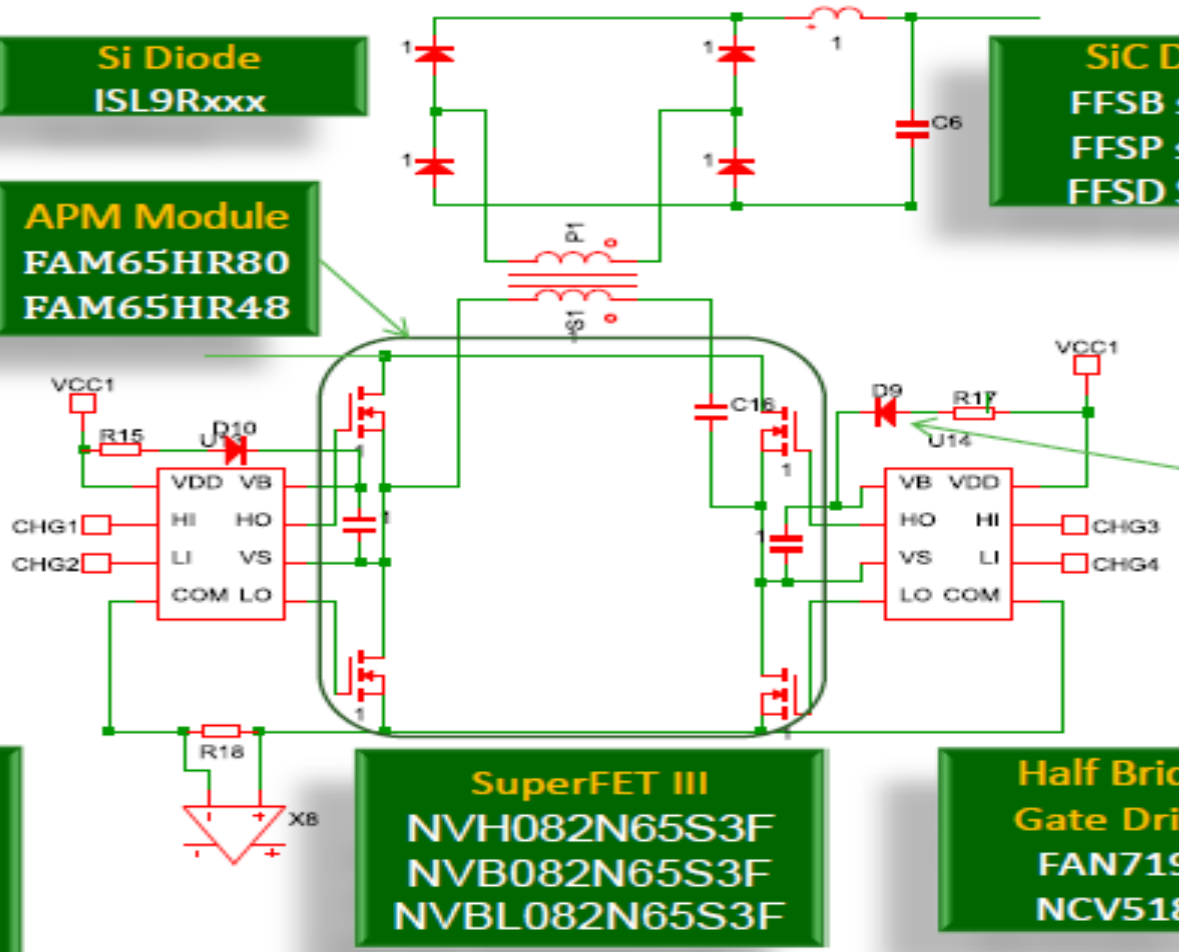
**APM Module**  
FAM65HR80  
FAM65HR48

**Boot Diode**  
SURHS8160  
SURA8160  
Low current  
SiC Diode  
required

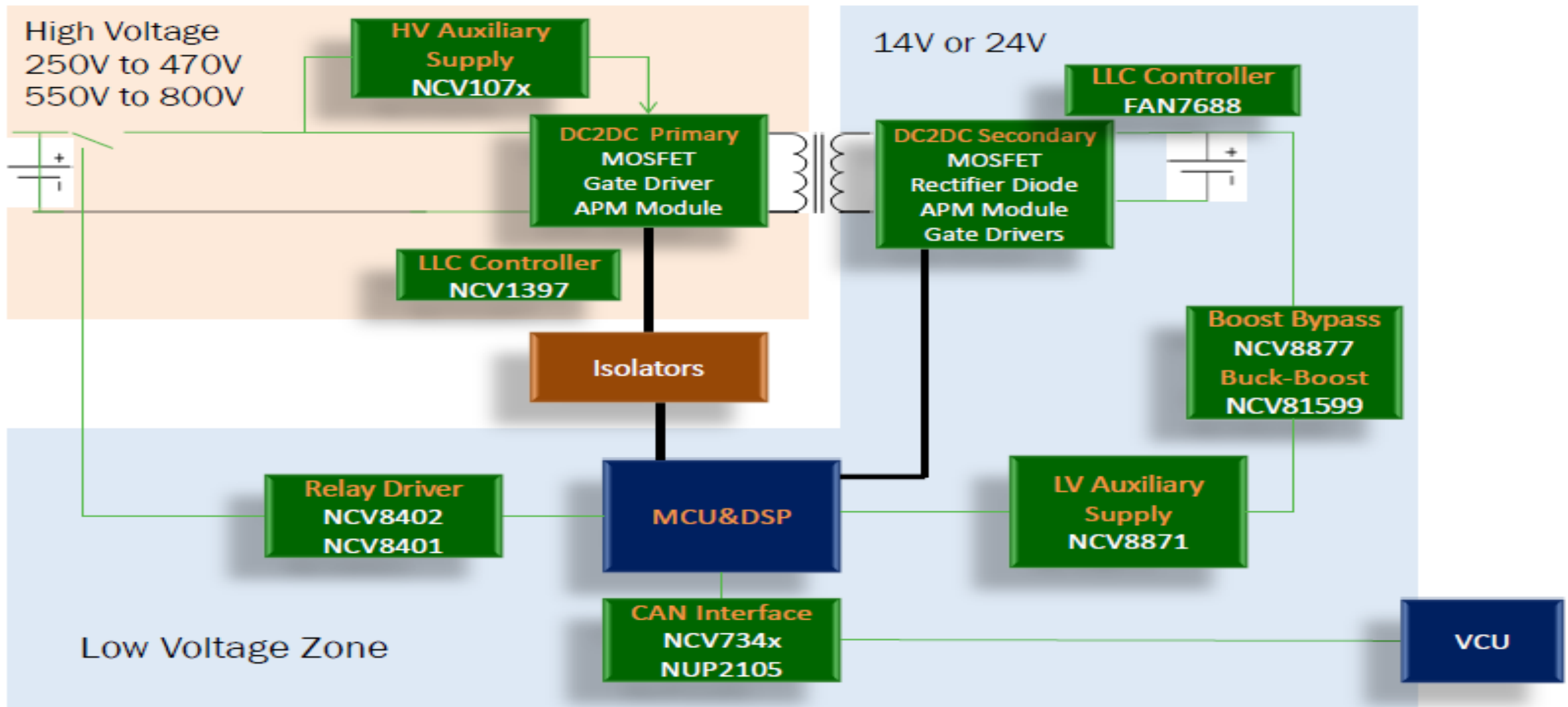
**Amplifier**  
NCV333  
NCV21x  
NCV2006x  
NCV2007x  
NCV2003x

**SuperFET III**  
NVH082N65S3F  
NVB082N65S3F  
NVBL082N65S3F

**Half Bridge  
Gate Driver**  
FAN7191  
NCV5183



# 高电压至低电压 DC-DC



# 高电压至低电压 DC-DC

移相全桥 or LLC+倍流整流

HV DC-DC 250V to 470V

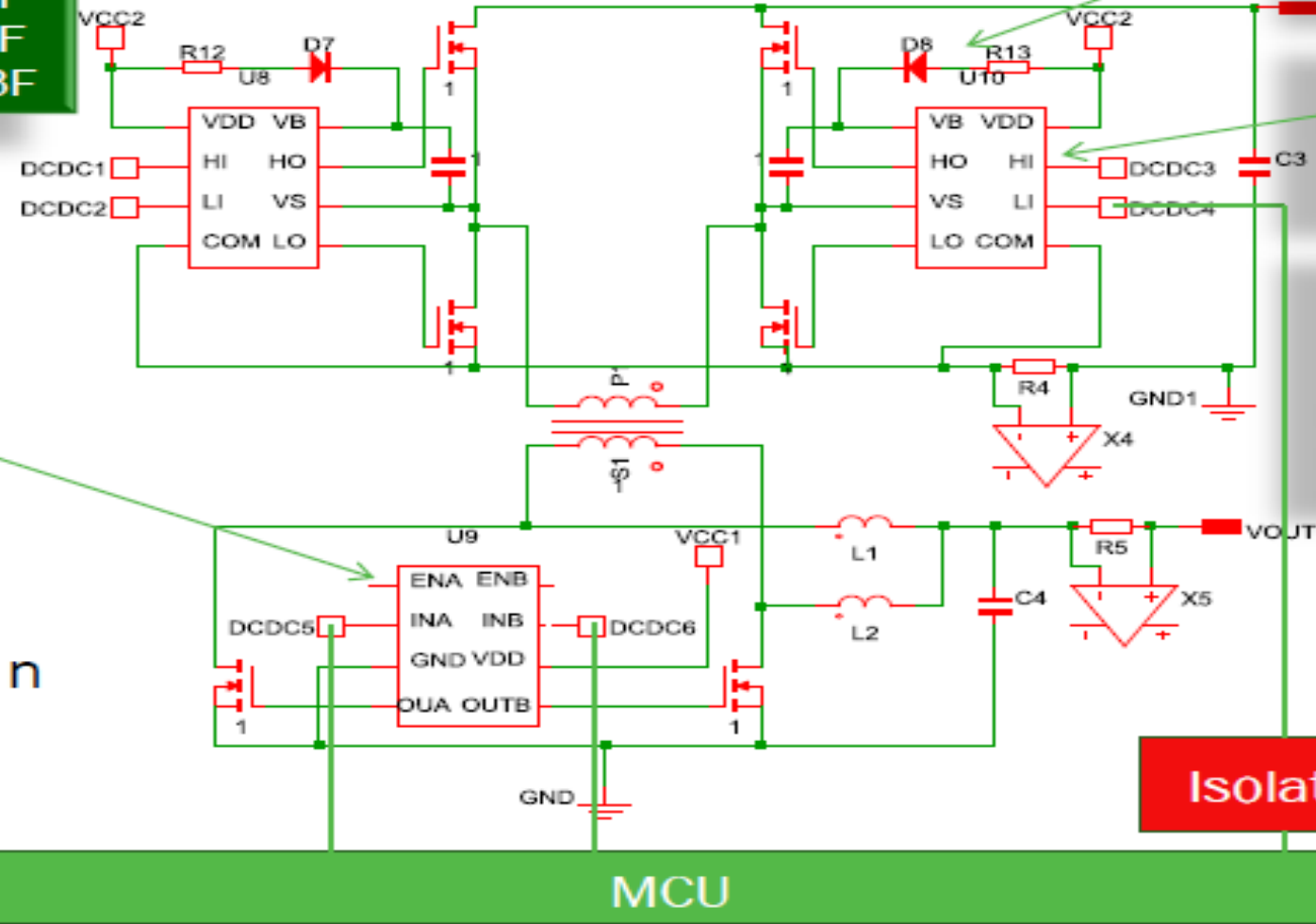
**SuperFET III**  
NVH082N65S3F  
NVB082N65S3F  
NVBL082N65S3F

