Automotive Solutions (MMS, AMS and IPG perimiter)

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August 27, 2013

Content

- Power Transistors
- IGBT for Electronic Ignition
- Diodes
- Protections
- IPAD

- High Voltage Converters
- DC-DC Converter
- Linear Regulators
- Voltage Reference
- Gate Driver
- LED Driver

- Amplifiers & Comparators
- Current Sensing
- MEMS

- 8 bit Microcontroller
- Serial EEPROM

Power Transistors for Automotive Applications

Low Voltage (LV) Power MOSFETs

- planar N-channel
- trench N-channel
- trench P-channel

SAFeFETs

Medium Voltage (MV) Power MOSFETs

- planar
- super-junction

High Voltage (HV) Power MOSFETs

- planar
- super-junction

IGBTs

- planar (PT)
- trench gate field stop (FS)

All parts are enhancement mode

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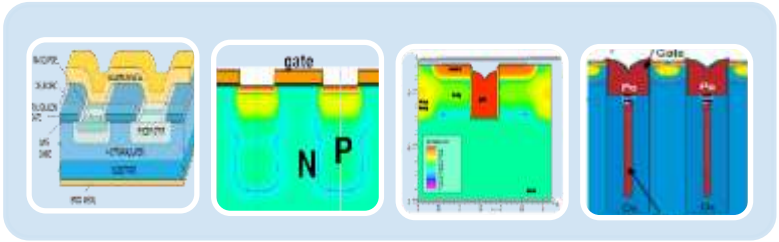
MOSFET Technology Overview

BV_{DSS}=40÷150V



Planar STripFET II	Planar STripFET III	Trench STripFET VI DeepGATE	Trench STripFET VII DeepGATE
AG qualified	AG qualified	AG qualified	AG qualification ongoing
High ruggedness in linear mode operation	Better R_{DS} x Silicon Area than past gen	Better R_{DS} x Silicon Area than past gen	Ideal for synchronous rectification
		Lowest R_{DS} x Area	Lowest R_{DS} x Area
			Better performance of intrinsic diode
			Crss/Ciss ratio optimized for motor control

Technology features

STripFET VII DeepGATE

Segment	Benefit	Key Features
SMPS	Industry 's lowest R_{DS}(on)	Low conduction losses
Telecom	High avalanche capability	Small form factor of final system
Solar	Reduces losses in Telecom Power Supplies, Notebook adapters, LCDs, Solar inverters	Robust design
Automotive		40-150 V breakdown voltage

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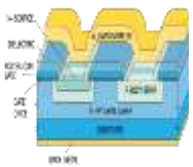
Automotive LV MOSFET Technologies

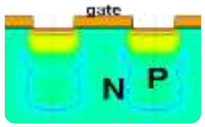


Planar

STripFET II
Planar Technology

20V — 300V

AG Mature Technology
6” fab CT and Singapore

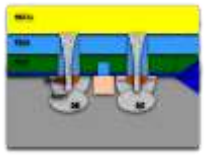


Planar

STripFET III
Planar Technology

30V — 75V

AG Mature Technology
6” Singapore and 8” fab CT

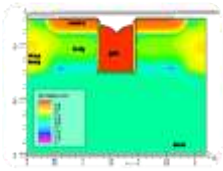


Planar

STripFET V
Planar Technology

30V — 40V

AG Qualified
8” fab CT

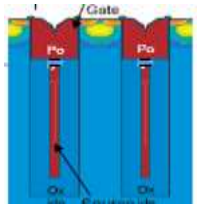


Vertical

STripFET VI DeepGATE
(Trench)

30V — 40V

AG Qualified
8” fab CT and 8” fab Grace



Vertical

STripFET VII DeepGATE
(Trench)

40V — 150V

AG on going
8” fab CT and 8” fab Grace

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Automotive HV MOSFET Technologies

SuperMESH “NK series” (400 ÷ 1500)V

- Standard technology
- Improved Rds(on) * Area vs previous generation

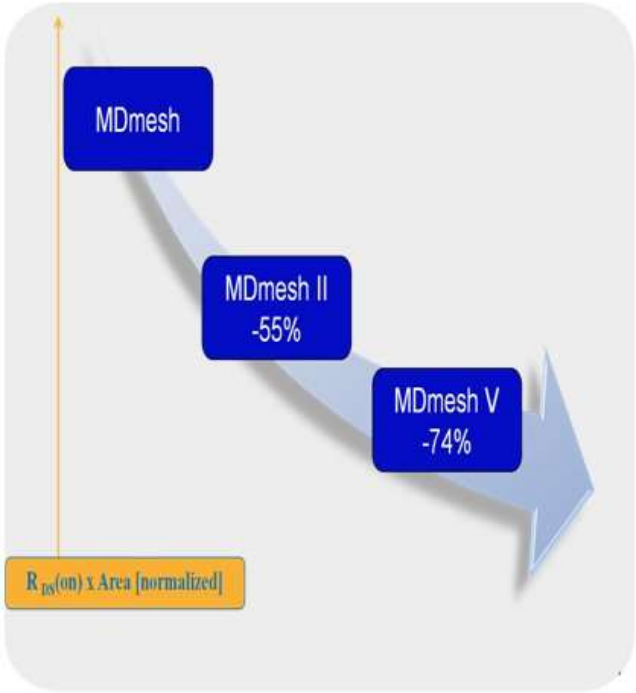
MDmesh II / FDmesh II “NM..N & NM..ND” series (600 ÷ 650)V

- SuperJunction structure
- Improved Rds(on) * Area vs std junction generation
- Fast Diodes version (Fdmesh)

MDmesh V “ N..M5” series (600 ÷ 650)V

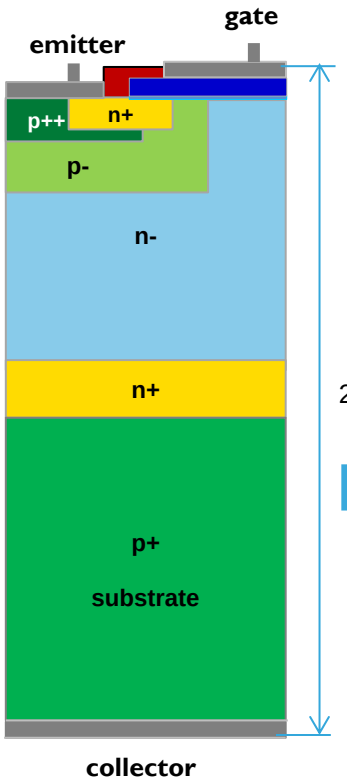
- Improved SuperJunction structure
- Improved Rds(on) * Area vs previous generation II
- Optimized RDS(on)*Qg
- Higher VDSS rating

Superjunction Performance Evolution



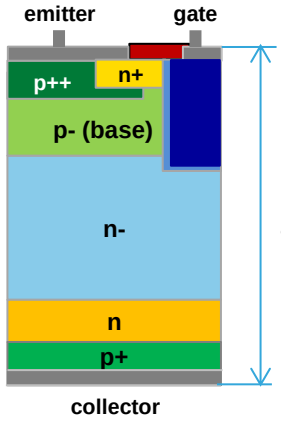
IGBTs : Technology Milestones and Features

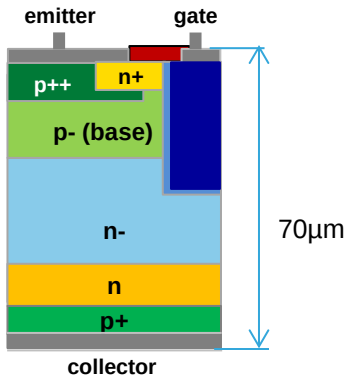
Planar PT



H

V





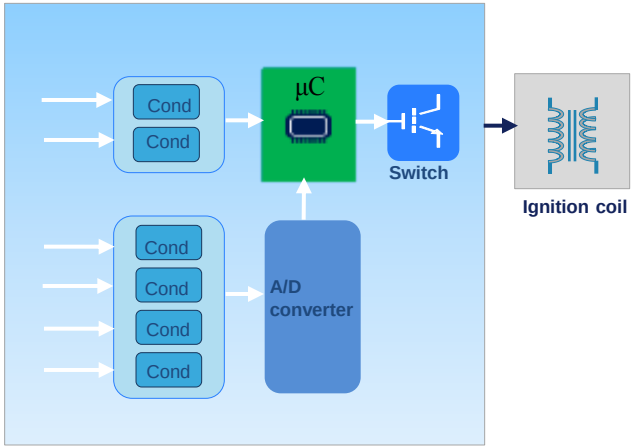
STG100M65F2	650 V	200 A	M (up to 20 kHz)	HEV, Drives	available	Sept. 2013

Technology Milestones moving from “ H ” to “ V ”

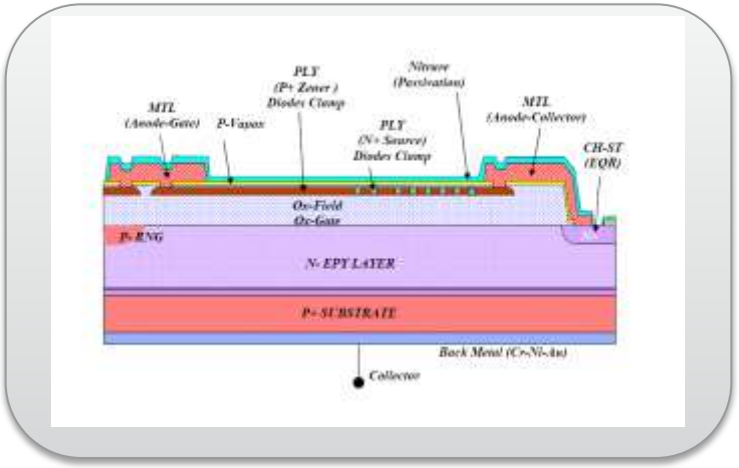
- Increased Trench Gate deep
- P-N-P BJT optimization to improve the switching-off performance
- Thinner die thickness moving from “ H ” to “ V ” series

Planar Punch-Through (PT) IGBTs for Automotive Electronic Ignition

Electronic Ignition



Advanced PowerMESH™



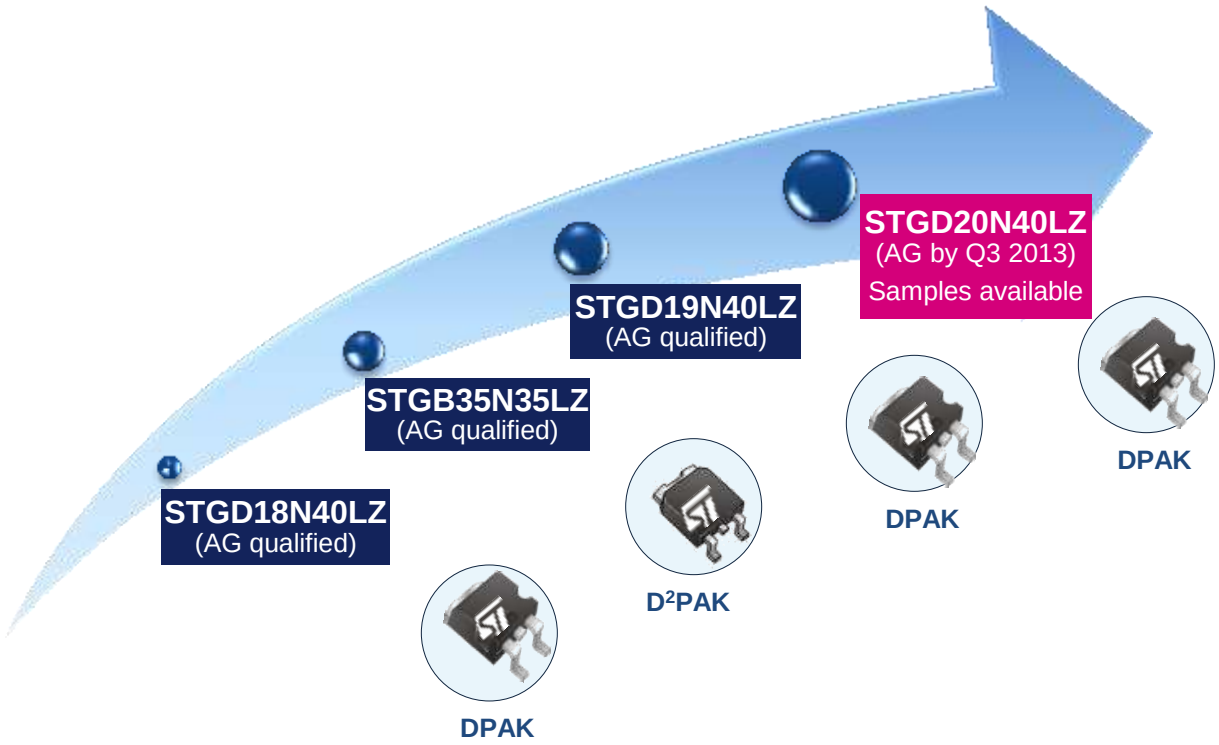
The switch…

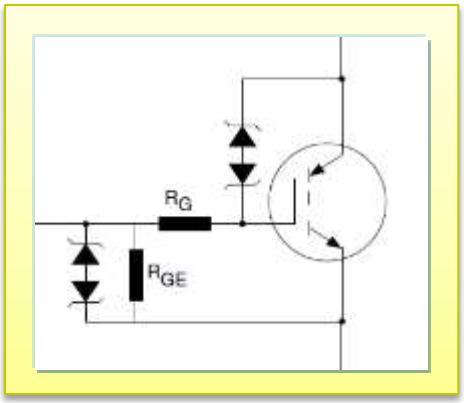
- operates at low frequencies
- must have very low Vce(sat)
- must have high ruggedness

Advantages

- Heavy minority carrier injection freq in the range of 100Hz
- Drift region and buffer layer region optimization
- Best Vce(sat) / ruggedness trade-off

IGBTs for Electronic Ignition





- ESD gate-emitter protection
- Gate-collector high voltage clamping
- Intrinsic gate resistors

Monolithic Circuitry Integration

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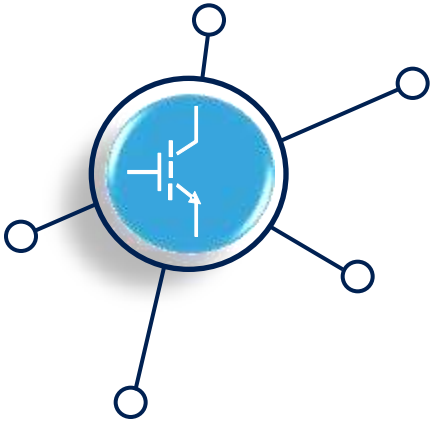
The new STGD20N40LZ



- Logic level gate drive
- Low saturation voltage
- High pulsed current capability
- High voltage capability
- Jump start capability and switching times aligned to the competition

Main Features

- 400V clamping voltage
- 175˚C max operating TJ
- 100Ω monolithic resistor in series to the gate
- 16KΩ monolithic gate-emitter resistor
- 180mJ avalanche energy
  @ L = 3 mH, TC = 150˚C
- ± 8KV ESD Human Body Model protection

Main Parameters

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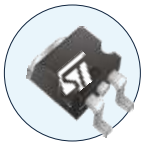
IGBTs for Piezoelectric Direct Injection

STGD10HF60KD
(AG by Q3 2013)
Samples available

STGD8HF60KD
(AG qualified)

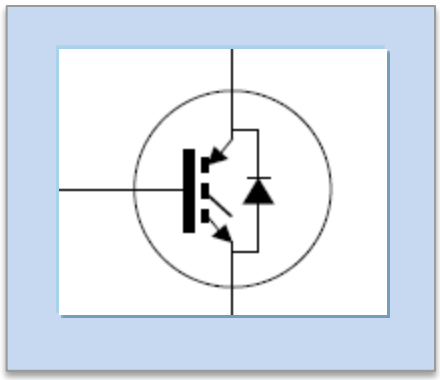
STGB14NC60KD
(AG qualified)