**APM Module**  
FAM65HR80  
FAM65HR48

**Gate Driver**  
NCV81071  
FAN122  
FAN3224

**MV MOSFET**  
FDBL86xxx  
FDB86xxx  
NVMFS6Hxxx  
200V NPR

**APM Module**  
FAM10D35DT1



**Boot Diode**  
SURHS8160  
SURA8160

**Half Bridge Gate Driver**  
FAN7191  
NCV5183

**Amplifier**  
NCV333  
NCV21x  
NCV2006x  
NCV2007x  
NCV2003x

14V for passenger cars

24V for BUS, Trucks

CC, CV, CP control

**Isolator**

MCU





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## 3.3KW 车载充电器 (OBC) 解决方案

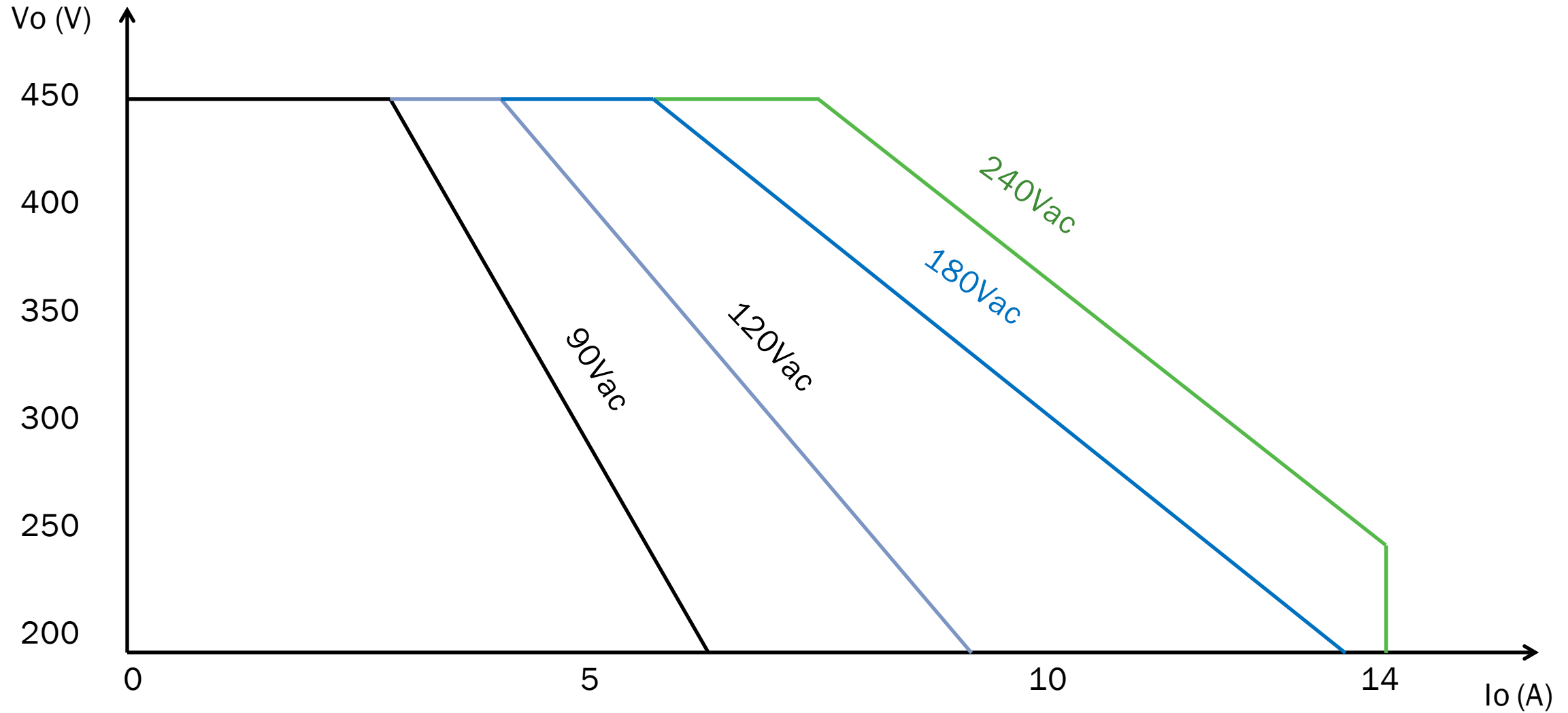
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## 3.3KW 车载充电器 (OBC) 规格

Parameter	Symbol	Value	Unit
Input Voltage Range	Vin	90-265	Vac
Input Rating Current	Iin	16	A
Output Power	Po	3300	W
Output Voltage Range (High Voltage)	Vo (HV)	200-450	Vdc
Output Current Range (High Voltage)	Io (HV)	0-14	A
Output Voltage Range (Low Voltage)	Vo (HV)	12	Vdc
Output Current Range (Low Voltage)	Io (HV)	10	A
Power Factor	PF	>0.99	
Efficiency	Eff.	>95	%

# 规格 - 输出CC, CV曲线



# 风扇冷却演示



254mm

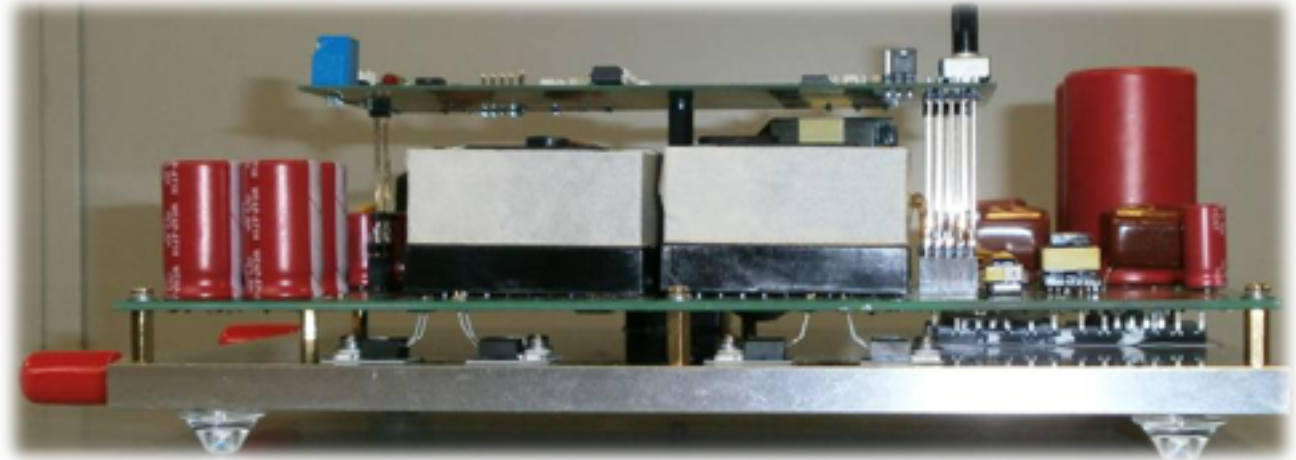
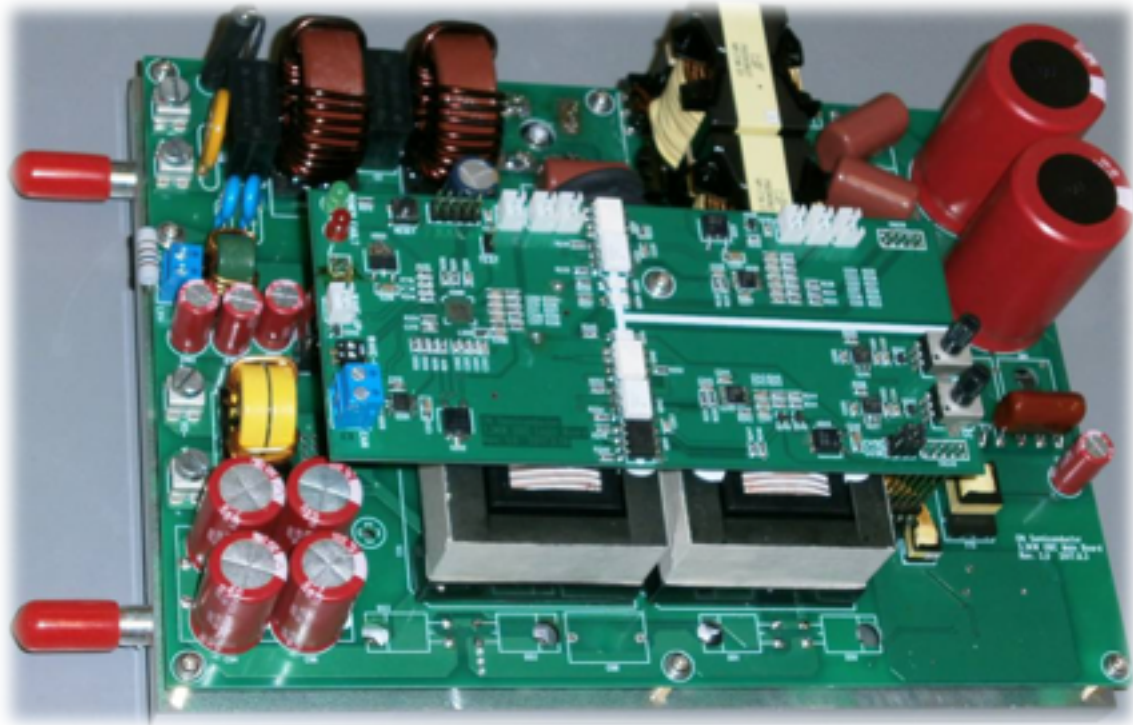
69mm  
114mm

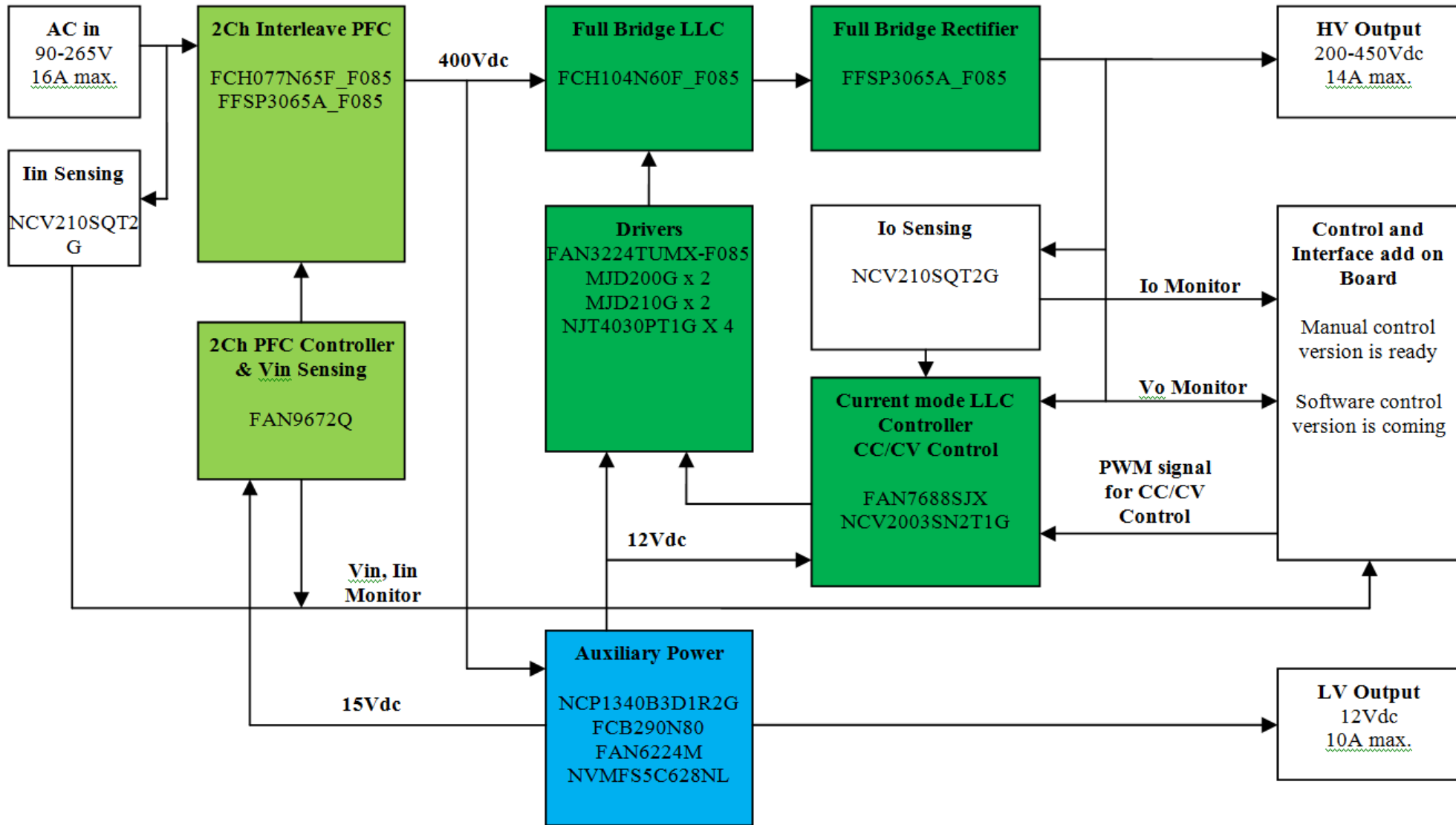


180.4mm



# 液体冷却演示







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# Automotive Si MOSFET

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# Automotive HV MOSFET

RDS(on): 25mΩ / 28mΩ / 40mΩ / 72mΩ / 82mΩ / 110mΩ / 150mΩ

	D2PAK	TOLL HV	TO-247	TO-247-4L
Package				

# Automotive HV MOSFET and KGD Dies

Type	Process Voltage	Family	Part Number	Max Rds mOhm	Package	Status
N Ch	600V	SuperFETI	FCB20N60F_F085	190 mOhm	D2PAK	Released
N Ch	600V	SuperFETI	FCH47N60F_F085	75 mOhm	T0247-3L	Released
N Ch	650V	SuperFETII	FCH041N65F_F085	41 mOhm	T0247-3L	Released
N Ch	600V	SuperFETII	FCH072N60F_F085	72 mOhm	T0247-3L	Released
N Ch	650V	SuperFETII	FCH077N65F_F085	77 mOhm	T0247-3L	Released
N Ch	600V	SuperFETII	FCH104N60F_F085	104 mOhm	T0247-3L	Released
N Ch	650V	SuperFETII	FCH190N65F_F085	190 mOhm	T0247-3L	Released
N Ch	650V	SuperFETII	PCCA048N65FK8	48 mOhm	Die	Released
N Ch	650V	SuperFETII	PCCA077N65FK8	77 mOhm	Die	Released
N Ch	600V	SuperFETI	PCFA2060FK6	190 mOhm	Die	Released



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# 汽车碳化硅二极管和MOSFET

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# 汽车碳化硅二极管

## 650V

Power Diode	Package	BVDSS (V)	Current (V)	Samples	RTM
FFSH2065BDN-F085	T0247-3L	650V	20	Q1, 2018	Q2, 2018
FFSH3065B-F085	T0247-2L	650V	30	Q1, 2018	Q2, 2018
FFSH1065B-F085	T0247-2L	650V	10	Q1, 2018	Q2, 2018

## 1200V

Power Diode	Package	BVDSS (V)	Current (V)	Samples	RTM
FFSH40120ADN-F085	T0247-3L	1200V	40	Now	Q1, 2018
FFSH20120A-F085	T0247-2L	1200V	20	Dec, 2017	Q1, 2018
FFSH10120A-F085	T0247-2L	1200V	10	Dec, 2017	Q1, 2018
FFSB20120A-F085	D2pak	1200V	20	Dec, 2017	Q2, 2018
FFSB10120A-F085	D2pak	1200V	10	Jan , 2018	Q2, 2018

# 汽车碳化硅MOSFET

## 1200V

Power MOSFET	Package	BVDSS (V)	Gate Level (V)	RDS(on) max @ 10V (mΩ)	QG Typ @20V (nC)	Samples	RTM
NVH080N120SC1	T0247-3L	1200V	+20/-5V	80	TBD	Q1, 2018	Q2, 2018







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# 汽车中低压MOSFET

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# 汽车中低压MOSFET组合 (PWR56/S08FL)

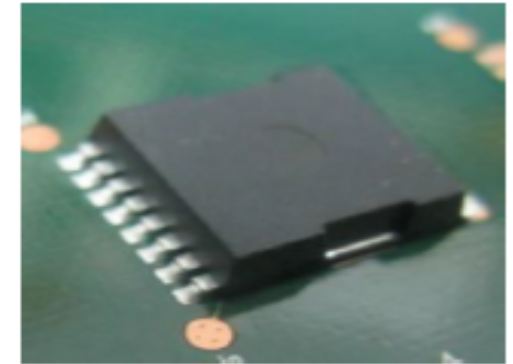
Automotive MOSFET Portfolio to Promote									
Part Number	Package	Configuration	Polarity	$BV_{DSS}$ (V)	Gate Level	$R_{DS(on)}$ max @ 10V (m $\Omega$ )	$Q_G$ @10V typ (nC)	Samples	RTM
NVMFS4C01N	SO-8FL	Single	N	30	LL	0.67	139	Now	Now
NVMFS4C302N	SO-8FL	Single	N	30	LL	1.15	11.6	Now	Q4'17
NVMFS4C03N	SO-8FL	Single	N	30	LL	2.3	45.2	Now	Now
NVMFS4C05N	SO-8FL	Single	N	30	LL	3.4	30	Now	Now
NVMFS4C306N	SO-8FL	Single	N	30	LL	3.4	11.6	Now	Q1'18
NVMFS4C308N	SO-8FL	Single	N	30	LL	4.8	8.4	Now	TBD
NVMFS4C310N	SO-8FL	Single	N	30	LL	6	9.7	Now	TBD
<b>40V</b>									
NVMFS5C404N	SO-8FL	Single	N	40	SL	0.7	128	Now	Now
NVMFS5C404NL	SO-8FL	Single	N	40	LL	0.75	181	Now	Now
NVMFS5C410NL	SO-8FL	Single	N	40	LL	0.9	143	Now	Now
NVMFS5C410N	SO-8FL	Single	N	40	SL	0.92	86	Now	Now
NVMFS5C426N	SO-8FL	Single	N	40	SL	1.3	65	Now	Now
NVMFS5C426NL	SO-8FL	Single	N	40	LL	1.1	65	Now	Now
NVMFS5C430NL	SO-8FL	Single	N	40	LL	1.5	70	Now	Now
NVMFS5C430N	SO-8FL	Single	N	40	SL	1.7	47	Now	Now
NVMFS5C423NL	SO-8FL	Single	N	40	LL	2	50	Now	Now
NVMFS5C442N	SO-8FL	Single	N	40	SL	2.3	32	Now	Now
NVMFS5C442NL	SO-8FL	Single	N	40	LL	2.8	50	Now	Now
NVMFS5C450NL	SO-8FL	Single	N	40	LL	2.8	35	Now	Now
NVMFS5C450N	SO-8FL	Single	N	40	SL	3.3	23	Now	Now



5X6 mm  
SO-8FL

# 汽车中低压MOSFET组合 (TOLL)

Automotive MOSFET Portfolio to Promote									
Part Number	Package	Configuration	Polarity	BV <sub>oss</sub> (V)	Gate Level	R <sub>DS(on)</sub> max @ 10V (mΩ)	Q <sub>c</sub> @10V typ (nC)	Samples	RTM
NVBL0R5N04XC	TOLL	Single	N	40	SL	0.57	220	Now	Q3'17
FDBL9401_F085*	TOLL	Single	N	40	SL	0.65	220	Now	Now
NVBL0R7N04XC	TOLL	Single	N	40	SL	0.75	144	Now	Q3'17
FDBL9403_F085*	TOLL	Single	N	40	SL	0.9	144	Now	Now
FDBL9406_F085*	TOLL	Single	N	40	SL	1.2	90	Now	Now
FDBL9401L_F085	TOLL	Single	N	40	LL	0.65	280	Now	Q3'17
FDBL9403L_F085	TOLL	Single	N	40	LL	0.9	186	Now	Q3'17
FDBL9406L_F085	TOLL	Single	N	40	LL	1.2	121	Now	Q3'17
<b>60V</b>									
FDBL86561_F085	TOLL	Single	N	60	SL	1.1	170	Now	Now
FDBL86563_F085	TOLL	Single	N	60	SL	1.5	130	Now	Now
FDBL86566_F085	TOLL	Single	N	60	SL	2.4	80	Now	Now
<b>80V</b>									
FDBL86361_F085	TOLL	Single	N	80	SL	1.4	172	Now	Now
FDBL86363_F085	TOLL	Single	N	80	SL	2	130	Now	Now
FDBL86366_F085	TOLL	Single	N	80	SL	3	86	Now	Now
<b>100V</b>									
FDBL86062_F085*	TOLL	Single	N	100	SL	2	95	Now	Now
FDBL86063_F085*	TOLL	Single	N	100	SL	2.6	76	Now	Now
FDBL86066_F085*	TOLL	Single	N	100	SL	2.8	46	Now	Q3'17
<b>150V</b>									
FDBL86210_F085*	TOLL	Single	N	150	SL	6.3	70	Now	Now



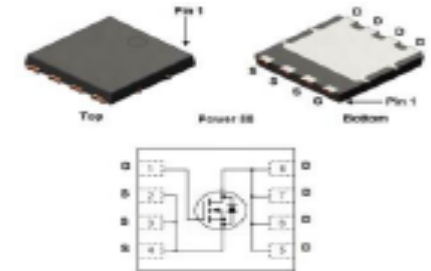
**TOLL = 10X12 mm  
TO LEADLESS**

NOTE: \*Possible change of nomenclature to ->

FDBL0065N40
FDBL0090N40
FDBL0120N40
FDBL0200N100
FDBL0260N100
FDBL0240N100
FDBL0630N150

# 汽车中低压MOSFET组合 (Power88)

Automotive MOSFET Portfolio to Promote									
Part Number	Package	Configuration	Polarity	$BV_{DSS}$ (V)	Gate Level	$R_{DS(on)}$ max @ 10V (m $\Omega$ )	$Q_g$ @10V typ (nC)	Samples	RTM
NVQFS04N0D4T6	Pwr88	Single	N	40	SL	0.44	250	Q4'17	Q2'18
FDMT9415	Pwr88	Single	N	40	SL	0.5	220	Q3'17(1)	Q2'18
NVQFS04N0D5T6	Pwr88	Single	N	40	SL	0.58	185	Q1'18	Q2'18
FDMT9416	Pwr88	Single	N	40	SL	0.8	144	Q3'17 (2)	Q2'18
NVQFS04N0D7T6	Pwr88	Single	N	40	SL	0.74	141	Q4'17	Q2'18
FDMT9417	Pwr88	Single	N	40	SL	1.1	90	Q3'17 (2)	Q2'18
<b>60V</b>									
NVQFS06N0D7LT6	Pwr88	Single	N	60	LL	0.75	215	Q1'18	Q2'18
NVTQFS001N06LT6	Pwr88	Single	N	60	LL	1	160	Q1'18	Q2'18
<b>80V</b>									
FDMT86385DC	Pwr88DC	Single	N	80	SL	1.3	170	Now	Q1'18



Power88 = 8x8 mm

Additional devices or voltages may be added later.

- (1) Early samples on preliminary outline available
- (2) Early samples provided in Q3 2016 were marked FDMT9403 and 9406
- (3) DC = Dual Cool Version

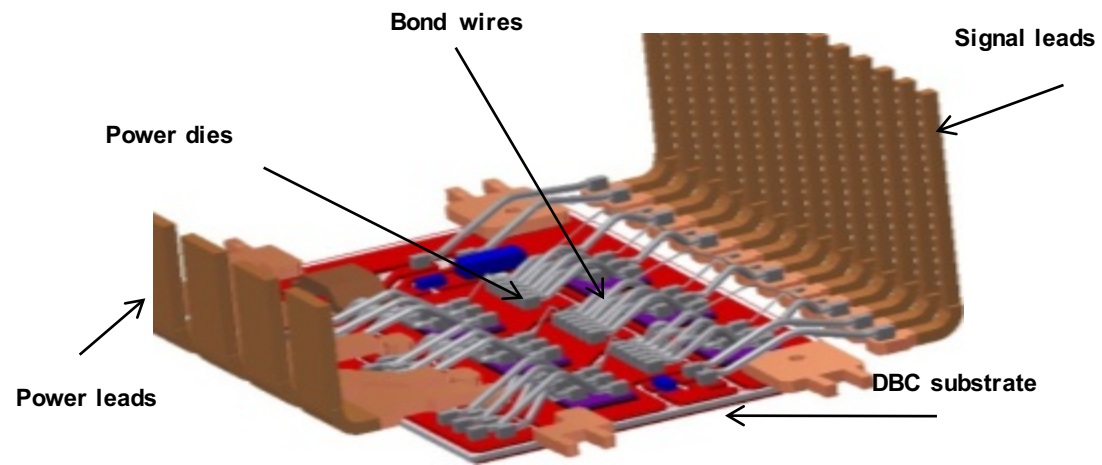
# 汽车中低压MOSFET组合 (DPAK)

Automotive MOSFET Portfolio to Promote									
Part Number	Package	Configuration	Polarity	$BV_{DSS}$ (V)	Gate Level	$R_{DS(on)}$ max @ 10V (m $\Omega$ )	$Q_g$ @10V typ (nC)	Samples	RTM
NVD5C632NL	DPAK	Single	N	60	LL	3	78	Now	Now
FDD86567-F085	DPAK	Single	N	60	SL	3.2	63	Now	Now
NVD5C648NL	DPAK	Single	N	60	LL	4.6	39	Now	Now
FDD86569-F085	DPAK	Single	N	60	SL	5.7	35	Now	Now
NVD5C668NL	DPAK	Single	N	60	LL	9.3	19	Now	Now
FDD86580-F085	DPAK	Single	N	60	SL	10	20	Now	Now
FDD86581-F085	DPAK	Single	N	60	SL	15	13	Now	Now
NVD5C684NL	DPAK	Single	N	60	LL	17.5	9	Now	Now
NVD5C688NL	DPAK	Single	N	60	LL	30	6	Now	Now
<b>80V</b>									
FDD86367-F085	DPAK	Single	N	80	SL	4.2	68	Now	Now
FDD86369-F085	DPAK	Single	N	80	SL	7.9	34	Now	Now
FDD86380-F085	DPAK	Single	N	80	SL	13.5	20	Now	Now
FDD86381-F085	DPAK	Single	N	80	SL	21	14	Now	Now
<b>100V</b>									
FDD86067-F085	DPAK	Single	N	100V	SL	5	38	Q3'17	Q4'17
FDD86069-F085	DPAK	Single	N	100V	SL	9.1	19	Now	Q1'18
FDD3672-F085	DPAK	Single	N	100V	SL	28	24	Now	Now
FDD3682-F085	DPAK	Single	N	100V	SL	36	18.5	Now	Now
<b>150V</b>									
FDD86250-F085	DPAK	Single	N	150V	SL	22	23	Now	Q3'17
FDD2572-F085	DPAK	Single	N	150V	SL	54	34	Now	Now