DPAK

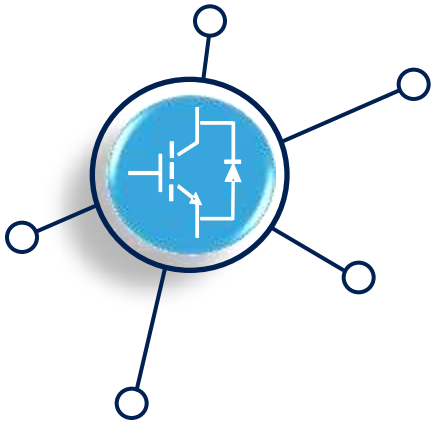
DPAK

D²PAK



Co packaged IGBT and freewheeling diode

The new STGD10HF60KD



- Low on-voltage drop
- No cross conduction susceptibility
- Short-circuit rated
- Very soft ultra fast recovery anti-parallel diode

Main Features

- 400V clamping voltage
- 175˚C max operating TJ
- 100Ω monolithic resistor in series to the gate
- 16KΩ monolithic gate-emitter resistor
- 180mJ avalanche energy
  @ L = 3 mH, TC = 150˚C
- ± 8KV ESD Human Body Model protection

Main Parameters

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Power MOSFET Automotive Products

Part number	V_{DSS} [V]	$R_{DS(on)}$ [mΩ]	I_D [A]	Tj max [°C]	Package
STD15P6F6[1]	-60	150.0	15	175	DPAK
STD44P4LLF6[1]	-40	17.0	44	175	DPAK
STD2 P3H6[1]	-30	50.0	20	175	DPAK
STD37P3H6[1]	-30	22.0	37	175	DPAK
STV300NH02L	24	1.5	200	175	PowerSO-10
STH300NH02L-6	24	1.5	180	175	H²PAK-6
STB155N3H6	30.0	3	80	175	D²PAK
STD155N3H6	30.0	3	80	175	DPAK
STB155N3LH6	30	3.0	80	175	D²PAK
STB100NF03L-03-1	30	3.2	100	175	I²PAK
STB100NF03L-03T4	30	3.2	100	175	D²PAK
* STD96N3LLH6	30	4.2	80	175	DPAK
STD86N3LH5	30	5.0	80	175	DPAK
STD100N3LF3	30	5.5	80	175	DPAK
* STL66N3LLH5	30	5.8	80	175	PowerFLAT 5x6
* STL66DN3LLH5	30	6.5	78	175	PowerFLAT 5x6 dual
STI55NF03L	30	13.0	55	175	I²PAK
STD35N3LH5	30	16.0	35	175	DPAK
STD30NF03LT4	30	25.0	30	175	DPAK
STD18NF03L	30	50.0	17	175	DPAK
STH360N4F6-6	40	1.3	360	175	H²PAK-6
STI360N4F6	40	1.8	360	175	I²PAK
*STL10N3LLH5	30	22.0	9	150	PowerFLAT 3.3x3.3
STP70NS04ZC	33 (clamped)	11.0	80	175	TO-220
STD70NS04ZL	33 (clamped)	10.5	70	175	DPAK
STP90NS04ZC[1]	33 (clamped)	6.0	80	175	TO-220
STI400N4F6	40	1.7	400	175	I²PAK

[1] qualification on going

* Rdson max @ 4.5V

Power MOSFET Automotive Products

Part number	V_{DSS} [V]	$R_{DS(on)}$ [mΩ]	I_D [A]	Tj max [°C]	Package
STH400N4F6-6	40	1.2	400	175	H²PAK-6
STH410N4F7-6[1]	40	1.1	410	175	H²PAK-6
STV270N4F3	40	1.5	270	175	PowerSO-10
STH270N4F3-6	40	1.7	180	175	H²PAK
STB270N4F3	40	2.0	160	175	D²PAK
STI270N4F3	40	2.6	120	175	I²PAK
STP200N4F3	40	3.5	120	175	TO-220
STB120N4F6	40	4.0	80	175	D²PAK
STB120N4LF6	40	4.0	80	175	D²PAK
STP120N4F6	40	4.0	80	175	TO-220
STD120N4F6	40	4.0	80	175	DPAK
STD120N4LF6	40	4.0	80	175	DPAK
STB170NF04	40	5.0	80	175	DPAK
STD95N4F3	40	5.8	80	175	DPAK
STD95N4LF3	40	6.0	80	175	DPAK
STP95N4F3	40	6.2	80	175	TO-220
STP150NF04	40	7.0	150	175	TO-220
STD64N4F6[1]	40	8.0	64	175	DPAK
STD55N4F5	40	8.5	55	175	DPAK
STL15DN4F5	40	9.0	15	175	PowerFLAT 5x6 dual
STD44N4LF6	40	12.5	44	175	DPAK
STH320N4F6-6	40	1.3	180	175	H²PAK-6
STI300N4F6	40	2.2	160	175	I²PAK
STD80N4F6	40	6.0	80	175	DPAK
STP190N55LF3	55	3.7	120	175	TO-220
STP185N55F3	55	3.8	120	175	TO-220
STB150NF55T4	55	6.0	120	175	D²PAK

[1] qualification on going

Power MOSFET Automotive Products

Part number	V_{DSS} [V]	$R_{DS(on)}$ [mΩ]	I_D [A]	Tj max [°C]	Package
STP150NF55	55	6.0	150	175	TO-220
STB80NF55-06-1	55	6.5	80	175	I²PAK
STB80NF55-06T	55	6.5	80	175	D²PAK
STB85NF55T4	55	8.0	80	175	D²PAK
STP141NF55	55	8.0	80	175	TO-220
STP85NF55	55	8.0	80	175	TO-220
STP85NF55L	55	8.0	80	175	TO-220
STD65N55F3	55	8.5	80	175	DPAK
STD65N55LF3	55	8.5	80	175	DPAK
STD60NF55LAT4	55	15.0	60	175	DPAK
STD80N6F6	60	6.5	80	175	DPAK
STB60NF06T4	60	16.0	60	175	D²PAK
STD35NF06LT4	60	17.0	35	175	DPAK
STB45NF06T4	60	28.0	38	175	D²PAK
STD30NF06T4	60	28.0	28	175	DPAK
STD30NF06LT4	60	28.0	28	175	DPAK
STF40NF06	60	28.0	23	175	TO-220FP
STL8DN6LF3	60	30.0	20	175	PowerFLAT 5x6 dual
STD20NF06LT4	60	40.0	24	175	DPAK
STD20NF06T4	60	40.0	24	175	DPAK
STP36NF06L	60	40.0	30	175	TO-220
STL7DN6LF3	60	43.0	6.5	175	PowerFLAT 5x6 dual
STS5DNF60L	60	45.0	4	150	Dual SO-8
STS5NF60L	60	55.0	5	150	SO-8
STD12NF06LT4	60	100.0	12	175	DPAK
STN4NF06L	60	100.0	4	150	SOT-223
STB76NF75	75	11	80	175	D²PAK

Power MOSFET Automotive Products

Part number	V_{DSS} [V]	$R_{DS(on)}$ [mΩ]	I_D [A]	Tj max [°C]	Package
STB75NF75LT4	75	11.0	80	175	D²PAK
STP76NF75	75	11.0	80	175	TO-220
STD45NF75T4	75	24.0	30	175	DPAK
STH245N75F3-6[1]	75	3.0	240	175	H²PAK-6
STH315N10F7-2[1]	100	2.5	315	175	H²PAK-2
STP315N10F7-2[1]	100	2.7	315	175	TO-220
STD25NF10LA	100	35.0	25	175	DPAK
STL8N10LF3	100	35.0	7.8	175	PowerFlat 5x6
STL8DN10LF3	100	35.0	7.8	175	PowerFLAT 5x6 dual
STD26NF10	100	38.0	25	175	DPAK
STH185N10F3[1]	100	4.5	120	175	H²PAK
STP185N10F3[1]	100	5.1	120	175	TO-220
STB30NF20L	200	75.0	30	175	D²PAK
STL25DN10F7[1]	100	80.0	25	175	Power Flat dual
STB18NF25	250	165.0	17	175	D²PAK
STD8NF25	250	420.0	8	175	DPAK
STW75NF30	300	45.0	60	150	TO-247
STB46NF30	300	75.0	45	150	D²PAK
STD10NF30	300	330.0	10	150	DPAK
STB18NF30[1]	330	180.0	18	150	D²PAK
STB21NK50Z	500	270.0	17	150	D²PAK
STD14NM50N	500	320.0	11	150	DPAK
STD5NM50T4	500	800.0	7.5	175	DPAK
STD9NM50N	500	790.0	5	150	DPAK
STW47NM60ND	600	88.0	35	150	TO-247
STB36NM60N	600	105.0	25	150	D²PAK
STW27NM60N	600	160.0	21	150	TO-247

[1] qualification on going

Power MOSFET Automotive Products

Part number	V_{DSS} [V]	$R_{DS(on)}$ [mΩ]	I_D [A]	Tj max [°C]	Package
STB27NM60ND	600	160.0	21	150	TO-247
STW27NM60ND	600	160.0	21	150	TO-247
STB36NM60ND	600	110.0	29	150	D^2PAK
STW36NM60ND	600	110.0	29	150	TO-247
STWA36NM60ND[1]	600	110.0	29	150	TO-247 Long Leads
STW19NM60N	600	285.0	13	150	TO-247
STB7ANM60N[1]	600	900.0	7	150	D2PAK
STD7ANM60N[1]	600	900.0	7	150	DPAK
STF12NM60ND[1]	600	600.0	12	150	TO-220FP
STW78N65M5	650	32.0	69	150	TO-247
STW62N65M5	650	49.0	46	150	TO-247
STW22N95K5[1]	950	330.0	20	150	TO-247
STD4NK100Z[1]	1000	6800.0	4	150	DPAK

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[1] qualification on going

IGBT Automotive Products

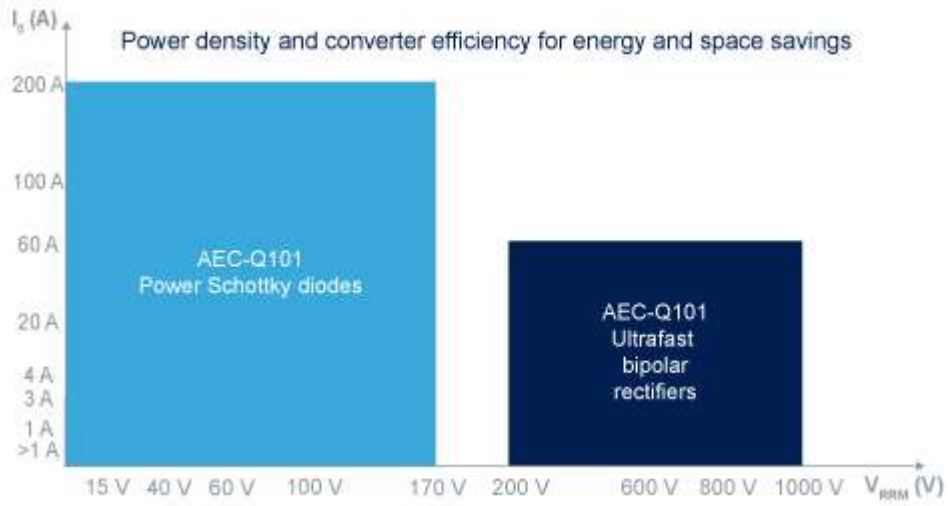
Part number	Description	T_j max [°C]	V_{DSS} [V]	I_D [A]	Package
STGP10NB37LZ	Logic level, fully clamped	175	clamped @ 370	10	TO-220
STGD20N40LZ[1]	Logic level, fully clamped	175	clamped @ 390	20	DPAK
STGB20NB41LZ[1]	Logic level, fully clamped	175	clamped @ 410	20	D^2PAK
STGD3NB60SDT4	Logic level, monolithic free-wheeling diode	175	clamped @600	3	DPAK
STGD10HF60KD[1]	Logic level, fully clamped	175	600	10	DPAK
STGD18N40LZT4	Logic level, fully clamped	175	clamped @ 400	25	DPAK
STGD18N40LZ-1	Logic level, fully clamped	175	clamped @ 400	25	IPAK
STGB18N40LZT4	Logic level, fully clamped	175	clamped @ 400	30	D^2PAK
STGD19N40LZT	Logic level, fully clamped	175	clamped @ 400	25	DPAK
STGB18N40LZ-1	Logic level, fully clamped	175	clamped @ 400	30	I^2PAK
STGP18N40LZ	Logic level, fully clamped	175	clamped @ 400	20	TO-220
STGP35N35LZ	Logic level, fully clamped	175	clamped @ 350	30	TO-220
STG100M65F2[1]	die	175	650 V	200	

[1] qualification on going

Automotive-grade diodes

ST's portfolio of Schottky diodes is qualified to the AEC-Q101 standard and is intended for DC-DC converters used in numerous automotive functions. These dedicated products are guaranteed in operation at junction temperatures as low as -40 °C and as high as +150 °C. The extension Y is used in the part number to identify the automotive version for a given rectifier.

A special screening matrix is implemented on these automotive-grade products at die and finished product levels, in order to comply with the most stringent international automotive quality requirements.



Diode portfolio

Signal Schottky
Power Schottky
Schottky barrier

STPSxx

600V / 650V
200V
170V
150V
120V
100V
80V
60V
40/45V
30V
15V

15mA
2x120A

From wall adapters 1A to solar farms 200A

FER diodes technologie

Avalanche-rated up to 170V

From 200 V to 1200 V
From 1 A to 200 A
Bipolar rectifiers

STTHxx

High-performance
L series
« blank » series
R series
Low Q_{RR}
Low V_F
S series
Mainstream

Complete current / voltage range
Wide range of trade-offs
From mainstream to high-performance devices

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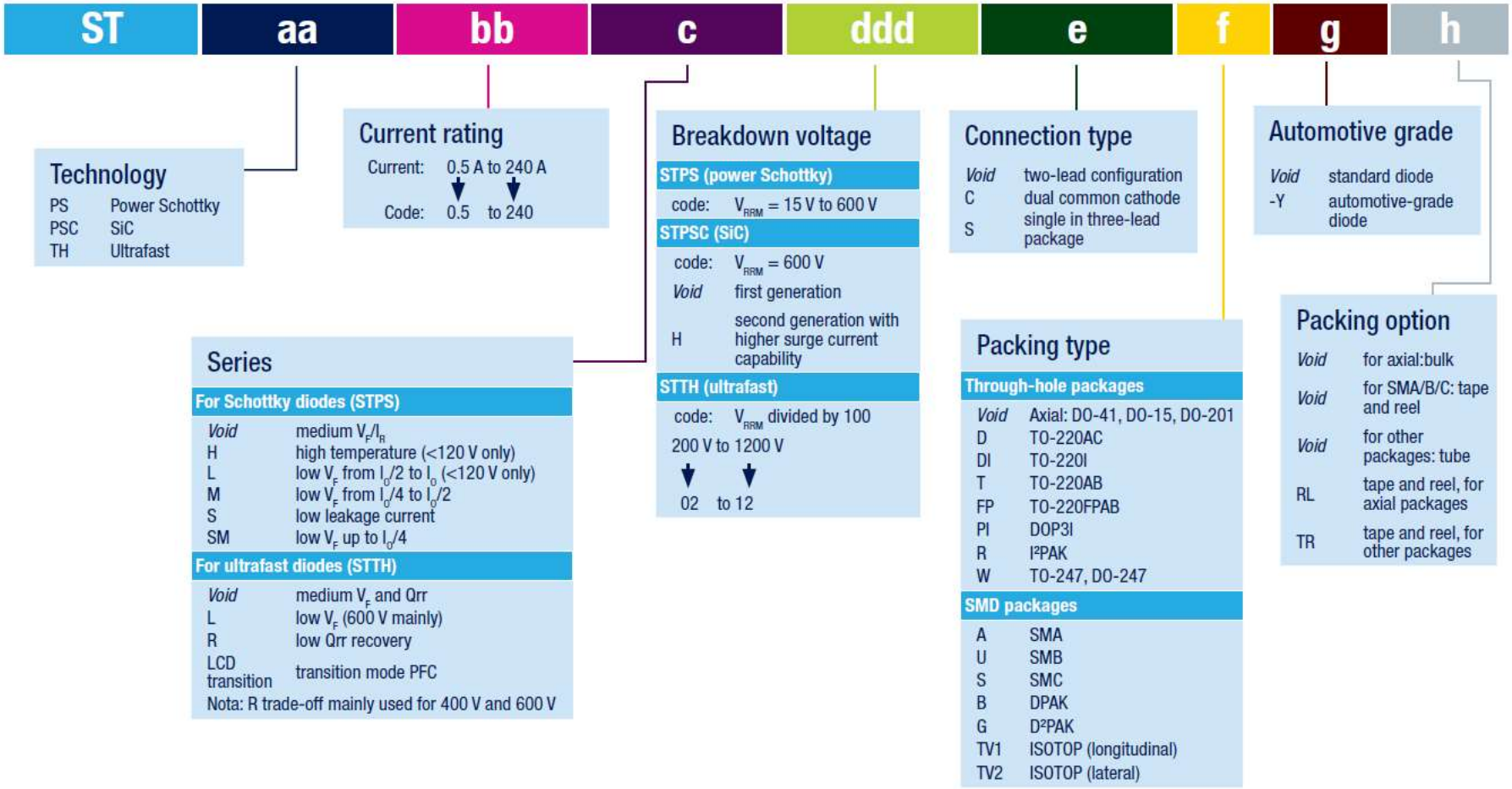
Diode part numbering