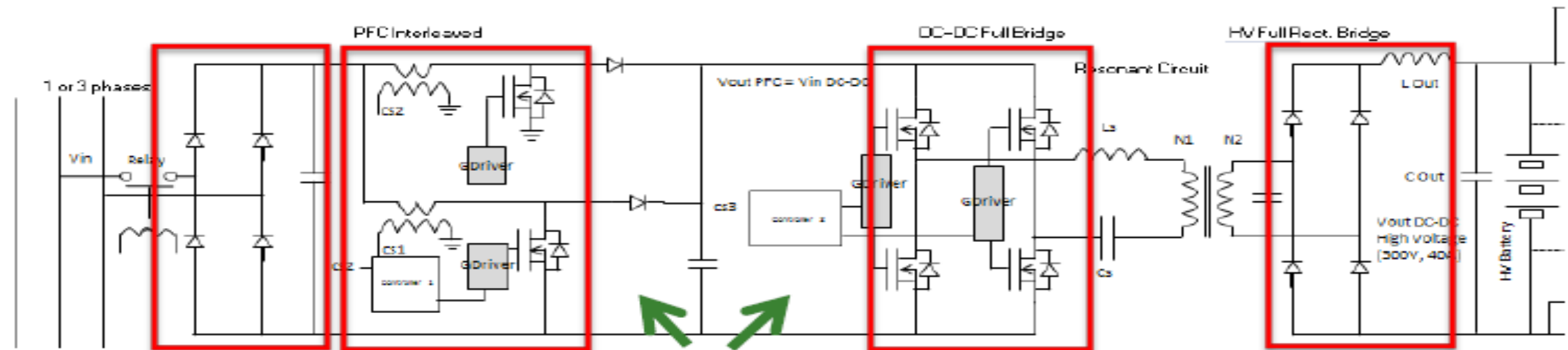


DPAK

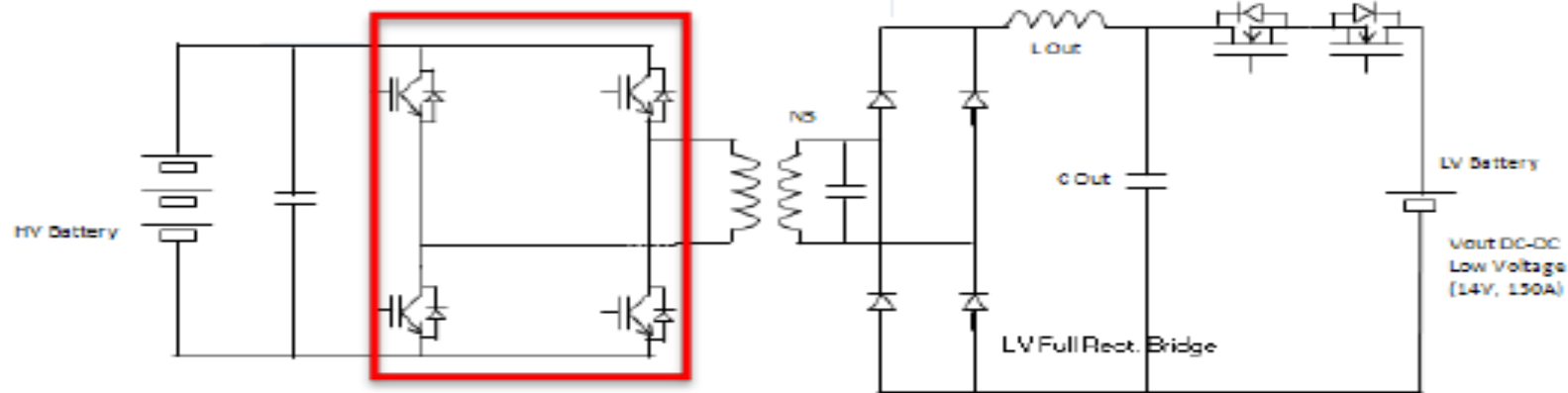
# APM (汽车电源模块 - MOSFET)



# 典型车载充电器系统

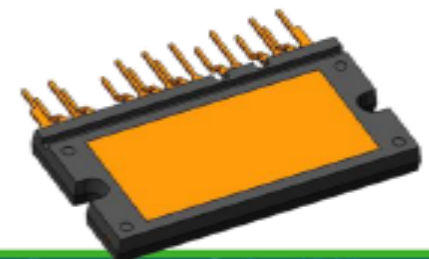


APM16 OBC Modules



## APM16 Module value proposition:

- One package outline
- Covers all different circuit configuration of OBC and DC/DC
- Automotive qualified

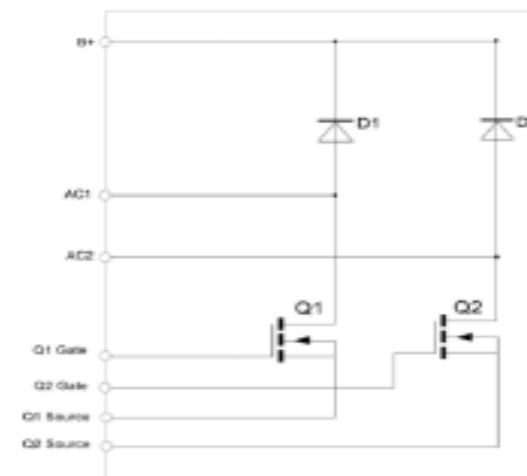
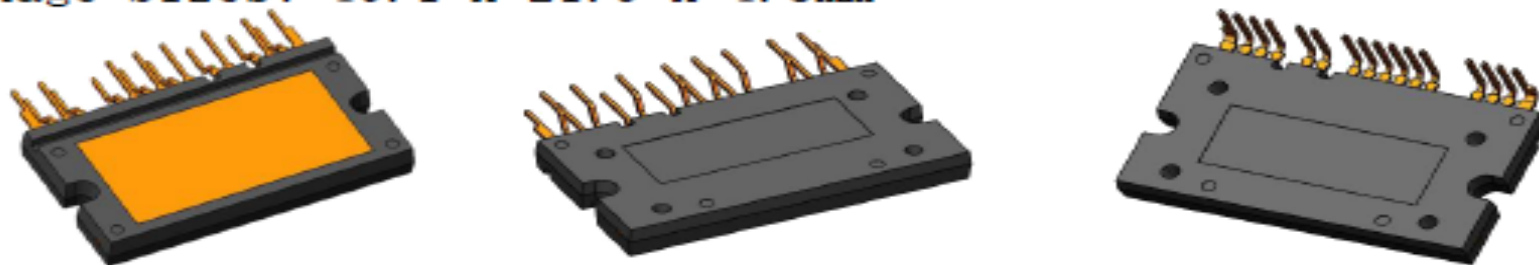


# APM 16 as multiphase PFC for EV/HEV OBC

## Multiphase PFC for EV/HEV On-Board Charger

- Different lead forming options for vertical and horizontal mounting on heat sink
- 650V SuperFet III mosfets down to 26mΩ
- Road map with 1200V SiC Mosfet down to 20mΩ

Package Sizes: 40.1 x 21.9 x 4.5mm



Part number	Tech	Rdson/Current @ 25C	Rating	Tj rating	Release date
FAM65CR80DZ1	SuperFETIII	80mΩ max	650V	-55C/150C	1 <sup>st</sup> half 2018
	Stealth diode	15A	600V, 1.24V@15A, 127ns@Tj=175C	-55C/175C	
FAM65CR26DZ1	SuperFETIII	26mΩ max	650V	-55C/150C	1 <sup>st</sup> half 2018
	Stealth diode	30A	600V, 1.5V@30A, 135ns @Tj=175C	-55C/175C	
FAM65CR80ADNZ1	SuperFETIII	80mΩ max	650V	-55C/150C	2 <sup>nd</sup> half 2018
	SiC diode	30A	650V, 1.5V@30A/Tj=25C	-55C/175C	
FAM65CR26ADNZ1	SuperFETIII	26mΩ max	650V	-55C/150C	2 <sup>nd</sup> half 2018
	SiC diode	30A	650V, 1.5V@30A/Tj=25C	-55C/175C	

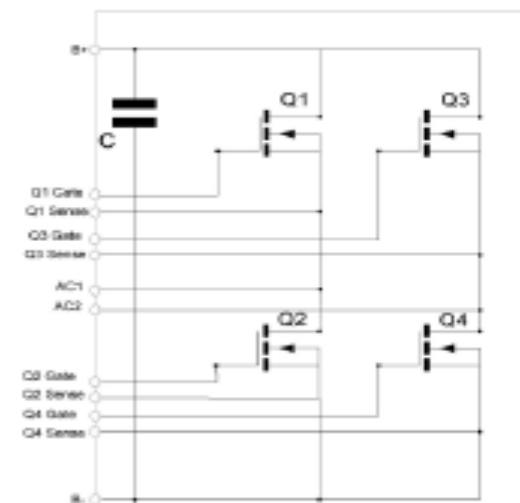
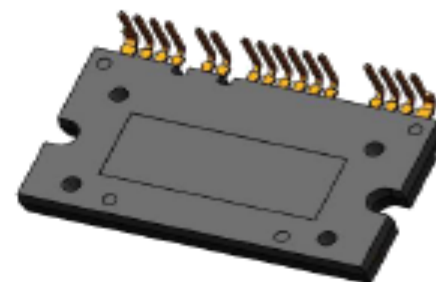
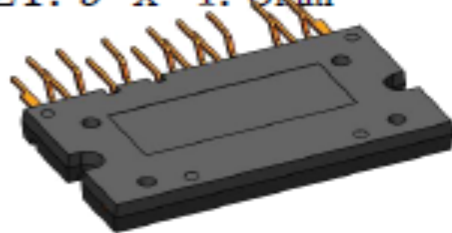


# APM16 as LLC H-Bridge for EV/HEV OBC

## LLC H-Bridge for EV/HEV On-Board Charger

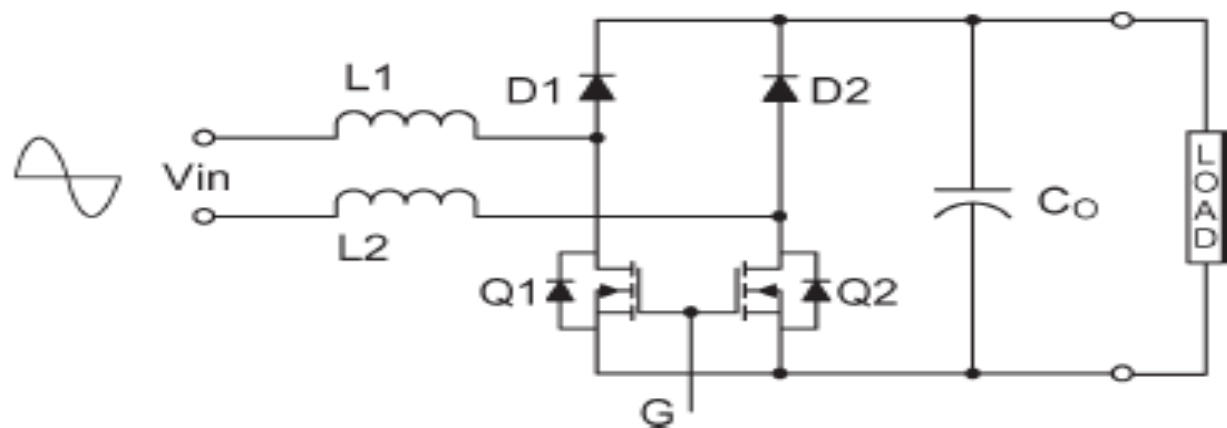
- Different lead forming options for vertical and horizontal mounting on heat sink
- SuperFet III mosfets down to 48mΩ
- Option for half bridge with 650V SuperFet III mosfets down to 26mΩ
- Road map with 1200V SiC Mosfet down to 20mΩ

Package Sizes: 40.1 x 21.9 x 4.5mm

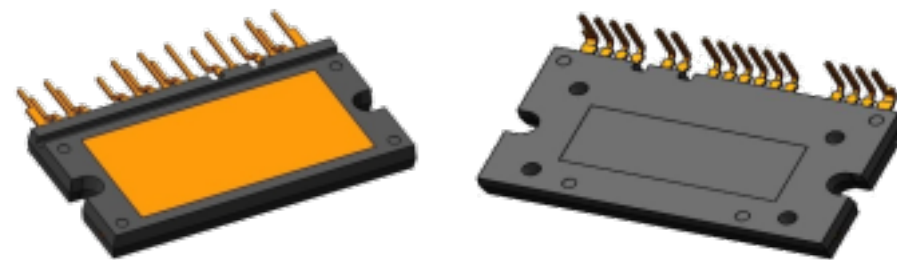


Part number	Tech	Rdson@ 25C	Rating	Tj rating	Release date
FAM65HR80DS1	SuperFETIII	80mΩ max	650V	-55C/150C	1 <sup>st</sup> half 2018
FAM65HR48DS1	SuperFETIII	48mΩ max	650V	-55C/150C	2 <sup>nd</sup> half 2018

# APM16模块支持的其他拓扑



Bridgeless PFC topology



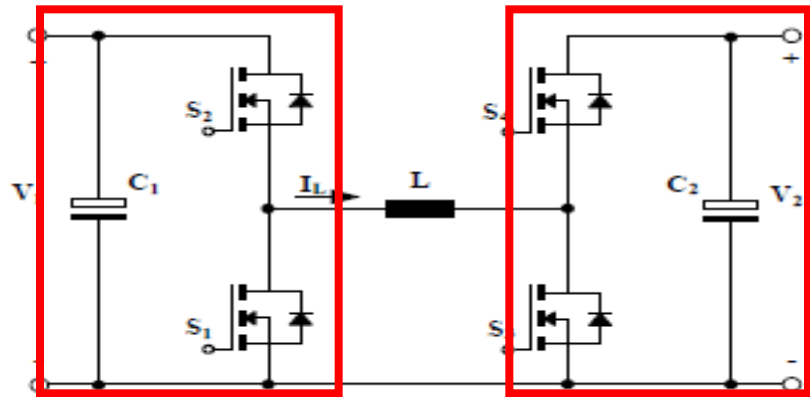
APM16 Module value proposition:

- One package outline covers all different circuit configurations

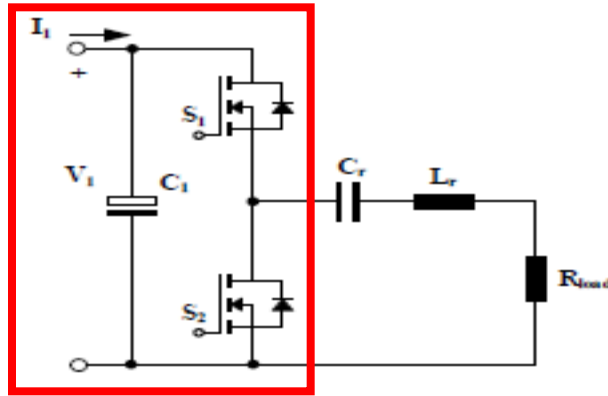
Part number	Tech	Rdson/Current@ 25C	Rating	Tj rating	Release date	Samples
FAM65CR28DZ1/2	SuperFETIII	28mΩ max	650V	-55C/150C	1 <sup>st</sup> half 2019	Q3,2018
	Stealth diode	30A	600V, 1.3V@15A, 150ns@Tj=175C	-55C/175C		
FAM65CR51DZ1/2	SuperFETIII	51mΩ max	650V	-55C/150C	1 <sup>st</sup> half 2018	Q4,2017
	Stealth diode	15A	600V, 1.24V@15A, 127ns@Tj=175C	-55C/175C		
FAM65CR51ADNZ1 /2	SuperFETIII	51mΩ max	650V	-55C/150C	2 <sup>nd</sup> half 2018	Q2,2018
	SiC diode	10A	650V, 1.35V@30A/Tj=25C	-55C/175C		
FAM65CR80DZ1/2	SuperFETIII	80mΩ max	650V	-55C/150C	2 <sup>nd</sup> half 2018	Q3,2018
	Si diode	10A	650V, 1.34V@10A/Tj=25C	-55C/175C		
FAM65CR28ADNZ1/2	SuperFETIII	28mΩ max	650V	-55C/150C	2 <sup>nd</sup> half 2019	Q3,2018
	SiC diode	30A	650V, 1.35V@30A/Tj=25C	-55C/175C		



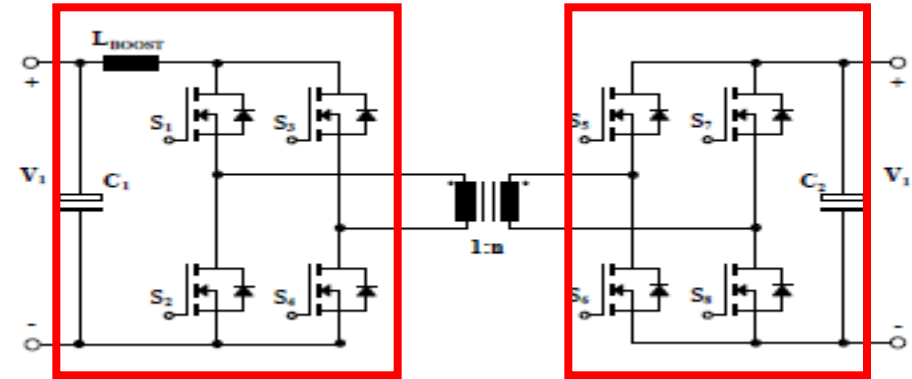
# APM16模块支持的其他拓扑



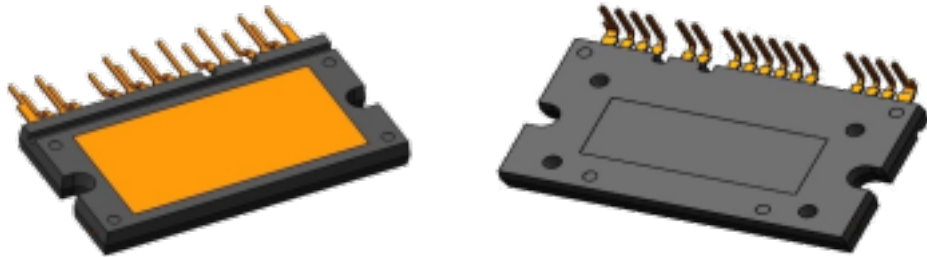
Buck-Boost Converter



Half Bridge LLC Converter



Dual Active Bridge Buck-Boost



APM16 Module value proposition:

- One package outline covers all different circuit configurations

Part number	Tech	Rdson@ 25C	Rating	Tj rating	Release date	Samples
FAM65HR51DS1/2	SuperFETIII	51mΩ max	650V	-55C/150C	1 <sup>st</sup> half 2018	Q4,2017
FAM65HR80DS1/2	SuperFETIII	80mΩ max	650V	-55C/150C	2 <sup>nd</sup> half 2018	Q2,2018



想到ON



## 高端和低端驱动器

安森美半导体  
ON Semiconductor®



# NCV81071-Dual 5A 低端驱动器

## Value Proposition

NCP81071 is a high speed dual low-side MOSFETs driver, capable of providing large peak currents into capacitive loads.

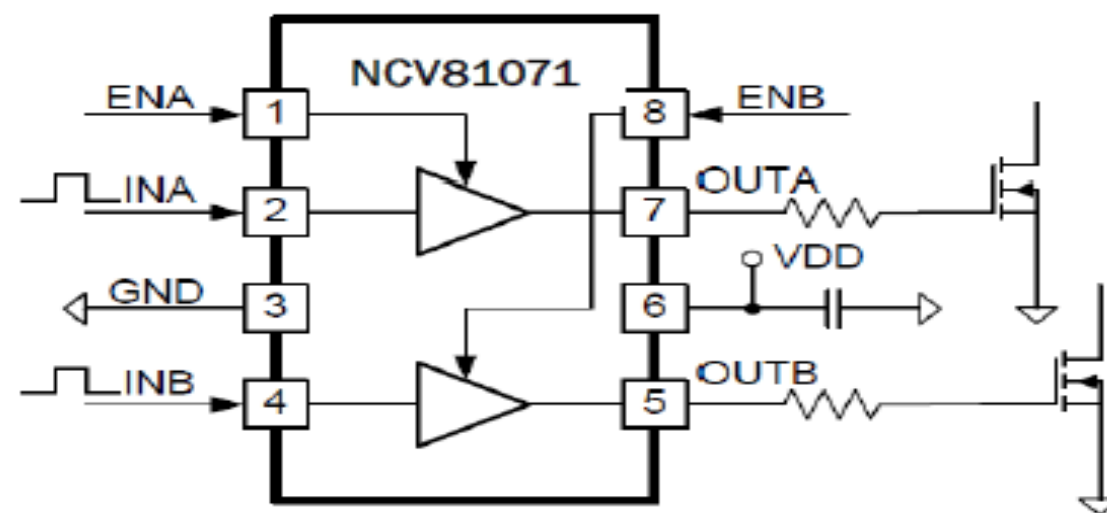
## Features

- High Current Drive Capability  $\pm 5A$
- TTL/CMOS Compatible Inputs Independent of Supply Voltage
- Industry Standard Pin-out
- Enable Functions for Each Driver
- 8ns Typical Rise and 8ns Typical Fall Times with 1.8nF Load
- Typical Propagation Delay Times of 20ns with Input Falling and 20ns with Input Rising
- Input Voltage from 4.5V to 20V
- Dual Outputs can be Paralleled for Higher Drive Current

## Market & Applications

- Switch-Mode Power Supplies
- DC-DC Converters
- Motor Control
- Solar Power
- Second source for UCC2742X, UCC2743X, UCC2752X

## Typical Application diagram & Package info



MSOP8 EP 3mm\*5mm

# FAN322x: Dual 5A 低端栅极驱动器

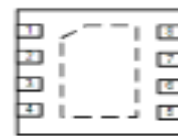
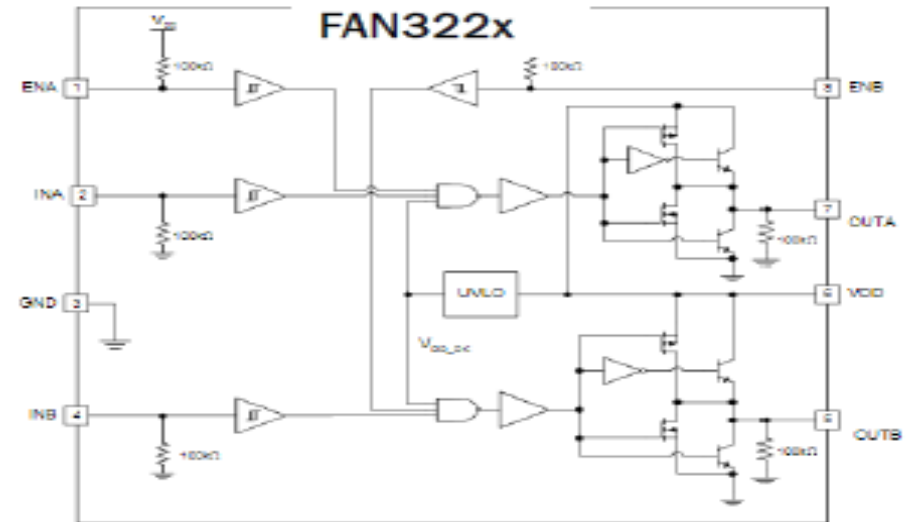
## Value Proposition

The FAN3223-25 family of dual 4A gate drivers is designed to drive N-channel enhancement-mode MOSFETs in low-side switching applications by providing high peak current pulses during the short switching intervals. The driver is available with either TTL or CMOS input thresholds.

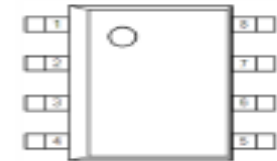
The FAN322X drivers incorporate MillerDrive™ architecture for the final output stage. This bipolar-MOSFET combination provides high current during the Miller plateau stage of the MOSFET turn-on / turn-off process to minimize switching loss, while providing rail-to-rail voltage swing and reverse current capability.