Automotive – Safety & chassis

ABS/ESP

Free Wheeling diodes

- STPS1045BY-TR
- STPS1545CGY-TR
- STPS2045CGY-TR
- STPS2545CGY-TR
- STPS3045CGY-TR
- STPS40L45CGY-TR

Passive Safety

Free Wheeling diodes

- STPS1045BY-TR
- STPS1545CGY-TR
- STPS2045CGY-TR
- STPS2545CGY-TR
- STPS3045CGY-TR
- STPS40L45CGY-TR

Reverse Polarity protection

- STPS1L40AY
- STPS140AY

Electric Park Braking

Free Wheeling diodes

- STPS1045BY-TR
- STPS1545CGY-TR
- STPS2045CGY-TR
- STPS2545CGY-TR
- STPS3045CGY-TR
- STPS40L45CGY-TR

Electrical Power Steering

Free Wheeling diodes

- STPS140UY
- STPS1L40UY
- STPS1L40AY
- STPS1045BY-TR
- STPS1545CGY-TR
- STPS2045CGY-TR
- STPS2545CGY-TR
- STPS3045CGY-TR
- STPS40L45CGY-TR
- STPS2L60AY
- STPS3150AY
- STPS1150UY

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AEC-Q101 QUALIFIED

Note: Part numbers listed here are examples. This is not an exhaustive list,

Automotive – Body & Convenience

Car Alarm

Free Wheeling diodes

- STPS1045BY-TR
- STPS1545CGY-TR
- STPS2045CGY-TR
- STPS2545CGY-TR
- STPS3045CGY-TR
- STPS40L45CGY-TR

HID lighting

Output rectification diodes

- STTH5R06BY-TR
- STTH5R06GY-TR
- STTH806GY-TR
- STTH8R06GY-TR
- STTH30L06WY

Windscreen Wiper

Free Wheeling diodes

- STPS1045BY-TR
- STPS1545CGY-TR
- STPS2045CGY-TR
- STPS2545CGY-TR
- STPS3045CGY-TR
- STPS40L45CGY-TR

Car Audio System

Multi phase Boost converter

- STPS30H60CKY-TR
- STPS60L30CKY-TR

Reverse Polarity protection

- STPS1L40AY
- STPS140AY
- STPS1045BY-TR
- STPS1545CGY-TR
- STPS2045CGY-TR
- STPS2545CGY-TR
- STPS3045CGY-TR
- STPS40L45CGY-TR

LED lighting

Output rectification diodes

- STPS5H100BY-TR
- STPS15H100CBY-TR
- STTH2R02UY
- STTH802BY-TR

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AEC-Q101 QUALIFIED

Note: Part numbers listed here are examples. This is not an exhaustive list,

Automotive – Powertrain and transmission – HEV

www.emcu.it

Bidirectional auxiliary power converter

Output rectification diodes

- STTH5R06BY-TR
- STTH5R06GY-TR
- STTH806GY-TR
- STTH8R06GY-TR
- STTH30L06WY
- STTH30ST06WY
- STTH30ST06GY-TR

AC-DC battery charger

Free Wheeling diodes

- STPS40170CGY-TR

Output rectification diodes

- STTH810GY-TR
- STTH1210Y-TR
- STTH3010GY-TR
- STTH3010WY-TR
- STTH6010WY

Electrical pumps

Free Wheeling diodes

- STPS140UY
- STPS1L40UY
- STPS1L40AY
- STPS1045BY-TR
- STPS1545CGY-TR
- STPS2045CGY-TR
- STPS2545CGY-TR
- STPS3045CGY-TR
- STPS40L45CGY-TR
- STPS2L60AY
- STPS3150AY
- STPS1150UY

Output rectification diodes

- STTH5R06BY-TR
- STTH5R06GY-TR
- STTH806GY-TR
- STTH8R06GY-TR
- STTH30L06WY
- STTH30ST06WY
- STTH30ST06GY-TR

Main inverter

Free Wheeling diodes

- *JTTH200EV650Y-TR (KGD1)
- *JTTH7512Y-TR (KGD1

[1]KGD: **K**nown **G**ood **D**ies

*In dev.

DC-DC Converters

Output rectification diodes

- STPS2H100UY
- STPS5H100BY-TR
- STPS15H100CBY-TR
- STPS340UY
- STPS1045BY-TR
- STPS1545CGY-TR
- STTH5R06BY-TR

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AEC-Q101 QUALIFIED

Note: Part numbers listed here are examples. This is not an exhaustive list,

Automotive – Powertrain and transmission – ICE[1]

Engine Management

Output rectification diodes

- STPS1045BY-TR
- STPS1545CGY-TR
- STPS2L60UY
- STPS1L40UY
- STPS15H100CBY-TR
- STPS2H100UY
- STPS5H100BY-TR
- STPS8H100GY-TR
- STPS2H100AY
- STPS5H100BY
- STPS1150AY
- STPS3150UY
- STTH102AY
- STTH2R02UY

Free Wheeling diodes

- STPS40170CGY-TR

ICE* - Start-stop system

Output rectification diodes

- STPS140UY
- STPS1L40UY
- STPS2L60UY
- STPS2H100UY
- STPS 3150UY
- STTH5R06BY-TR
- STTH5R06GY-TR
- STTH806GY-TR
- STTH8R06GY-TR
- STTH30L06WY
- STTH30ST06WY
- STTH30ST06GY-TR

Free Wheeling diodes

- STPS40170CGY-TR

Charging and power management

Output rectification diodes

- STPS2H100AY
- STPS3150AY
- STPS5H100Y

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AEC-Q101 QUALIFIED

[1]ICE: Internal Combustion engine

Note: Part numbers listed here are examples. This is not an exhaustive list,

Automotive protection devices

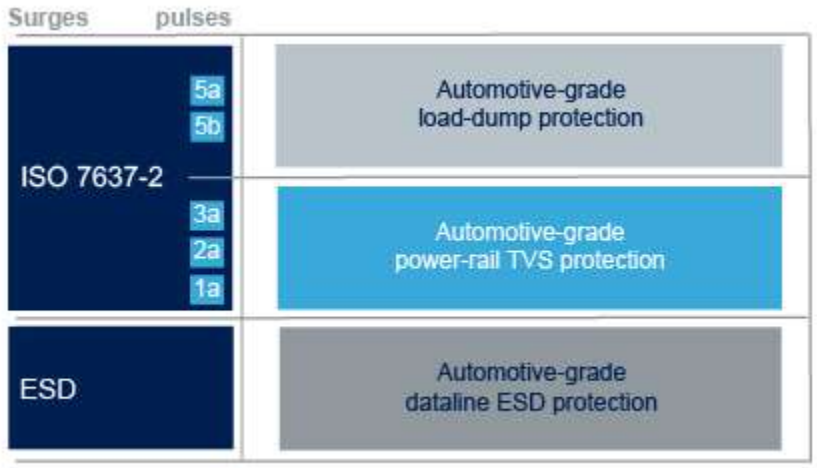
ST's automotive-grade protection device series meets all standard needs for automotive including:

- ESD protection
- Load-dump protection
- Power-rail transient voltage suppressor (TVS) protection

As such, ST's TVS clamping diodes, or Transil™, are designed to protect sensitive automotive circuits against overvoltage surges defined in ISO 7637-2 and against electrostatic discharges according to IEC 61000-4-2 and ISO 10605.

The broad range of devices addresses all the protection sockets in automotive applications, from infotainment, navigation, communication, audio and video to battery charging systems, smart junction boxes, and relay and power-line protection.

Standard automotive bus interfaces are supported to meet applications requiring CANbus, LINbus, and FLEXray.



Automotive grade protection portfolio

AG TVS full range qualified

- ST ready for AG conversion & market share increase at Automotive customer
- Part numbers
  - SM4TY : 400W SMA
  - **SMA6TY : 600W SMA**

More power for same size

  - SM6TY : 600 W SMB
  - SM15TY : 1500 W SMC
  - **SM30TY : 3000 W SMC**

More power for same size

LIN & CAN buses

- **LIN** protection : **ESDLIN1524BJ** in production for automotive customers
- **CAN** protection : **ESDCAN24-2BLY** fully qualified and in production, ready for design at automotive customers:
  - **Better ESD protection quality** (better clamping performances than NXP and ON)
  - **Pin to pin** compatible with NXP and ON

Safer CAN transceiver

IPAD filters available

- **EMI Filters** : loud speaker, microphone, SIM card
- **ECMF** : USB2.0, HDMI …
- Package: µQFN and Flip Chip
- **ESD protections integrated** for safe design

Space saving and safe design

Die business enabled

- High power TVS die business availalble upon request
- **KGD** : Known Good Die process

- Example : **3000W TVS** die business for **DC/DC**-Converter for **HEV**

Save space with System in Package

life.augmented

Automotive TVS portfolio

Package size

400W | 600W | 1500W | 3000W

SMC

SMB

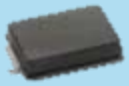
SMA

SM4TY
2.55 mm x 5.05 mm
31W/mm²

SM6TY
3.60 mm x 5.35 mm
31W/mm²

SMA6TY
2.55 mm x 5.05 mm
47W/mm²

NEW



SMA6FY
2.5mm x 5.2 mm

SOD128 footprint compatible
Better power capability

SM15TY
5.90 mm x 7.95 mm
31W/mm²

SM30TY
5.90 mm x 7.95 mm
62W/mm²

AG CP	ISO7637-2 – Pulse 1*	ISO7637-2 – Pulse 2*	ISO7637-2 – Pulse 3*	ISO10605 (C=330pF – R=330Ω)	ISO10605 (C=150pF – R=330Ω)
SM4TY	PASS	PASS	PASS	+/- 30 kV	+/- 30 kV
SMA6TY	PASS	PASS	PASS	+/- 30 kV	+/- 30 kV
SMA6FY	PASS	PASS	PASS	+/- 30 kV	+/- 30 kV
SM6TY	PASS	PASS	PASS	+/- 30 kV	+/- 30 kV
SM15TY	PASS	PASS	PASS	+/- 30 kV	+/- 30 kV
SM30TY	PASS	PASS	PASS	+/- 30 kV	+/- 30 kV

Power (10/1000µs)

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AEC-Q101 QUALIFIED

Automotive TVS low derating vs T°

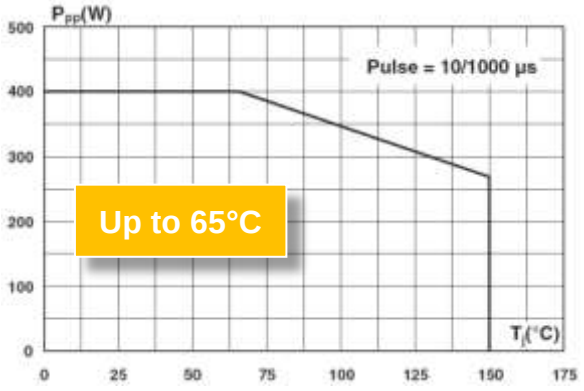
Competitive advantage: High thermal performance

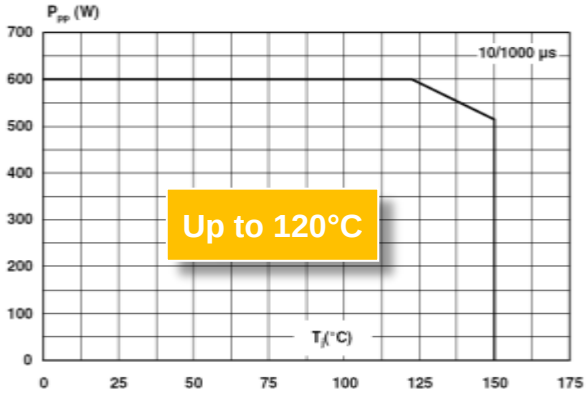
- Because of technology enhancements, ST Transils can maintain their **Peak Pulse Power** capability over a wide range of **temperature**