## Features

- Industry-Standard Pinouts
- 4.5 to 18V Operating Range
- 5A Peak Sink/Source at  $V_{DD} = 12V$
- 4.3A Sink / 2.8A Source at  $V_{OUT} = 6V$
- Choice of TTL or CMOS Input Thresholds
- Three Versions of Dual Independent Drivers:
  - Dual Inverting + Enable (FAN3223)
  - Dual Non-Inverting + Enable (FAN3224)
  - Dual-Inputs(FAN3225)
- Internal Resistors Turn Driver Off If No Inputs
- Second source for UCC2742X, UCC2743X, UCC2752X



3mm\*3mm MLP



SOIC-8

For complete documentation, see the [data sheet](#)

# FAN312x Single 9A 高速低端栅极驱动器

## Value Proposition

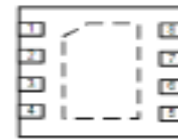
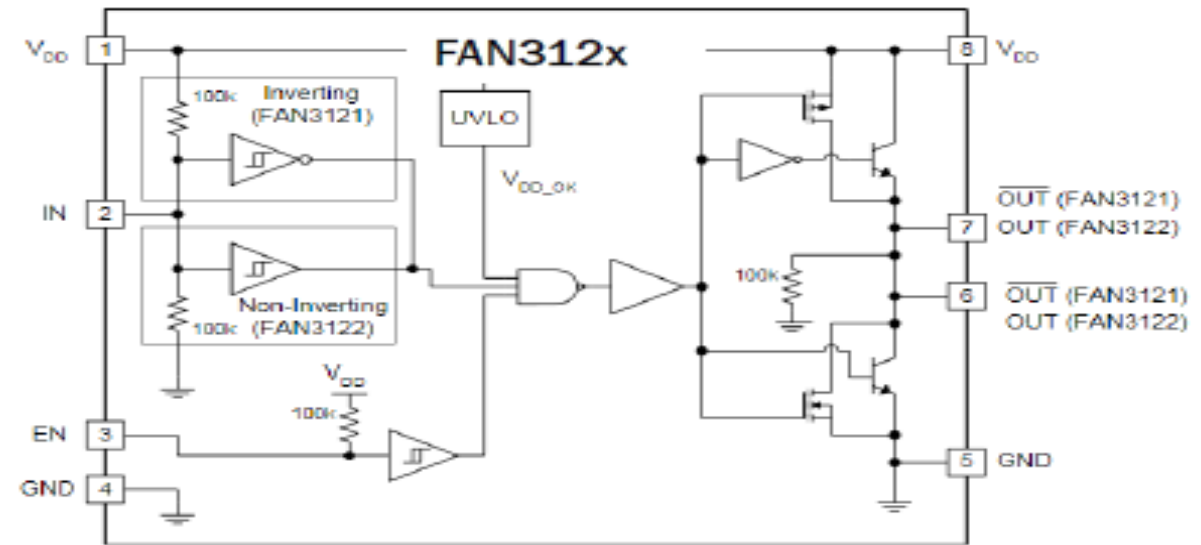
The FAN3121 and FAN3122 MOSFET drivers are designed to drive N-channel enhancement MOSFETs in low-side switching applications by providing high peak current pulses. The drivers are available with either TTL (FAN312xT) or CMOS (FAN312xC) input thresholds. Internal circuitry provides an under-voltage lockout function by holding the output low until the supply voltage is within the operating range.

FAN312x drivers incorporate the MillerDrive™ architecture for the final output stage. This bipolar / MOSFET combination provides the highest peak current during the Miller plateau stage of the MOSFET turn-on / turn-off process.

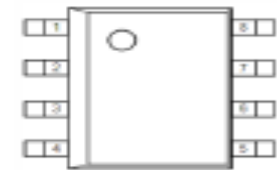
## Features

- Industry-Standard Pin-out with Enable Input
- 4.5 to 18 V Operating Range
- 11.4 A Peak Sink at  $V_{DD} = 12\text{ V}$
- 9.7 A Sink / 7.1 A Source at  $V_{OUT} = 6\text{ V}$
- Inverting Configuration (FAN3121) and Non-Inverting Configuration (FAN3122)
- Internal Resistors Turn Driver Off If No Inputs
- 23 ns / 19 ns Typical Rise/Fall Times with 10nF Load
- 20 ns Typical Propagation Delay Time
- Choice of TTL or CMOS Input Thresholds
- MillerDrive™ Technology

For complete features, see the [data sheet](#).



3mm\*3mm MLP



SOIC-8

# NCV51705 SiC MOSFET 门驱动器

## Features

- High peak output current - 6A
- Extended positive voltage rating for SiC MOSFETs
- Integrated negative charge pump (adjustable to -5V)
- Adjustable UVLO levels
- Vcc supply for digital isolators
- DESAT detection for short circuit protection
- Thermal shutdown function
- Inverting/Non-inverting Input

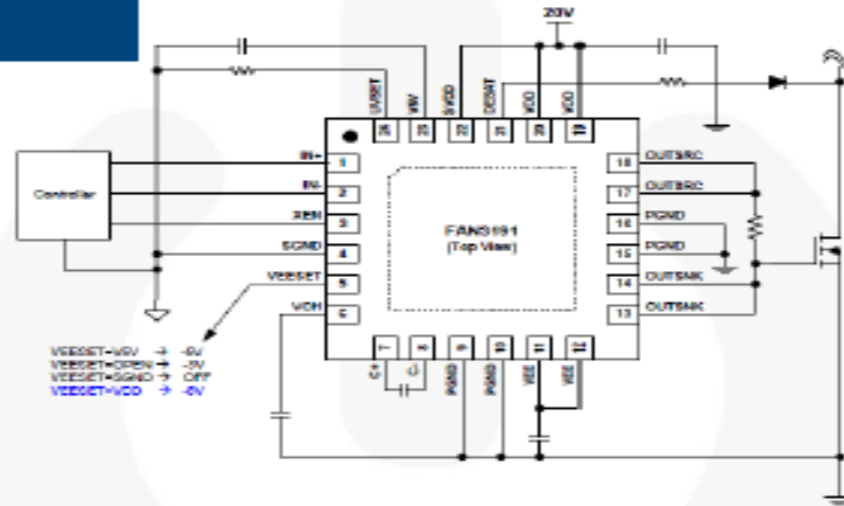


Figure 1. Typical Application Circuit for SiC MOSFET Driver



## Benefits

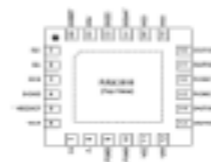
- Optimized to drive all SiC MOSFETs
- Tunable for design
- Simplified BOM and no need for extra DC/DC
- Negative voltage drive for fast turn-off
- Very small package

Samples Available

## Market & Applications

- Industrial Inverters, Motor drives
- High Performance Automotive DC-DC Converters, OBC and Traction Inverter Systems

## Ordering & Package information



- QFN24 4mm x 4mm





# FAN7191MX 600V 门驱动器

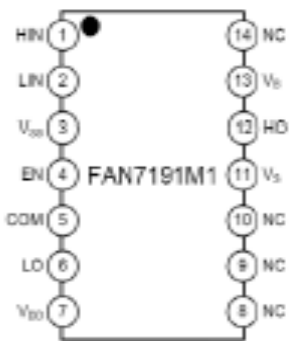
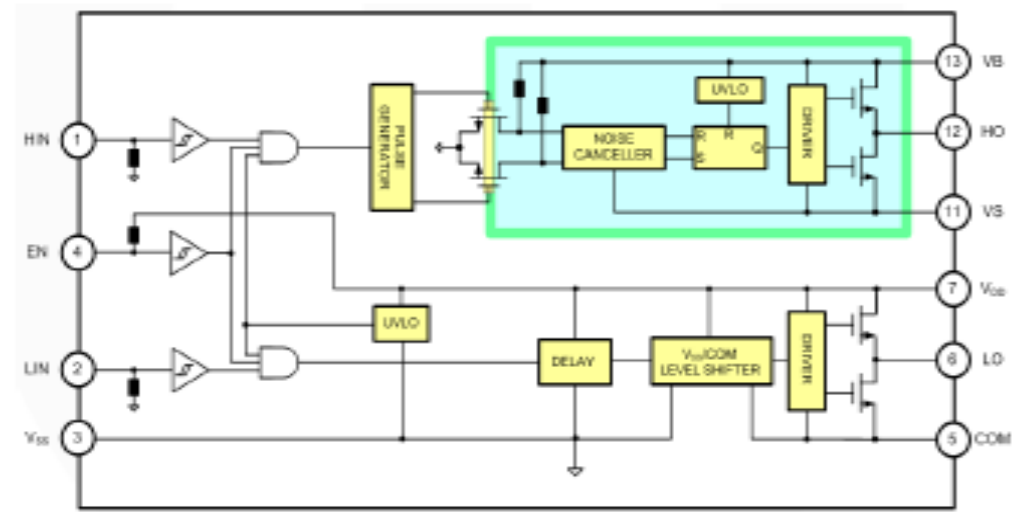
600V bootstrap Automotive Gate Driver

DC-DC converters, auxiliary motors running off HV bus in HEV/EV

Features	FAN7191M1X
Peak Output current	typ. 4.5A
Package	SOIC-14
UVLO	typ 8.3V / 8.8V
Propagation Delay	typ. 140ns
Max dVBS/dt	50V/ns
Vbs Quiescent Current	110uA max

## Main Features:

- Enable pin, for shutdown redundancy / external shutdown control
- Separate power and logic ground for high power applications that require enhanced immunity against high di/dt
- SOIC-14 package for High Voltage applications with higher clearance and creepage distance requirements



# NCV5183 600V/4.3A 门驱动器

The NCV5183 are 600 V high frequency high-side and low-side drivers with very low and matched propagation delays for direct drive of 2 N-channel power MOSFETs in high performance Telecom and Automotive converters.

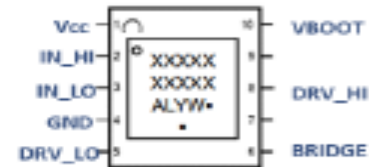
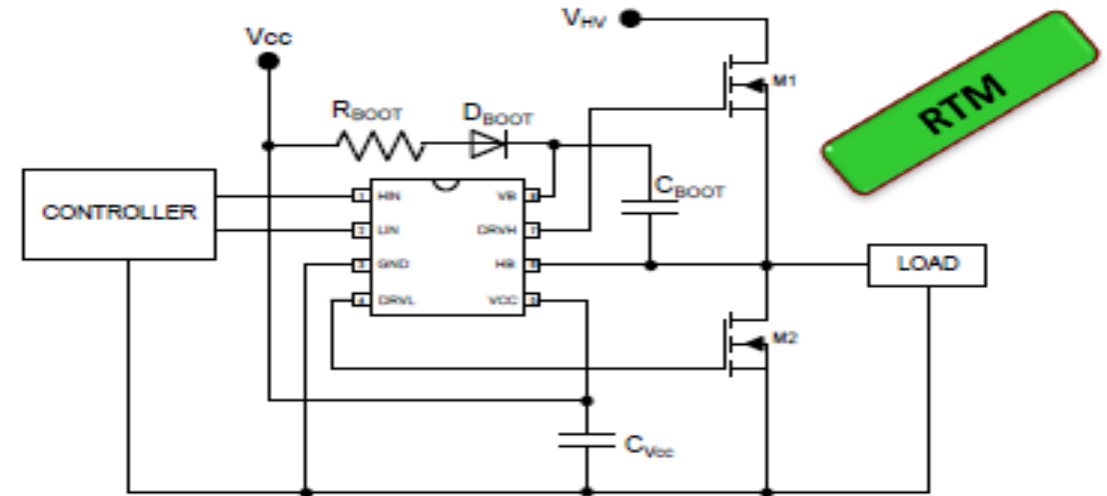
- Pin to pin compatible with industry standards
- Input range: 600 V
- dV/dt Immunity: 50 V/ns & improved robustness
- Drive capability: 4.3 A peak Sink/Source
- Reduced design efforts and rugged design
- Robust design
- Suitable for high power

## Other Features

- 3.3 V and 5 V input logic
- 15 ns Rise & Fall Times
- 90 ns propagation delay
- Max Vcc : 18 V
- Under voltage lockout for both inputs
- AEC-Q100 qualified (-40° to 125°C)

## Market & Applications

- High performance Automotive DC/DC converters



DFN10 4\*4 option on demand

## Ordering & Package information

- NCV5183DR2G: SOIC-8

# 更多产品信息

有关安森美半导体汽车方案的更多信息，请访问网站：[www.onsemi.cn](http://www.onsemi.cn)  
首页 > 应用 > 汽车应用

详细信息请联系  
安森美半导授权代理商：

- 新晔电子（深圳）有限公司
- [Sam.Zeng@serialsystem.com](mailto:Sam.Zeng@serialsystem.com)

The screenshot shows the ON Semiconductor website's Automotive section. The header includes the ON Semiconductor logo and navigation links for Product, SensL, Application, Design Support, About, and MyON. The main content area is titled '汽车应用' (Automotive) and features a grid of product categories such as '有源天线', '引擎管理系统(汽油)', and '驾驶员保护系统'. Below this, there are sections for '技术文档及设计资源' (Technical Documents and Design Resources) and '工具' (Tools), including 'POWER SUPPLY WebDesigner™'.