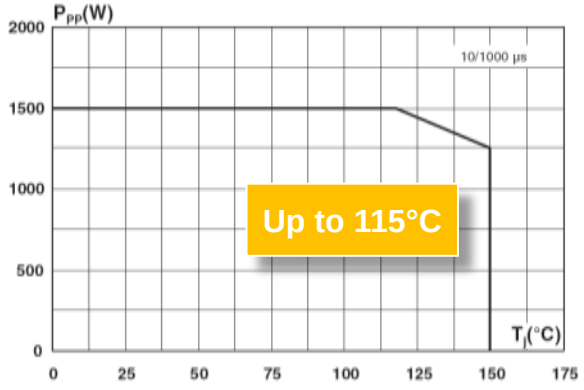
SM4TY
2.55 mm x 5.05 mm

SM6TY
3.60 mm x 5.35 mm

SM15TY
5.90 mm x 7.95 mm







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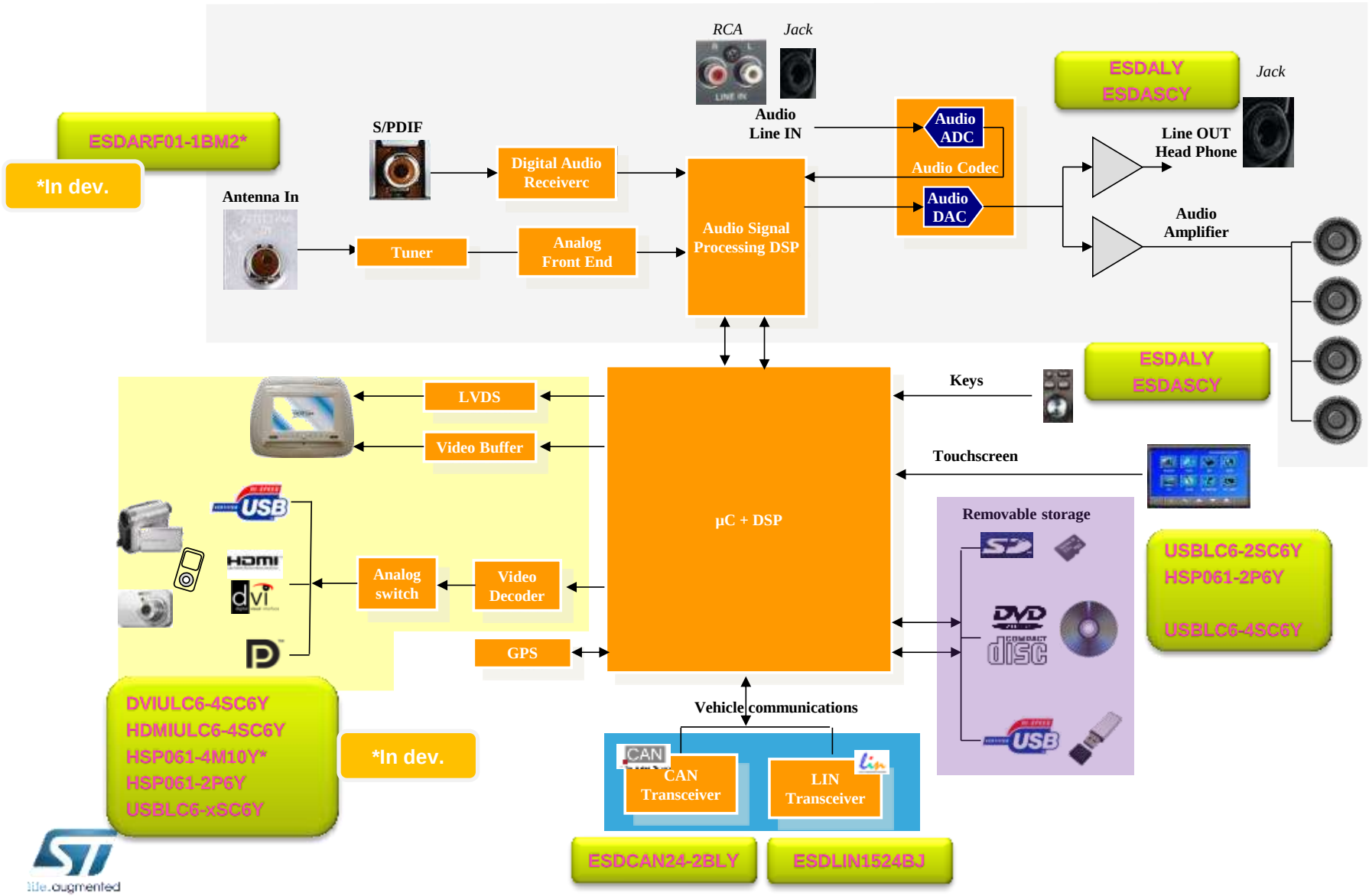
Automotive Grade dataline protection

General ESD protection	# lines protected	Capacitance	ISO7637
DVIULC6-4SC6Y	4	1pF	3a;3b
ESDA14V2LY	2	90pF	1;2a;2b;3a;3b
ESDA14V2SC5Y	4	100pF	1;2a;2b;3a;3b
ESDA25LY	2	50pF	1;2a;2b;3a;3b
ESDA25SC6Y	4	60pF	1;2a;2b;3a;3b
HDMIULC6-4SC6Y	4	1pF	3a;3b
USBLC6-2SC6Y	2	2.5pF	3a;3b
USBLC6-4SC6Y	4	3pF	3a;3b
ESDA5V3SC6Y	4	280pF	3a;3b
ESDA6V1SC6Y	4	190pF	3a;3b
ESDA5V3LY	2	220pF	3a;3b
ESDA6V1LY	2	140pF	3a;3b
HSP061-2P6Y	2	0.85pF	3a;3b
HSP061-4M10Y	4	0.6pF	3a;3b
ESDALC5-1BT2Y	1	10pF	3a;3b

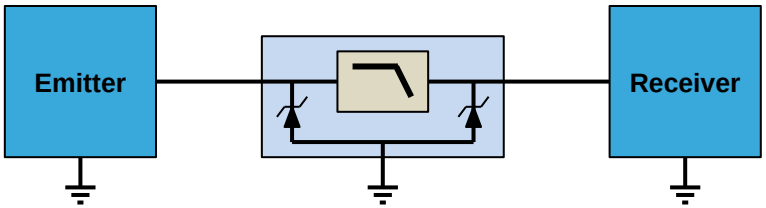
Automotive - Infotainment



Automotive Grade IPAD portofolio

EMIF series

Electro**M**agnetic **I**nterference **F**ilter



Application / function :
- Keypad and data lines
- SIM card / SD card
- …

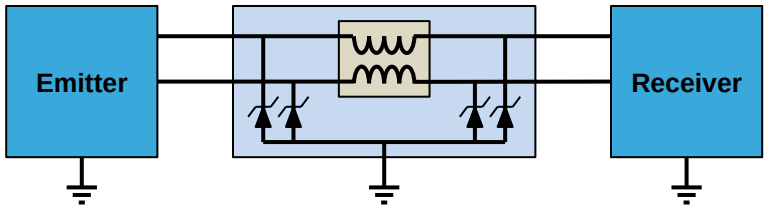
The filter can be made of **R, C and/or L elements** depending on the application requirements / tradeoff (insertion loss vs max attenuation vs frequency)

The ESD protection is generally specified to sustain IEC61000-4-2 level 4. It can be either unidirectional or bidirectional.

It is proposed in **single line** or **multi lines**, in **plastic package** or in **CSP flip-chip**.

ECMF series

ESD protected **C**ommon **M**ode **F**ilter



Application / function :
- USB
- HDMI
- …

The filter drastically **reduces the common mode noise** in the mobile phone frequency range, and in the same time **keeps the high speed differential** signal integrity.

The ESD protection are generally specified to sustain IEC61000-4-2 level 4. It can be either unidirectional or bidirectional.

It is proposed in **single line** or **multi lines**, in **plastic package** or in **CSP flip-chip**.

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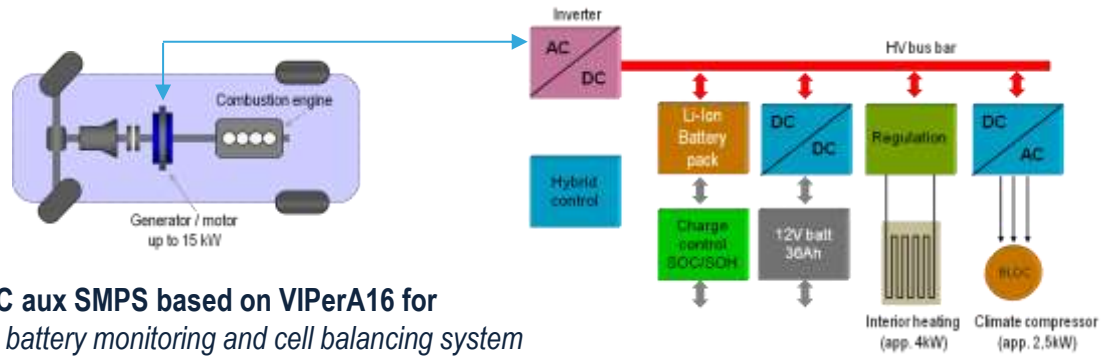
High Voltage Converters- VIPerA16

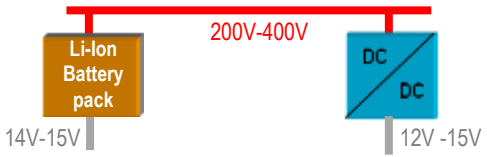
VIPerA16
in automotive
hybrid / EV control



HV DC/DC aux SMPS based on VIPerA16 for

- *Li-Ion battery monitoring and cell balancing system*
- *DC-DC conversion to generate 12V/24V needs to subsystems*

Aux SMPS
market needs



DC-DC conversion

Strong thermal robustness

Reliability

VIPerA16
Key benefits
& topologies supported

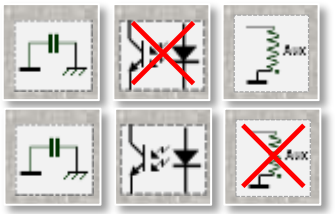
VIPerA16 - Automotive grade 1, key benefits for the application

- AEQ100 compliant
- Operating temperature: -40°C to +125°C
- 800V breakdown
- Op-amp available for direct feedback

Smart Flyback topologies

Li-Ion Battery pack → Not isolated direct feedback

DC DC → Isolated
- primary regulation
- secondary regulation



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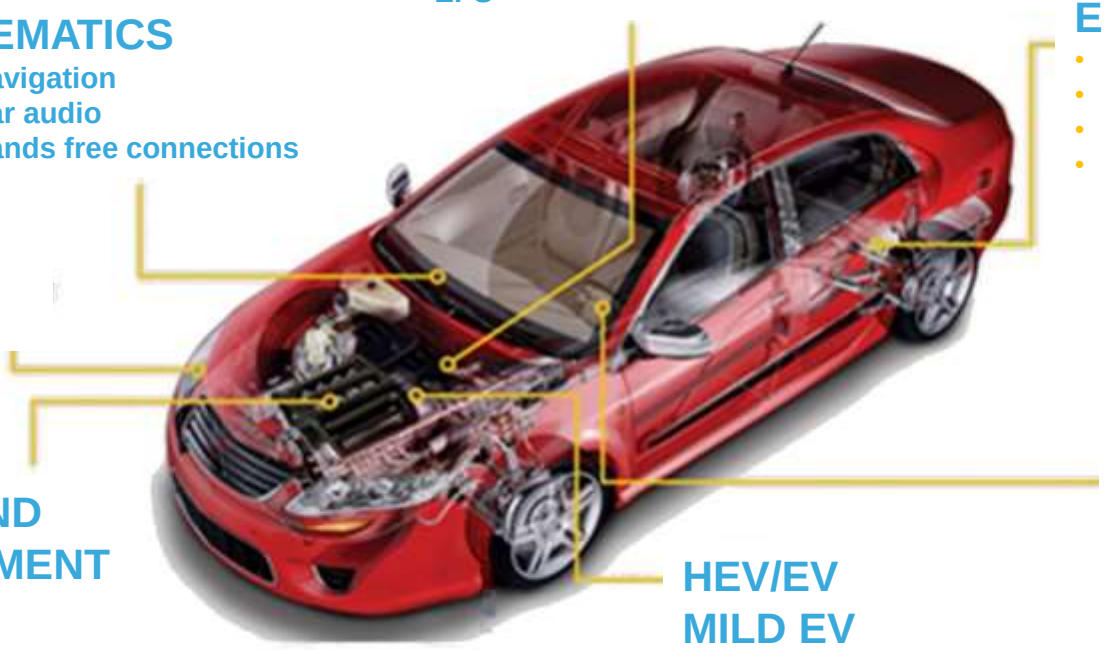
DC-DC converters

SAFETY AND CHASSIS
- Electrical power brake
- EPS

INFOTAINMENT AND TELEMATICS
- Navigation
- Car audio
- Hands free connections

BODY ELECTRONICS
- Power windows
- Door control
- Gateway modules
- Remote keyless entry



ADAPTATIVE LIGHTINIG CONTROL

INSTRUMENT CLUSTERS
- Hardware architecture
- HMI interfaces

POWER TRAIN AND ENGNE MANAGEMENT
- injection
- ECU
- Start and stop

HEV/EV MILD EV
- Vehicle energy management

DC/DC converters- Buck regulators

Key features

- Up to 3A in a small HSOP8 package with minimum external component count
- P-channel power MOS: no bootstrap capacitor
- Wide input voltage range (4.5V up to 38V)
- High switching frequency (250KHz, adjustable up to 1MHz) with Synchronization capability (180° out of phase)
- Internal Soft-start
- Enable pin
- Embedded protection features
- Suitable for MLCC output filter
- Typ RDSon=200mΩ
- All Parameters tested over the -40°C to + 125°C junction temperature range

HSO8

A7986A	Up to 3A 1MHz
A7985A	Up to 2A 1MHz

DC/DC converters- Buck regulators

Key features

- 4V to 38V input voltage
- Up to 2A DC output current
- Synchronous rectification
- LOW QUIESCENT CURRENT (30µA)
- High efficiency or constant switching frequency at light load
- Low dropout operation: up to 100% duty cycle
- Fixed 5V and 3V3 also available (A698xF)
- 250 kHz Switching frequency, programmable up to 2MHz
- Programmable output voltage monitoring circuitry
- Prebias start-up capability
- Mlcc output capacitor compliant
- Overvoltage and overcurrent protection (peak and valley current sense)
- Adjustable soft-start
- All parameters tested over the -40°C to + 135°C junction temperature range

MP Q1-'14
Industrial version MP Q3-'13

HTSSOP16		A6986	Up to 2A 2MHz
HTSSOP16		A6986F	Up to 1.5A 2MHz
QFN – 20L 4x4		A6985F	Up to 0.5A 2MHz

MP Q1-'15

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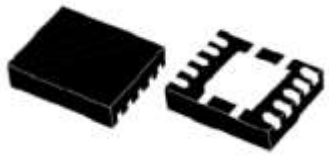
DC/DC converters- Buck regulators

Key features

- AEC-Q100 compliant
- 4.5V to 36V input voltage
- Synchronous rectification
- Up to 400mA DC Output current
- 100µA Iq (VIN 12V – VOUT 3.3v – PSKIP - SWO)
- Pulse skipping or forced PWM at light load
- Programmable switching frequency: 200kHz – 600kHz
- Prebias start-up capability
- Vbias maximizes efficiency at light load (PSKIP)
- Pgood output
- No voltage divider required for VOUT 3V3
- COT architecture implements frequency FF over Vin range
- MLCC output capacitor compliant
- Thermal shutdown
- Overvoltage and overcurrent protection

DFN4x4 10L

A6984 Up to 400mA 600kHz



MP Q1-'14
Industrial version MP Q4-'13

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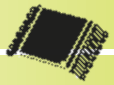
DC/DC converters- Buck regulators

Key features

- Up to 3A in HTSSOP16 packages with minimum external component count
- 4V to 61V input voltage range
- High switching frequency (up to 1.5MHz) with Synchro capability
- V_{OUT} adjustable from 0.6V
- Adjustable current limit
- Adjustable Soft-start
- Enable pin
- Vbias improved efficiency at light load
- Embedded protection features
- Typ R_{DSon}=200mΩ



HTSSOP16

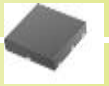
A7987	Up to 3A 1.5MHz
A7987L	Up to 2A 1.5MHz

MP Q3-'14
Industrial version MP Q3-'13

DC/DC converters- Buck regulators

Key features

- Input Voltage: from 2.8V to 4V
- Output Current Capability: 3A
- Output Voltage: Adjustable from 0.8V up to Vin
- Switching Frequency:
- 1.5MHz
- 2.3MHz (HF)
- Soft-Start circuit to reduce inrush current
- Integrated 65 and 45mOhm RDSon MOSFETs
- Internal compensation network
- Power good/enable pin
- Short Circuit and Thermal Protection
- DFN 3x3mm Packages



DFN – 8L 3x3

AST1S31	3A 1.5MHz	
AST1S31HF	3A 2.3MHz	

MP Q4-'13
HF MP Q1-'14

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Linear voltage regulators

Key features

- From 250mA up to 1.5A of maximum current
- 2.5V to 30V input voltage range
- Dropout voltage as low as 150mV
- High PSRR
- Low quiescent current
- Low noise
- Thermal protection and current limit

L4931 - 250mA LDO:
20V max Vin, 0.4V dropout voltage, Enable pin, SO-8 package

LDS3985 - 300mA LDO:
6V max Vin, Very low noise, High PSRR
150mV dropout voltage, Enable pin in DFN package

New!

LFxx 500mA LDO:
40V max Vin with load dump protection, 200mV dropout voltage, Enable pin, in DPAK /PPAK package

LD1086 1.5A LDO:
40V max Vin with load dump protection, 200mV dropout voltage, in TO-220 and DPAK packages

Shunt Voltage reference

Key features

- 1.24V and 2.5V reference voltage
- Adjustable up to 36V
- 100ppm/°C Max TempCo
- Minimum Cathode current from 60µA
- Operating temp range: -40°C to 125°C

TL431 – 2.5V to 36 V adjustable shunt Vref

1%-2% accuracy, 1-100mA Cathode current, SO-8 package

TL1431 – 2.5V to 36 V adjustable shunt Vref

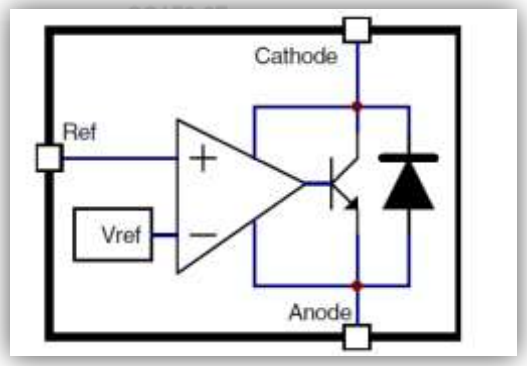
0.25%-0.4% accuracy, 1-100mA Cathode current, SO-8 package

TS431 – 1.24V to 6V adj. low power shunt Vref:

0.5%-1% and2% accuracy, 100ppm/°C - 60µA to 30mA Cathode current, SOT23-5L package

SO-8

SOT23-5L



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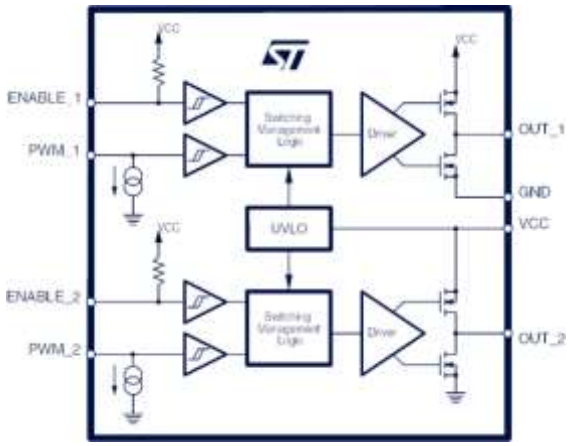
A8834 - 4A Dual Low Side Driver

Key features

- 4A sink and source capability
- Driver outputs can be put in parallel to achieve higher drive current
- Independent enable pin on each PWM
- Matched and short propagation delays for both outputs
- CMOS/TTL Compatible Input levels
- 5V -18V Supply Voltage Range
- Low bias switching current
- **-40°C to 125°C** temperature range



MSO8 with exposed pad

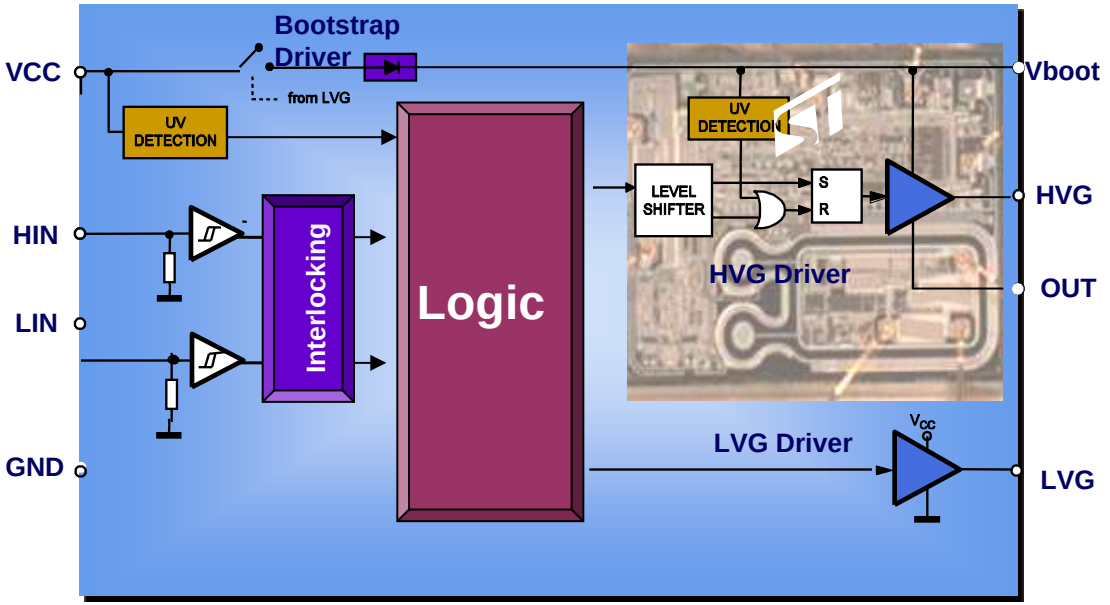
Key Applications

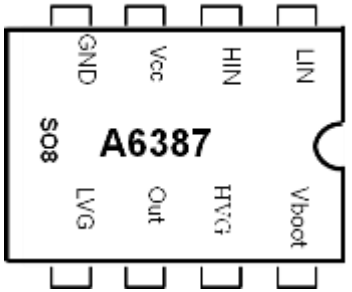
- Switch Mode Power Supplies
- DC/DC Converters
- Motor Controllers
- Line Drivers
- Class D Switching Amplifiers

A6387- Half bridge driver

Key features

- Internal bootstrap diode
- Outputs in phase with inputs
- Interlocking function to prevent from cross-conduction
- Under Voltage Lock Out on Vcc (Turn-On@6V, Turn-Off@5.5V)
- -40°C to 125°C temperature range 100% tested in production





LED Drivers

INFOTAINMENT

- LED Array drivers (STAP16/08xx)
- LED Matrix drivers (ALED7706/07)

Dome modules with LED

- LED Matrix divers (ALED7706/07)
- LED Array drivers (STAP16/08xx)

DRL High/Low beam/Blinkers

- LED Matrix drivers (ALED6001)

Rear Combination Lights

- LED Matrix divers (STAP16/08xx)
- LED Matrix divers (ALED7706/07)

Dashboard backlighting

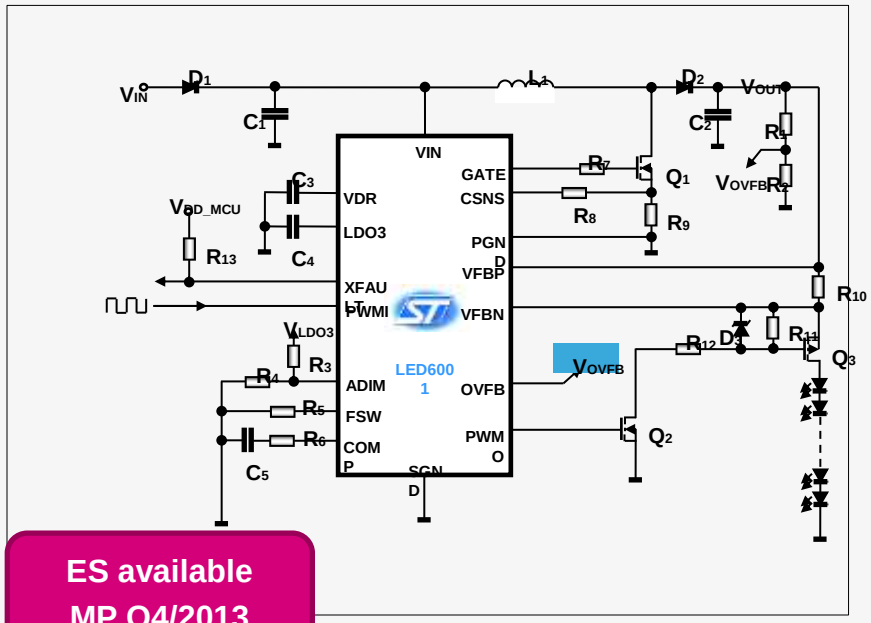
- LED Array drivers (STAP16/08xx)
- LED Array drivers with local dimming (ALED1642GW)

Ambient lights

- LED Array drivers with local dimming (ALED1642GW)

ALED6001

PWM-dimmable single channel LED driver with integrated boost Controller



ES available
MP Q4/2013

Switching controller section

- **5.5V to 40V** input voltage range
- Very low shutdown current: IQ<10µA
- Internal +5V LDO for gate driver supply
- Internal +3V3 LDO for device supply
- Fixed frequency peak current-mode control
- Adjustable (100kHz to 1MHz) switching frequency
- External synchronization for multi-device applications
- High performance external MOSFET driver
- Cycle-by-cycle external MOSFET OCP
- Fixed internal soft-start
- Programmable output OVP
- Boost, Buck-boost and SEPIC topologies supported
- Thermal shutdown with auto-restart
- Output short-circuit detection

LED control section

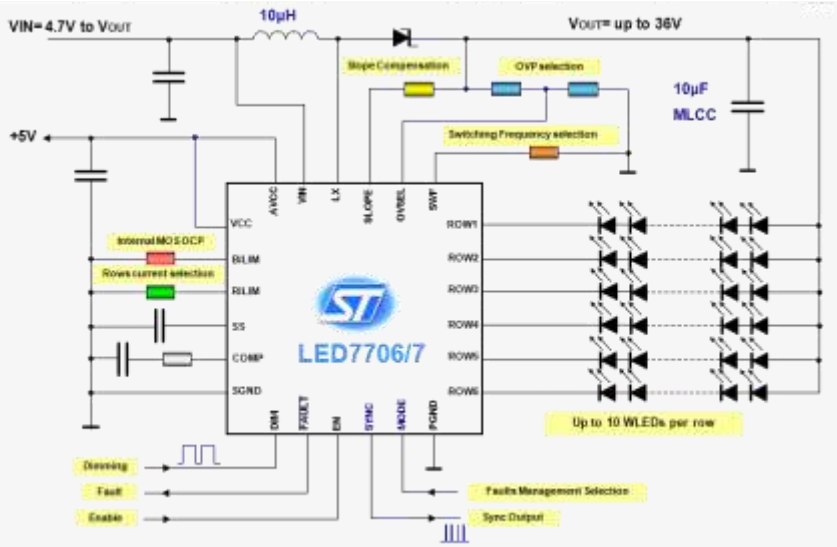
- Up to 60V output voltage
- Constant current control loop
- High-side output current sensing circuitry
- 30mV to 300mV differential sensing voltage
- ±4% output current reference accuracy
- Output over-current protection
- Sensing resistor failure protection
- PWM dimming
- Analog dimming

Key Applications

- Automotive exterior lighting
- Daytime running lights
- High and low beam
- Fog lights
- Position lights / Blinker

HTSSOP-16

ALED7706/7



Industrial grade in mass production, Automotive grade Q1/2013

VFQFPN-24 4x4

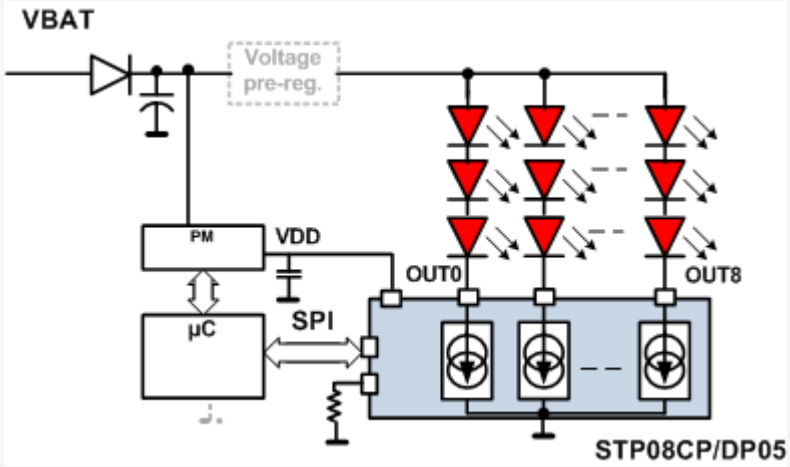
BOOST SECTION

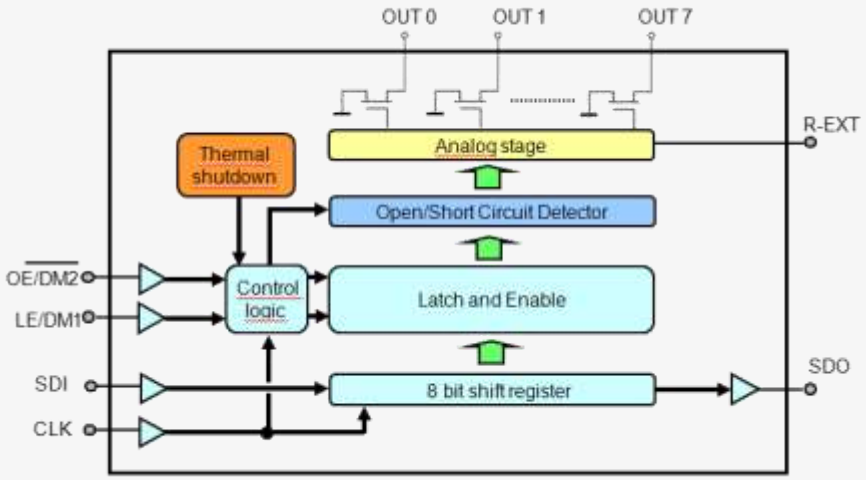
- 4.5V to 36V Input Voltage range
- Internal Power-MOSFET
- Up to 93% Efficiency
- Up to 36V Output Voltage
- 200kHz to 1MHz Switching Frequency
- Programmable Soft-Start Duration
- Programmable OV and OC Protections
- External sync for multi-device application

BACKLIGHT DRIVER SECTION

- Six ROWs capable of driving multiple LEDs in series (e.g. up to ten WLEDs per ROW)
- Up to 30mA (ALED7706) and 85mA (ALED7707) per row
- ±2% Current Matching between ROWs
- Shorted/Open LED Fault Detection
- PWM Dimming
- Capability to Disconnect Unused ROWs
- Possibility to parallel outputs for ALED7707

STAP08C/DP05



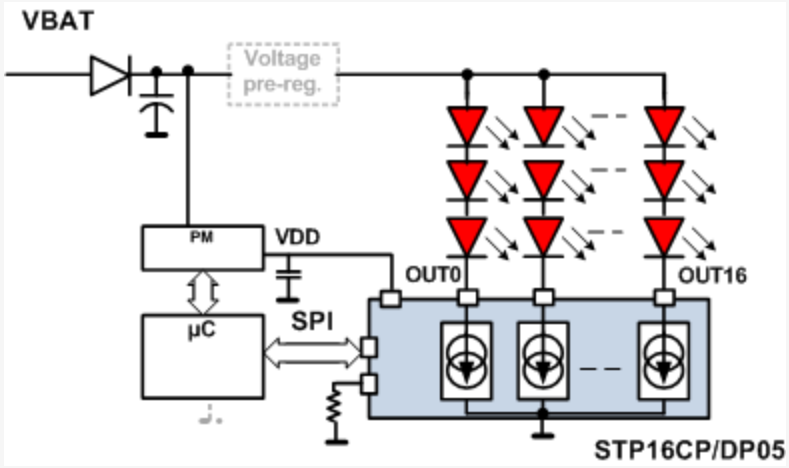


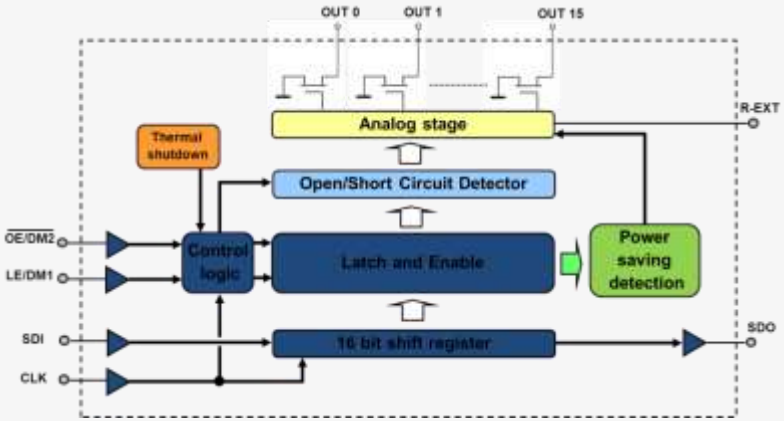
Key Features

- Low voltage power supply (3V to 5.5V)
- 4-wires SPI interface
- 8 constant current output channels
- Output current: from 5mA to 100mA
- Current programmable through external resistorCurrent accuracy:
- ±1.5% (between channels)
- ±3% (between ICs)
- Short and open output detection (STP08DP05)
- UVLO , POR and Thermal shut-down
- ESD protection 2.5kV HBM, 200V MM
- Available in high thermal efficiency TSSOP exposed pad package