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# 安森美半导体先进的驾驶员辅助系统解决方案

2018年6月

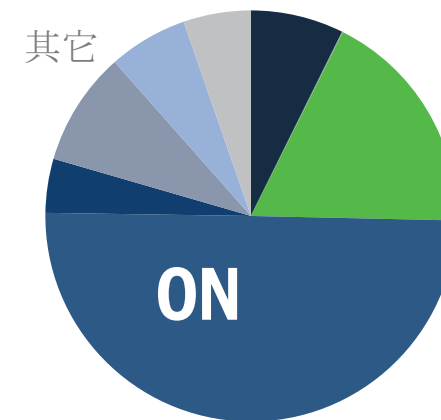
安森美半导体  
ON Semiconductor®



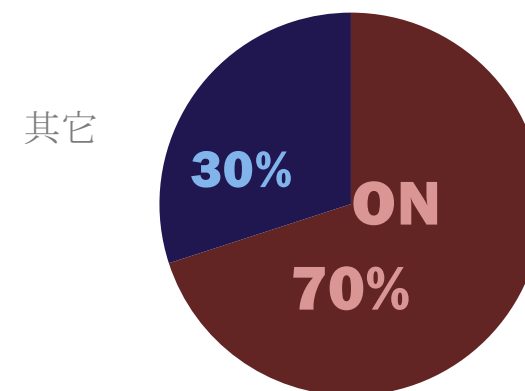
# 安森美半导体在汽车图像传感器的地位

- 全球汽车市场图像传感器的领袖
  - 占有所有汽车传感器第一位，份额50%
  - 先进驾驶辅助系统(ADAS)市场第一位，份额70%
- 2004年推出世界首款汽车CMOS图像传感器
- 推出世界首款汽车功能安全完整性等级(ASIL)图像传感器
- 同类最佳的全局快门，可以用于
  - 车舱内乘客监控
  - 疲劳驾驶监测
- 注于汽车品质标准
  - AECQ100 质量认证
  - 个位数PPM质量保证
- 自2004年起已出货超过3亿件

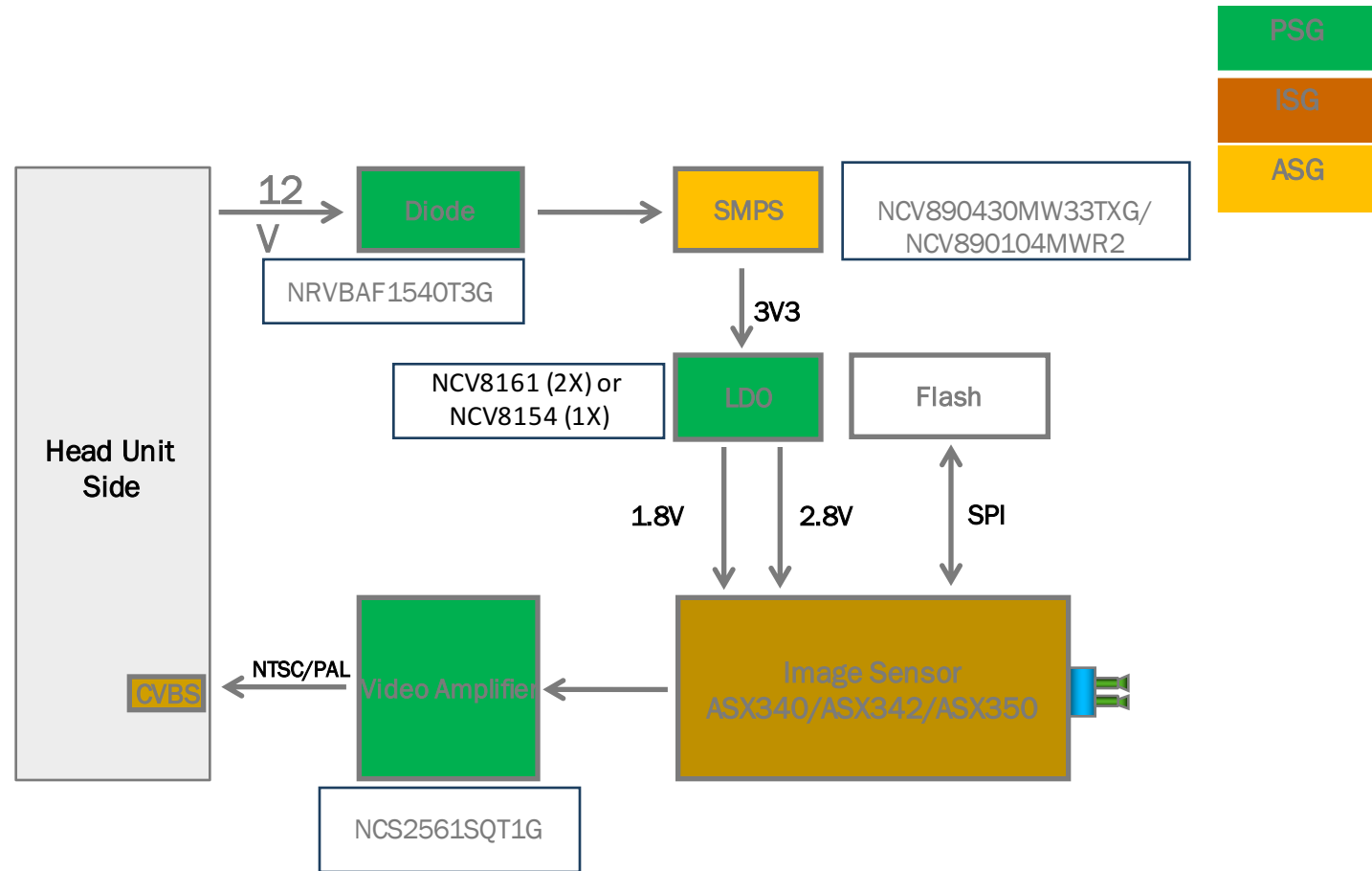
汽车 CMOS 传感器市场份额



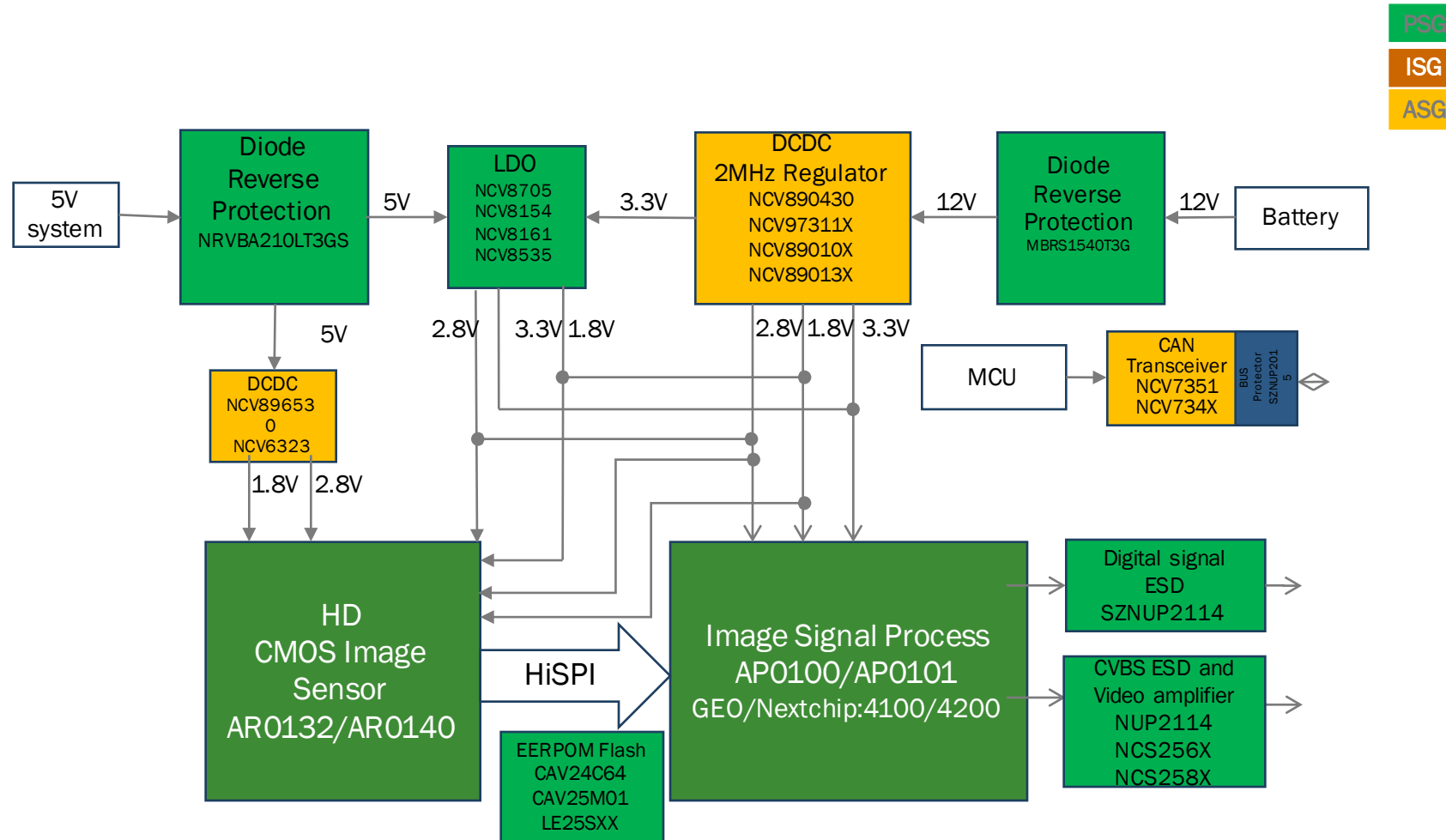
ADAS 图像传感器市场份额



# 安森美半导体系统方案：VGA摄像机模块方案



# 安森美半导体系统方案：汽车高清摄像机方案



# 倒车视觉摄像机



## 模拟

ASX340AT /342AT/ 350AT

ASX344AT

AP0100AT+AR0140AT

## RGB888

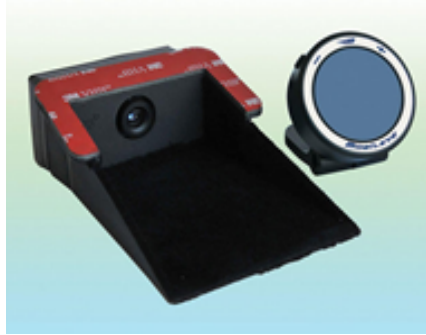
AR0140AT+AP0102AT

## 高清数字

LVDS:AR0140AT/AR0143AT  
+AP0101AT/102AT



# 前视摄像机



## ADAS

VGA: MT9V024

720P: AR0132AT/AR0138AT/AR0220AT

1080P: AR0231AT

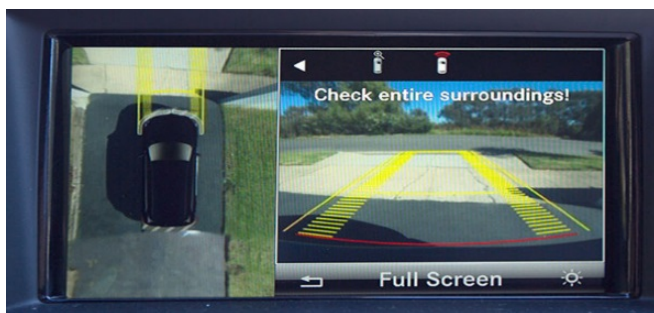
## CAR DVR

2M 1080P AR0230AT/AR0237AT

3M 1080P AR0331



# 全景泊车影像方案



## 模拟

ASX340AT /MT9V127

AR0140AT/AR0132AT/AR0143AT+AP0100AT

## 高清数字

LVDS:AR0140AT/AR0132AT/AR0143AT+AP0101AT

Ethernet:AR0140AT/AR0132AT/AR0143AT+AP0201AT

# eMirror (电子镜) 解决方案 - 后视镜代替

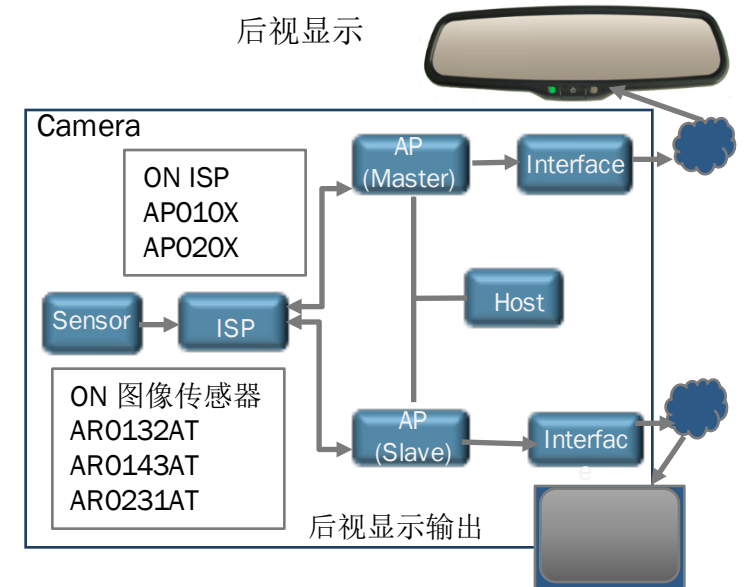
- 提供宽视野，消除盲区和人员车内物阻挡
- 提供完整统一的视图，不需要人工调整高度
- 降低制造成本