Industrial grade in mass production, automotive qualification ongoing

STAP16C/DPPS05



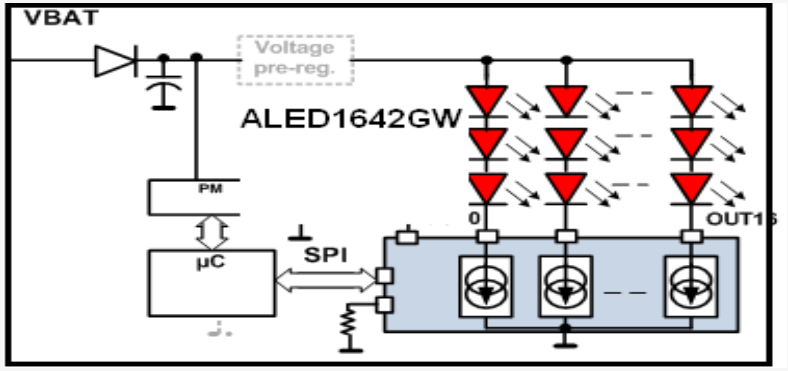


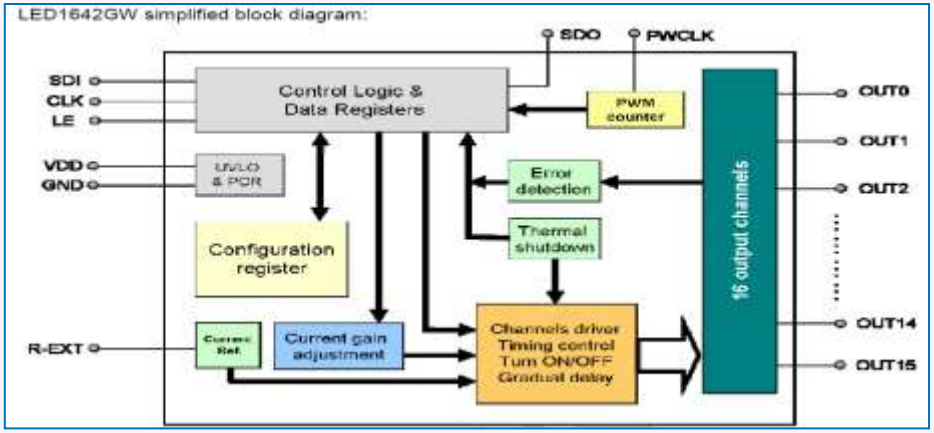
Key Features

- Low voltage power supply (3V to 5.5V)
- 4-wires SPI interface
- 16 constant current output channels
- Output current: from 5mA to 100mA
- Current programmable through external resistorCurrent accuracy:
- ±1.5% (between channels)
- ±6% (between ICs)
- Short and open output detection (STP08DP05)
- UVLO , POR and Thermal shut-down
- ESD protection 2.5kV HBM, 200V MM
- Available in high thermal efficiency TSSOP exposed pad package

Industrial grade in mass production, automotive qualification ongoing

ALED1642GW





Key Features

- Low voltage power supply (3V to 5.5V)
- 4-wires SPI interface ,up to 30 MHz clock frequency
- 16 constant current output channels
- 20 V current generators rated voltage
- Output current: from 3 mA to 40 mA, programmable through external resistor
- 7 bits global current gain adjustment in two ranges
- 12/16 bit PWM grayscale brightness control
- Programmable output turn on/off time
- Error detection mode (both open and shorted LED)
- Programmable shorted LED detection thresholds
- Auto power saving/auto wake-up
- Selectable SDO synchronization on the CLK falling edge
- Gradual Output Delay (selectable)
- Thermal shutdown and overtemperature alert

TSSOP24
(exposed pad)

Eng. Sample availlable, MP Q3/2013

Opamps & Comparators
Technologies & Voltage nodes

- 36V — Bipolar & JFET (LM29 Series, TL072,TL082)
- 16V — CMOS, Rail to Rail I/O, Low Power, high output capability, Tiny package
- 5V — CMOS, Rail to Rail I/O, Micro Power, Low bias current
- 70V — High side Current Sensing

Benefits

Ability to address Automotive market requirements

Automotive grade Opamps are emphasized by the « Y » letter.

T	S	X	5	6	2	I	Y	S	T

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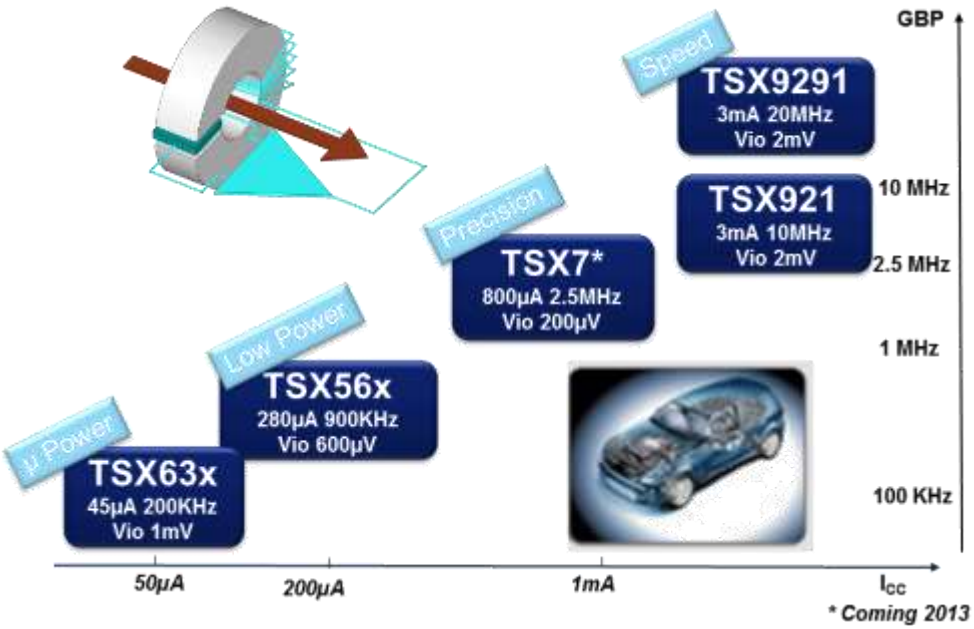
TSX Series
16V CMOS Op Amps

Key features

- Supply voltage: 3 V to 16 V
- CMOS Inputs
- High output current
- Precision Vio down to 600µV max
- Rail to Rail Input & output
- Space saving package
- High tolerance to ESD: 4 kV
- Wide temperature range: -40 to +125°C
- Automotive qualified



Accuracy
High output current
Robustness & Reliability

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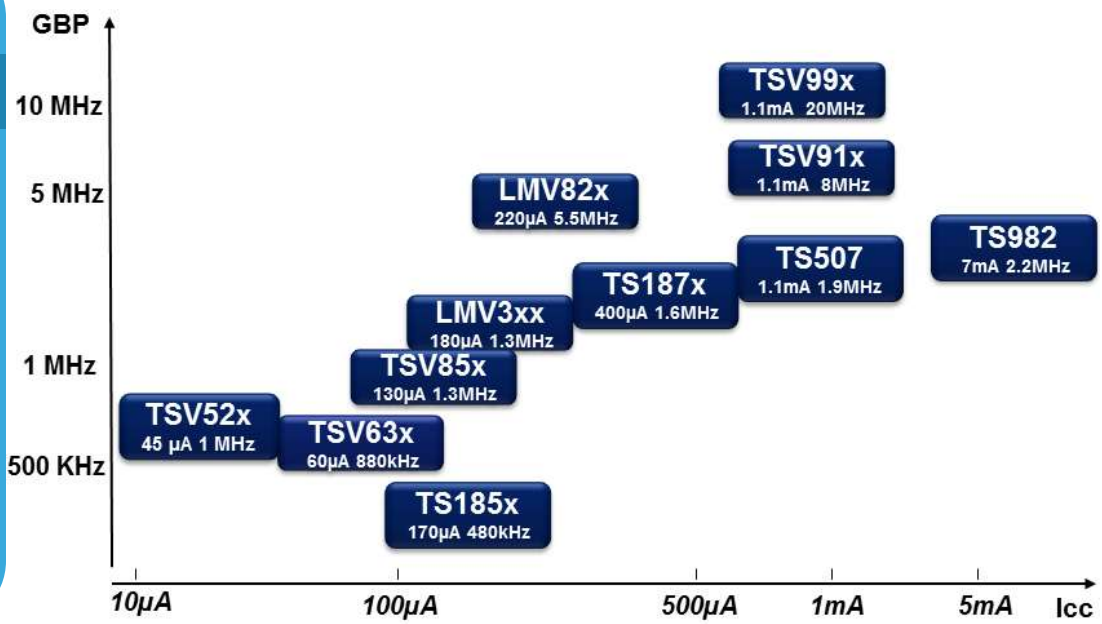
5V Operational Amplifiers

Key features

- Ultra low Supply voltage : Vccmin 1.5V
- Stand by current: Icc 5nA typ
- MicroPower & High Merit factor
- Lower Offset with Vio down to 100µV
- Low Input bias current : Iib = 1pA
- Higher ESD protection 4kV
- Wide package offer: MiniSO, SOT, SO, TSSOP
- Automotive Grade



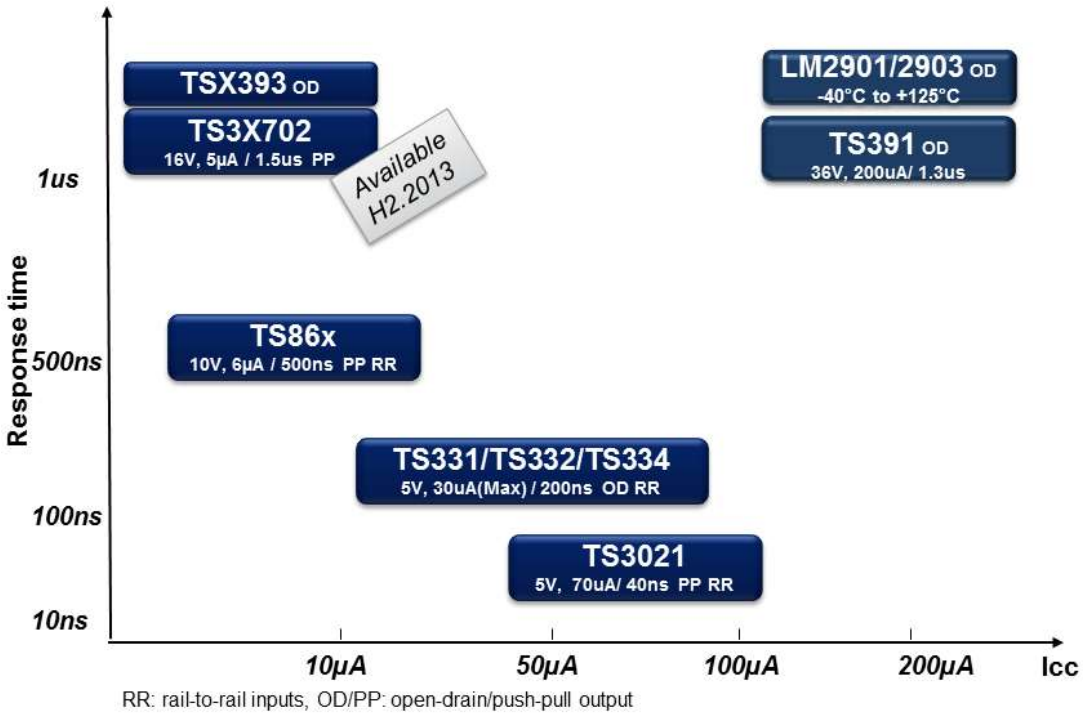
Ideal for Sensors signal conditioning (Gaz, Temperature or position Sensors)

Ideal for power sensitive functions such as Automotive Keyless entry

Comparators

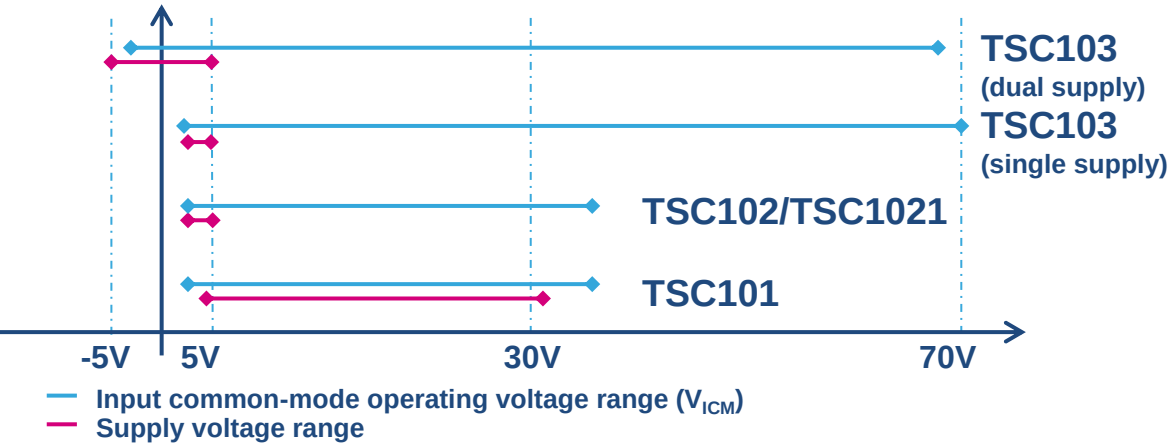
Key features

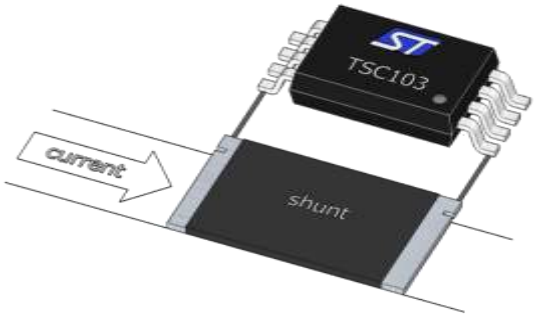
- Covering wide voltage nodes 5, 10, 16, 36V
- High Speed Down to 40 ns
- Micropower down to 5 µA
- Higher ESD protection 4kV
- Wide package offer: MiniSO, SOT, SO, TSSOP
- Wide Temp range -40°C to +125°C
- Automotive Grade



Ideal for threshold detection

TSC10 Series
High Side Current sensing Amplifiers

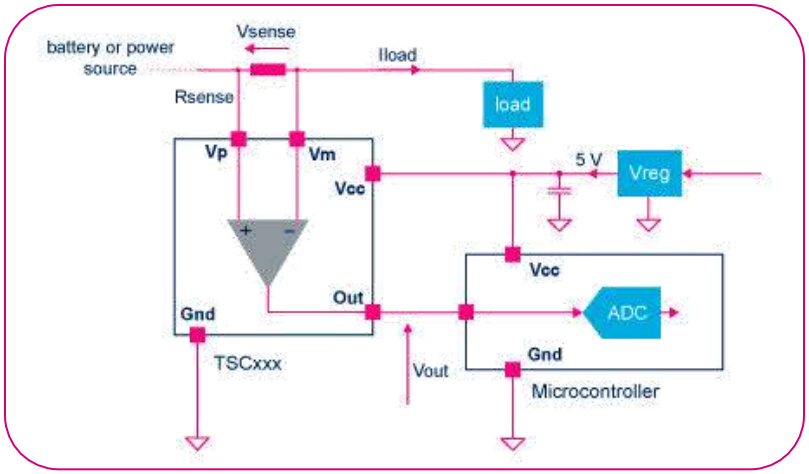




Key features

- Sustain a V_{ICM} far beyond Vcc supply rail
- Load Dump protections
- Reversed battery protections

The ideal interface between HV analog and LV digital



MEMS in Automotive

Mass production

Phase 1

AIS326DQ

AIS328DQ

A3G4250D

- Navigation assistance
- Anti-theft systems
- Telematics (eToll, …)
- Infotainment

Emerging applications

Mass production

Phase 2

AIS1200PS

Passive safety applications

- Satellite Airbags
- Frontal Airbags
- Rollover detection

Phase 3

xxxxx

- Vehicle Dynamics
- Active suspensions
- Electronic Parking Brake

Active safety applications

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Infotainment/Navigation/Telematics

AIS326DQ

- 3-axis XL
- QFN 7x7
- 2-6g full scale

2010

AIS328DQ

- 3-axis XL
- QFN 4x4
- 2-4-8g full scale
- Low power

2011

A3G4250D

2012

- 3-axis gyro
- LGA 4x4
- 245 dps full scale

First 3-axis gyro in the market for Automotive

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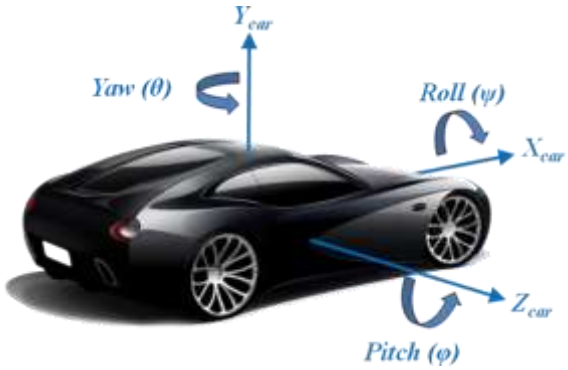
Why a 3-axis gyro in Automotive?

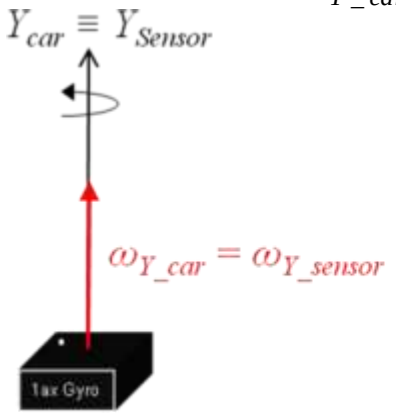
- The axes of rotation of the car do not correspond typically to the axes of rotation of the gyroscope
- With a single-axis sensor, the net result is a loss of sensitivity unless it is a mechanically compensated in the package itself

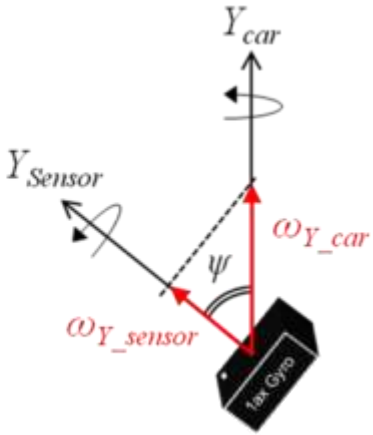


Key Advantages

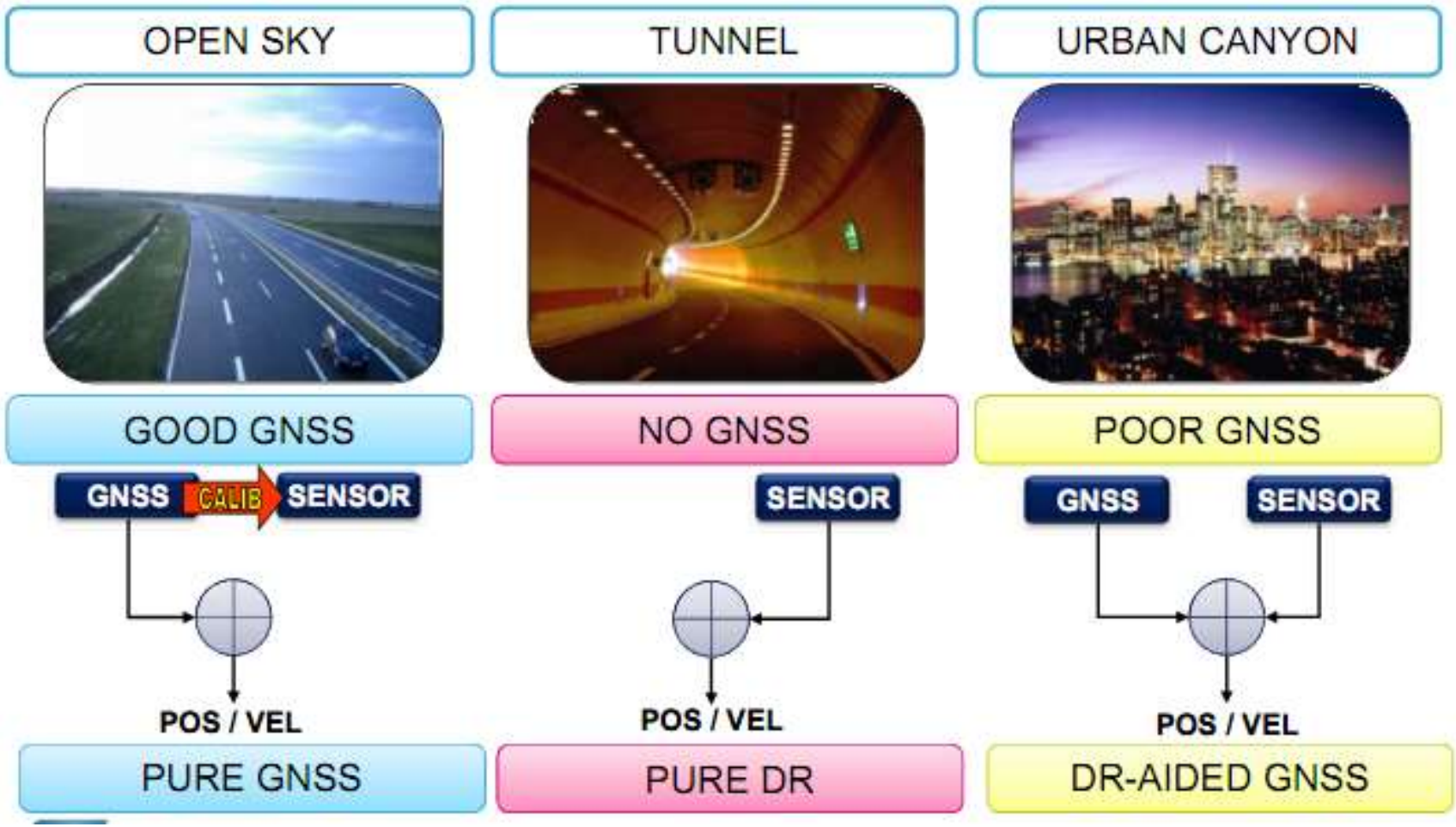
- Able to detect multiple vehicle angular velocities independently of the tilt installation
- The system sensitivity becomes independent of the tilt angle
- A single device can be used to support multiple applications

$$\frac{\omega_{Y\_sensor}}{\omega_{Y\_car}} = \cos(\psi)$$





ST full-solution for sensor-assisted navigation



with TeseoII

AIS1200PS: single-axis Airbag Accelerometer

Automotive **I**nertial **S**ensor – **1** axis – **200**g full scale – **P**SI5 Interface – **S**O16N package

- Current status: mass production (safe launch ongoing)
- Technology: BCD6Ss + THELMA
- Package: SO16N (ASIC/MEMS side-by-side)
- Full Scale: +/- 200g; Sensitivity: 2 LSB/g; Resolution: 10 bits
- PSI5 v.1.3 asynchronous mode
- Integrated 2nd order low-pass Bessel filter, 175Hz cut-off
- Input voltage: 5V … 16V
- Operating temperature: -40 … 125°C
- Current consumption: < 7mA
- Qualification, PPAP, and mass production: 2013
- Target applications: peripheral accelerometers for airbags

Reverse lead forming for optimized EMC performances

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STM8A- MAINSTREAM AUTOMOTIVE MCUS

STM8AF

STM8AF series is intended for automotive applications where no compromise on parameters is possible, from reliability to system cost effectiveness. The STM8AF series is modular, provides high performance and offers the flexibility required for short development cycles. Its true data EEPROM, combined with the capability to withstand up to 150 °C ambient temperature, make the series a sustainable choice for automotive applications

STM8AL

STM8AL ultra-low-power series for automotive applications puts green energy, application safety and power efficiency at the forefront. It is particularly suited to battery-operated functions such as remote keyless entry and tire pressure monitoring, as well as for applications where power consumption is critical over time: companion microcontroller, immobilizers and sensors

STM8AF SERIES – MAINSTREAM AUTOMOTIVE MCUS

Part number	Flash size (Kbytes)	Internal RAM size (Kbytes)	Data EEPROM (bytes)	Package	Timer functions		ADC	DAC	I/Os	Serial interface						Supply voltage (V)	Supply current (Icc)		Maximum operating temperature range (°C)
					8-/16- bit timers	Others				CAN	LIN-UART	USART (IrDA, ISO 7816, LIN 1.3, LIN 2.0)	SPI	I²C	IRTx		Lowest power mode (µA)	Run mode (per MHz) (µA)	
STM8AF Series																			
STM8AF52 CAN and LIN line - Up to 24 MHz CPU																			
STM8AF5268	32	6	1024	LQFP48	1x8-bit / 3x16-bit	IWDG, WWDG, AWU	10x10-bit		38	1	1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF5269	32	6	1024	LQFP64	1x8-bit / 3x16-bit		16x10-bit		54	1	1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF5288	64	6	2048	LQFP48	1x8-bit / 3x16-bit		10x10-bit		38	1	1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF5289	64	6	2048	LQFP64	1x8-bit / 3x16-bit		16x10-bit		54	1	1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF528A	64	6	2048	LQFP80	1x8-bit / 3x16-bit		16x10-bit		70	1	1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF52A8	128	6	2048	LQFP48	1x8-bit / 3x16-bit		10x10-bit		38	1	1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF52A9	128	6	2048	LQFP64	1x8-bit / 3x16-bit		16x10-bit		54	1	1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF52AA	128	6	2048	LQFP80	1x8-bit / 3x16-bit		16x10-bit		70	1	1		1	1		3 to 5.5	5	500	-40 to +150
STM8AF62 LIN line - Up to 24 MHz CPU																			
STM8AF6223	8	1	640	TSSOP20	1x8-bit / 2x16-bit	IWDG, WWDG, AWU	5x10-bit 7x10-bit		16		1		1	1		3 to 5.5	5	230	-40 to +150
STM8AF6226	8	2	384	LQFP32	1x8-bit / 3x16-bit		7x10-bit		25		1		1	1		3 to 5.5	5	430	-40 to +150
STM8AF6226T	8	1	640	LQFP32, VFQFPN32	1x8-bit / 2x16-bit		5x10-bit		28		1		1	1		3 to 5.5	5	230	-40 to +150
STM8AF6246	16	2	512	LQFP32, VFQFPN32	1x8-bit / 3x16-bit		7x10-bit		25		1		1	1		3 to 5.5	5	430	-40 to +150
STM8AF6248	16	2	512	LQFP48	1x8-bit / 3x16-bit		10x10-bit		38		1		1	1		3 to 5.5	5	430	-40 to +150
STM8AF6266	32	2	1024	LQFP32, VFQFPN32	1x8-bit / 3x16-bit		7x10-bit		25		1		1	1		3 to 5.5	5	430	-40 to +150

STM8AF SERIES – MAINSTREAM AUTOMOTIVE MCUS

Part number	Flash size (Kbytes)	Internal RAM size (Kbytes)	Data EEPROM (bytes)	Package	Timer functions		ADC	DAC	I/Os	Serial interface						Supply voltage (V)	Supply current (Icc)		Maximum operating temperature range (°C)
					8-/16- bit timers	Others				CAN	LIN-UART	USART (IrDA, ISO 7816, LIN 1.3, LIN 2.0)	SPI	I²C	IRTx		Lowest power mode (µA)	Run mode (per MHz) (µA)	
STM8AF6268	32	2	1024	LQFP48	1x8-bit / 3x16-bit	IWDG, WWDG, AWU	10x10-bit		38		1		1	1		3 to 5.5	5	430	-40 to +150
STM8AF6269	32	6	1024	LQFP64	1x8-bit / 3x16-bit		16x10-bit		54		1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF6286	64	6	2048	LQFP32	1x8-bit / 3x16-bit		7x10-bit		25		1		1	1		3 to 5.5	5	500	-40 to +150
STM8AF6288	64	6	2048	LQFP48	1x8-bit / 3x16-bit		10x10-bit		38		1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF6289	64	6	2048	LQFP64	1x8-bit / 3x16-bit		16x10-bit		54		1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF628A	64	6	2048	LQFP80	1x8-bit / 3x16-bit		16x10-bit		70		1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF62A6	128	6	2048	LQFP32	1x8-bit / 3x16-bit		7x10-bit		25		1		1	1		3 to 5.5	5	500	-40 to +150
STM8AF62A8	128	6	2048	LQFP 48	1x8-bit / 3x16-bit		10x10-bit		38		1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF62A9	128	6	2048	LQFP64	1x8-bit / 3x16-bit		10x10-bit		54		1	1	1	1		3 to 5.5	5	500	-40 to +150
STM8AF62AA	128	6	2048	LQFP80	1x8-bit / 3x16-bit		16x10-bit		70		1	1	1	1		3 to 5.5	5	500	-40 to +150

STM8AL SERIES – ULTRA-LOW-POWER AUTOMOTIVE MCUS

Part number	Flash size (Kbytes)	Internal RAM size (Kbytes)	Data EEPROM (bytes)	Package	Timer functions		ADC	DAC	I/Os	Serial interface						Supply voltage (V)	Supply current (Icc)		Maximum operating temperature range (°C)
					8-/16- bit timers	Others				CAN	LIN-UART	USART (IrDA, ISO 7816, LIN 1.3, LIN 2.0)	SPI	I²C	IRTx		Lowest power mode (µA)	Run mode (per MHz) (µA)	
STM8AL30 Value low-power line - 16 MHz CPU																			
STM8AL3026	4	1.5	2048	LQFP32, VFQFPN32	1x8-bit / 2x16-bit	IWDG, AWU, beeper			30			1	1	1	1	1.65 to 3.6	0.35	150	-40 to +125
STM8AL3036	8	1.5	2048	LQFP32, VFQFPN32	1x8-bit / 2x16-bit				30			1	1	1	1	1.65 to 3.6	0.35	150	-40 to +125
STM8AL31 Standard low-power line - 16 MHz CPU																			
STM8AL3126	4	2	256	LQFP32, VFQFPN32	1x8-bit / 3x16-bit	IWDG, WWDG, AWU, RTC, beeper	22x12-bit	1x12-bit	30			1	1	1		1.8 to 3.6	0.4	195	-40 to +125
STM8AL3136	8	2	256	LQFP32, VFQFPN32	1x8-bit / 3x16-bit		22x12-bit	1x12-bit	30			1	1	1		1.8 to 3.6	0.4	195	-40 to +125
STM8AL3138	8	2	1024	LQFP48	1x8-bit / 3x16-bit		25x12-bit	1x12-bit	41			1	1	1		1.8 to 3.6	0.4	195	-40 to +125
STM8AL3146	16	2	1024	LQFP32, VFQFPN32	1x8-bit / 3x16-bit		22x12-bit	1x12-bit	30			1	1	1		1.8 to 3.6	0.4	195	-40 to +125
STM8AL3148	16	2	1024	LQFP48	1x8-bit / 3x16-bit		25x12-bit	1x12-bit	41			1	1	1		1.8 to 3.6	0.4	195	-40 to +125
STM8AL3166	32	2	1024	LQFP32, VFQFPN32	1x8-bit / 3x16-bit		22x12-bit	1x12-bit	30			1	1	1		1.8 to 3.6	0.4	195	-40 to +125
STM8AL3168	32	2	1024	LQFP48	1x8-bit / 3x16-bit		25x12-bit	1x12-bit	41			1	1	1		1.8 to 3.6	0.4	195	-40 to +125
STM8AL3L LCD (4x17) or (4x28) Standard low-power line - 16 MHz CPU																			
STM8AL3L46	16	2	1024	LQFP32, VFQFPN32	1x8-bit / 3x16-bit	IWDG, WWDG, AWU, RTC, beeper	21x12.bit	1x12-bit	29			1	1	1		1.8 to 3.6	0.4	195	-40 to +125
STM8AL3L48	16	2	1024	LQFP48	1x8-bit / 3x16-bit		25x12-bit	1x12-bit	41			1	1	1		1.8 to 3.6	0.4	195	-40 to +125
STM8AL3L66	32	2	1024	LQFP32, VFQFPN32	1x8-bit / 3x16-bit		21x12-bit	1x12-bit	29			1	1	1		1.8 to 3.6	0.4	195	-40 to +125
STM8AL3L68	32	2	1024	LQFP48	1x8-bit / 3x16-bit		25x12-bit	1x12-bit	41			1	1	1		1.8 to 3.6	0.4	195	-40 to +125