## 安森美半导体图像传感器提供

- 卓越的低照性能
- 宽动态HDR (140dB)
- 降低LED闪频效应



电子



# ADAS解决方案 - 行人, 车辆, 道路线检测

- 道路偏移检测, 行人及车辆检测
- 对各种前方危险给出警告
- 主动避免交通事故

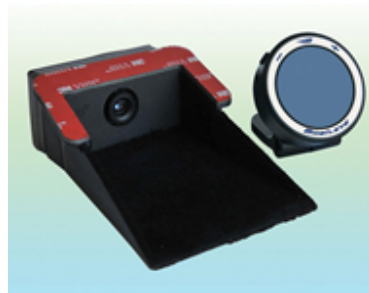
安森美半导体图像传感器

720P: AR0132AT/AR0138AT/AR0143AT

1080P: AR0231AT/AR0220AT

安森美半导体图像传感器提供

- 卓越的低照性能
- 高传输帧率 (>69FPS)
- 宽动态HDR(>120dB)
- 功能安全 (ASIL B)
- 降低LED闪频效应



# In Cabin (车舱内) 解决方案 - 疲劳驾驶监控

- 通过图像识别分析方法，时时分析驾驶员精神状态
- 对各种危险驾驶行为以及疲劳驾驶给出警告
- 减少由于疲劳驾驶导致的交通事故

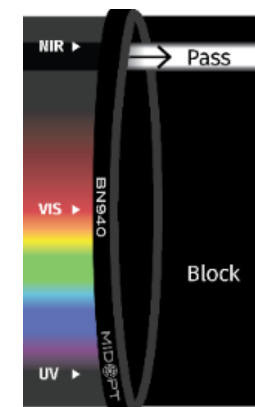
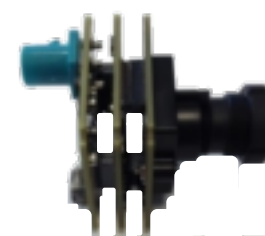
安森美半导体图像传感器提供

- 同类最佳的全局快门捕捉运动姿态
- 与脉冲光同步
- 小尺寸, 使摄像头更小, 容易安装



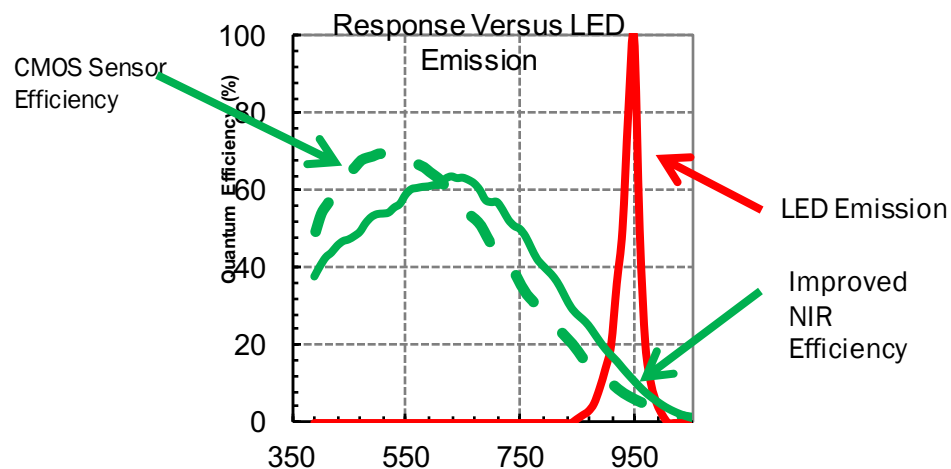
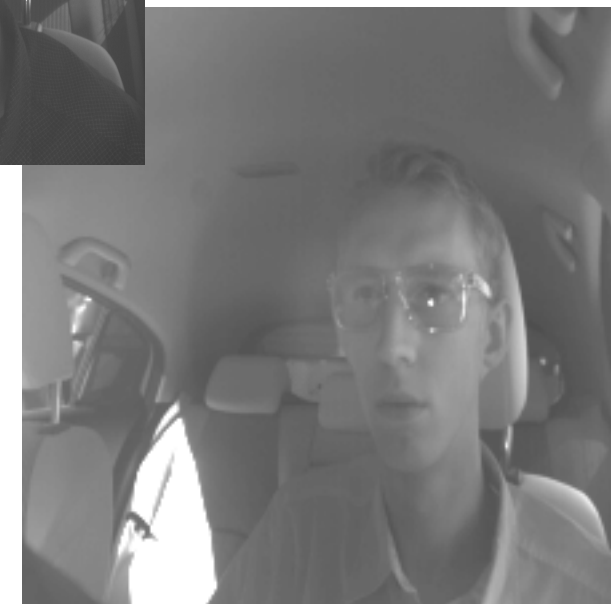
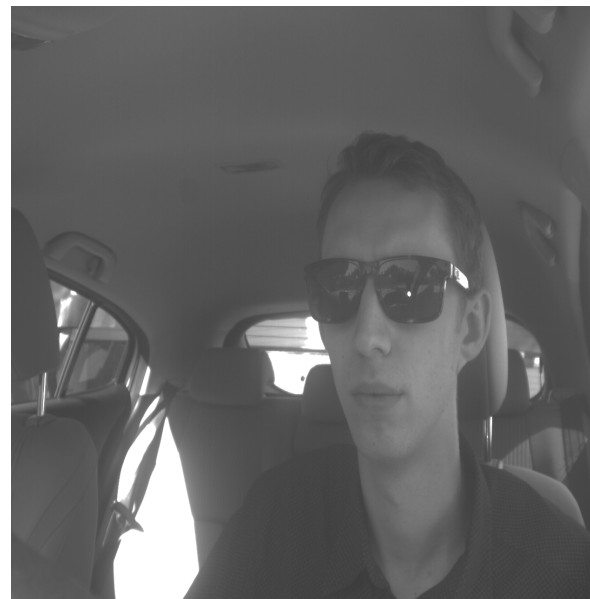
安森美半导体  
图像传感器  
AR0135AT  
AR0144AT

IR LED (940nm)



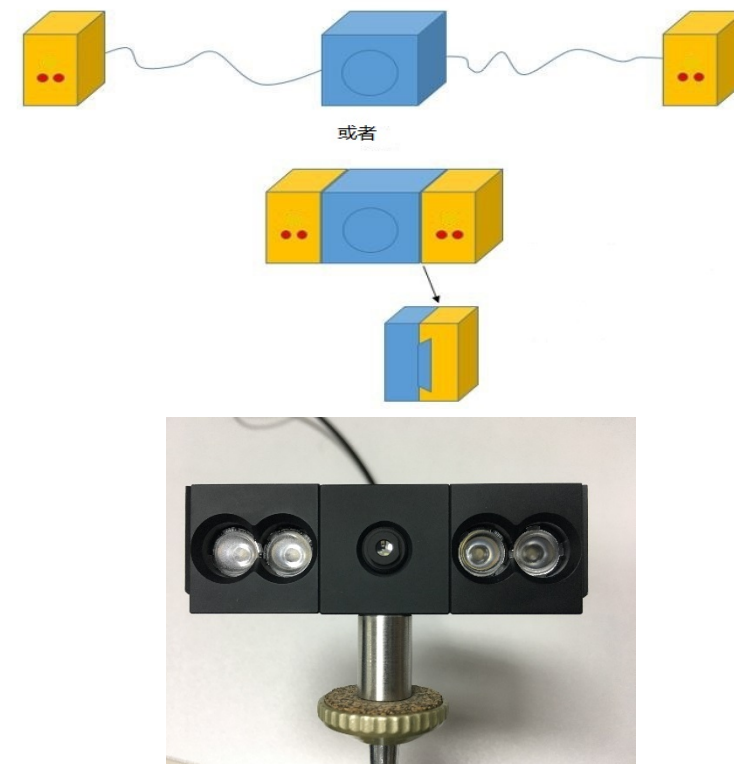
# 业界领先的驾驶员监控方案提供者

- 最佳的红外灵敏度：  
清晰地看到驾驶员的眼睛
- 最佳的全局快门能效：  
在明亮的环境条件下控制图像
- 完整的产品线：**VGA - 2MP +**
- 强大的软件合作伙伴关系：  
使用安森美半导体**GS AIS**产品调整应用



# 安森美半导体车舱内摄像机模块 - GazeT

- 选用具有性能最好的全局快门特性图像传感器 AR0144AT
- 设计中采用了940nm红外，没有采用850nm，这是避免850nm有过多的主动发光设备的干扰
- 摄像头在光暗(AR0144AT最佳红外特性)和光亮(AR0144最佳全局快门特性)时都能够准确及时捕捉到驾驶人员的脸部状况。
- 目前此系统已通过IEC-62471认证为豁免级别。



# 功能性安全：超越ISO26262

- 符合汽车安全完整性等级 (ASIL) 的“尖端的”图像传感器
- ISO 26262工作组 (TC22/SC32/WG8) 的成员
- 半导体子工作组的成员
- 基本故障率子工作组的协同领导者



## 产品

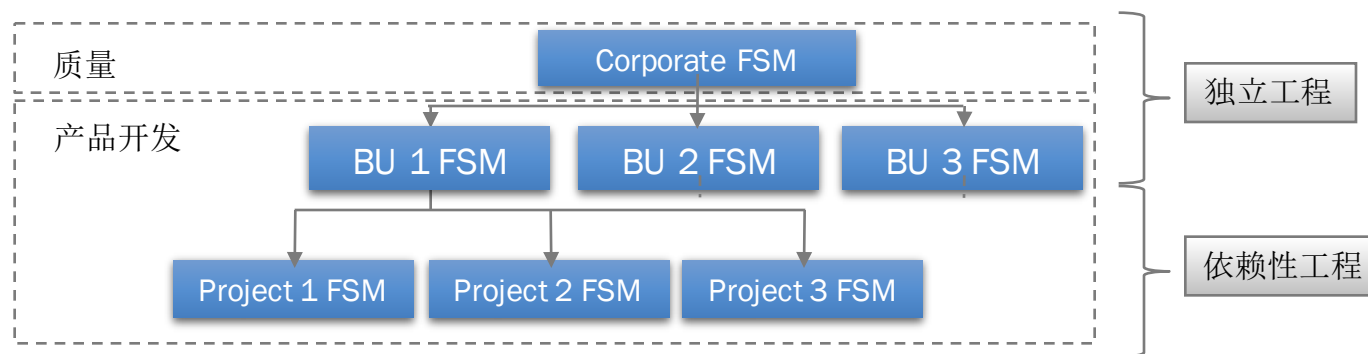
### IP知识产权

- 最大阵容的功能性安全专利(27 FuSa用于图像传感器)
- 全球和北亚

### 双功能性安全小组

- 企业等级(达ASILD)
- 图像传感器部等级

- 第4类安全产品
- 符合SEOOOC的全安全封装
- 21名经培训的/认证的FuSa员工





# 总结

- 图像传感器是ADAS及自动驾驶的核心
- 自动驾驶需要图像传感器有出色的微光特性，高动态范围，消除LED闪烁，支持汽车功能安全、背照式、全局快门等特性
- 安森美半导体是汽车摄像机传感器的全球市场领袖，第一大汽车视觉及ADAS半导体厂商
- 安森美半导体可提供全面的摄像机模块方案，包括电源、模拟和传感器，传感器阵容包括原始传感器、图像，信号处理器 (ISP) 和系统级单芯片 (SOC)
- 为快速原型开发提供MARS™，提供支持CVBS、LVDS 和以太网的摄像机完整方案
- 为安全而设计的图像传感器可以满足尽量减少检测时间，避免潜在危险事件的要求

# 更多产品信息

有关安森美半导体图像传感器的更多信息，请访问网站：

[www.onsemi.cn](http://www.onsemi.cn)

详细信息请联系安森美半导体授权代理商：

-新晔电子（深圳）有限公司

-[Andy.Zhou@serialsystem.com](mailto:Andy.Zhou@serialsystem.com)

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