Notes:
- All STM8AL part numbers have DMA with 4 channels except STM8AL30
- For all STM8AL3Lx6 LCD is(4x17) and for all STM8AL3Lx8 LCD (4x28)

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Automotive EEPROM Portfolio

Full Density range

SO8N & TSSOP8 & DFN

Write time

4ms

TSSOP 145°C

100 Million cycles per device

SPI 20Mhz

I2C 1MHz

MicroWire 2MHz

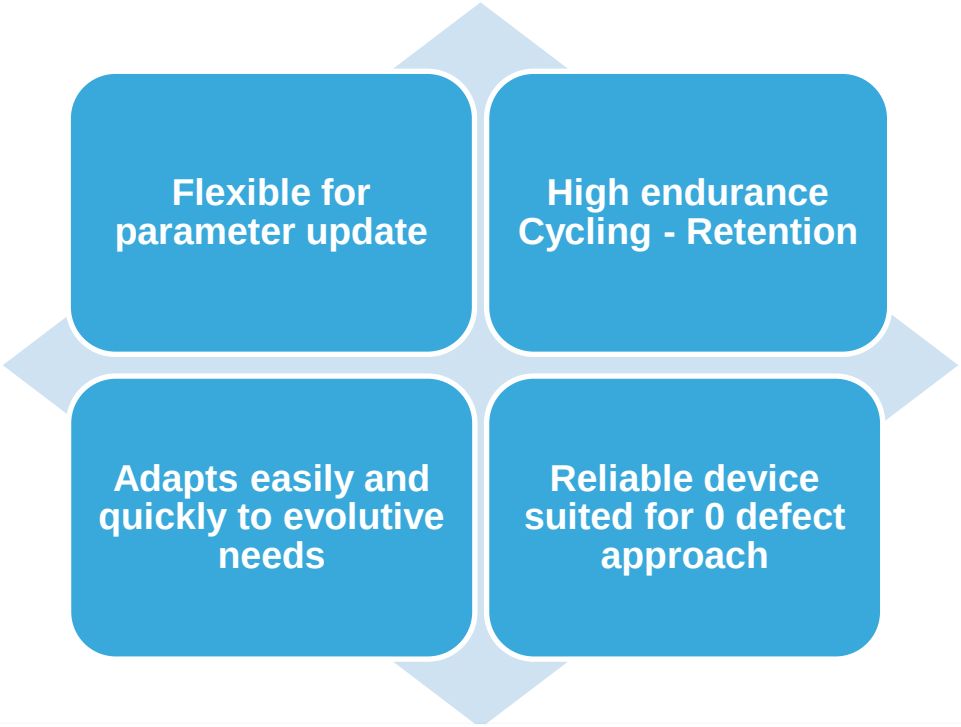
Low power

1.8V

Error Code Correction

Good reasons to use EEPROM in cars

Applications in cars becomes Smarter, Customized and need Datalogging
Parameters are multiplying



External EEPROM is the first choice for High Quality and Flexible parameter mangement

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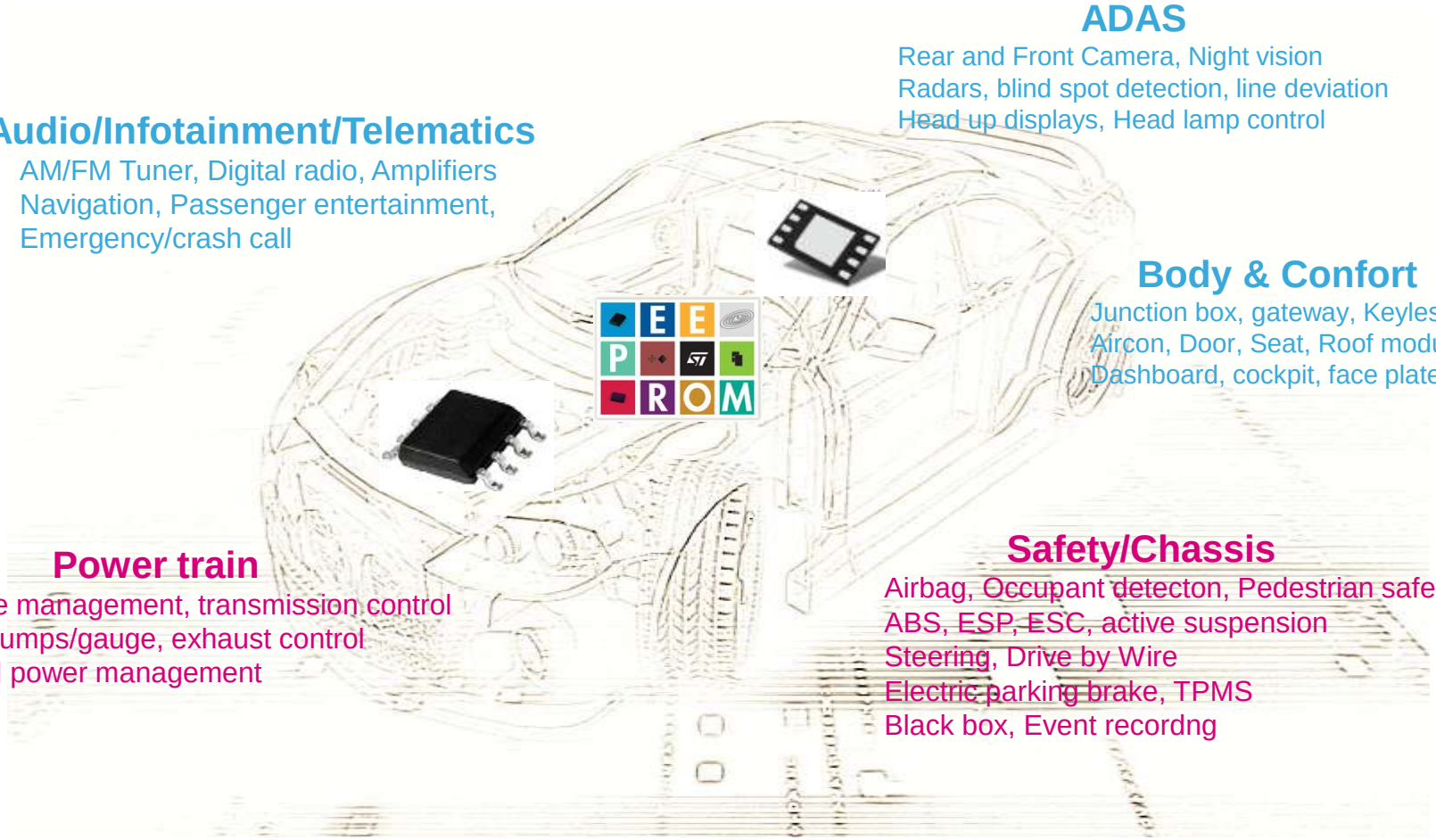
Automotive EEPROM

ADAS

Rear and Front Camera, Night vision
Radars, blind spot detection, line deviation
Head up displays, Head lamp control

Audio/Infotainment/Telematics

AM/FM Tuner, Digital radio, Amplifiers
Navigation, Passenger entertainment,
Emergency/crash call



Body & Confort

Junction box, gateway, Keyless Entry
Aircon, Door, Seat, Roof modules
Dashboard, cockpit, face plate

Power train

Engine management, transmission control
Fuel pumps/gauge, exhaust control
Hybrid power management

Safety/Chassis

Airbag, Occupant detecton, Pedestrian safety
ABS, ESP, ESC, active suspension
Steering, Drive by Wire
Electric parking brake, TPMS
Black box, Event recordng

Serial EEPROMs all around the car

Trace ability, calibration tables, Manufacturing & user settings, error flags, event recording, Datalogging

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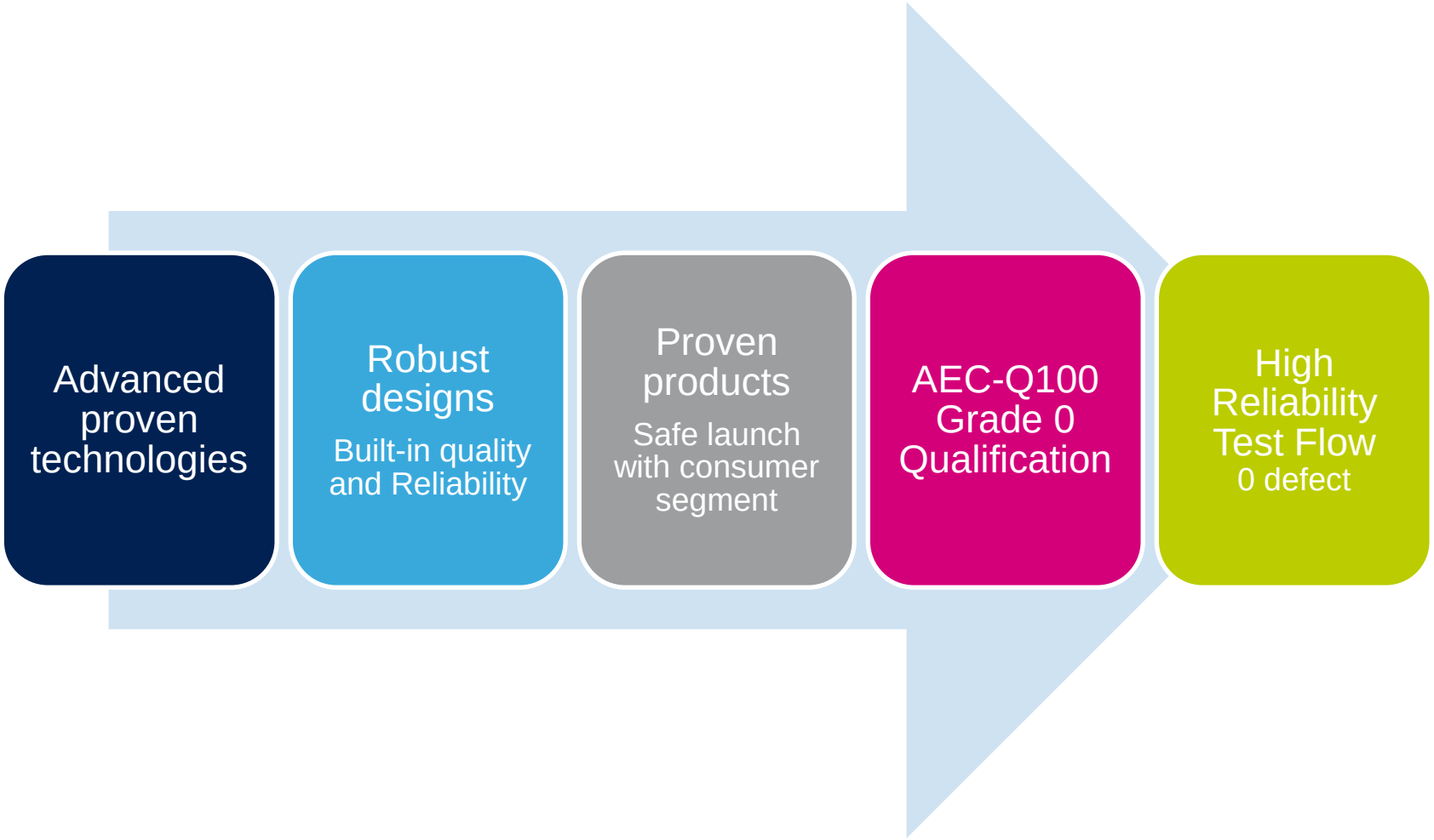
ST EEPROM – Automotive grade



New Automotive EEPROM portfolio

Family	Temp.	1Kb	2Kb	4Kb	8Kb	16Kb	32Kb	64Kb	128Kb	256Kb	512Kb	1Mb
SPI	**125°C** 1.8V; 5.5V	NA	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8
	145°C 2.5V; 5.5V	NA	*	TSSOP8	TSSOP8	TSSOP8	TSSOP8	TSSOP8	TSSOP8	TSSOP8	TSSOP8	TSSOP8
	>150°C	NA	NA	NA	NA	Bare die	*	Bare die	*	Bare die	*	*
I2C	**125°C** 1.8V; 5.5V	NA	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8 DFN2X3	SO8N TSSOP8
Micro Wire	**125°C** 1.8V; 5.5V	SO8N TSSOP8 *	SO8N TSSOP8 *	SO8N TSSOP8 *	SO8N TSSOP8 *	SO8N TSSOP8 *						

* On request

Full range TSSOP8

SPI TSSOP 145°C

DFN2X3 125°C

Error Code Correction

1.8V Low power

SPI 20Mhz I2C 1MHz

4 million cycles

Write time 4ms

Go to http://www.st.com/automotiveEEPROM

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SPI part numbers

Memory capacity	SPI Bus	Density code	-A125 -40°C/+125°C	-A145 40°C/+145°C
2Kbit	M95	020	-DRMN3TP/K *(SO8N)* -DRDW3TP/K *(TSSOP)* -DRMF3TP/K *(MLP2x3)*	-DWDW4TP/K *(TSSOP)*
4Kbit		040		
8Kbit		080		
16Kbit		160		
32Kbit		320		
64Kbit		640		
128Kbit		128		
256Kbit		256		
512Kbit		512		
1Mbit		M01	-DWMN3TP/K *(SO8N)* -DWDW3TP/K *(TSSOP)*	

I2C part numbers

Memory capacity	I2C Bus	Density code	-A125 (-40°C/+125°C)
2Kbit	M24	C02	-DRMN3TP/K *(SO8N)* -DRDW3TP/K *(TSSOP)* -DRMF3TP/K *(MLP2X3)*
4Kbit		C04	
8Kbit		C08	
16Kbit		C16	
32Kbit		C32	
64Kbit		C64	
128Kbit		128	
256Kbit		256	
512Kbit		512	
1Mbit		M01	-DWMN3TP/K *(SO8N)* -DWDW3TP/K *(TSSOP)*

Microwire part numbers

Memory capacity	Microwire bus	Density code	-A125 (-40°C/+125°C)
1Kbit	M93	C46	-DRMN3TP/K *(SO8N)* -DRDW3TP/K *(TSSOP)* -DRMF3TP/K *(MLP2X3)*
2Kbit		C56	
4Kbit		C66	
8Kbit		C76	
16Kbit		C86	