Infineon Automotive MOSFET

OptiMOS™ 7 Overview
IFX's next leading edge Automotive MOSFET Technology

5th Trench Technology
released by ATV MOSFET

State of the art dual poly
trench technology

Leading Edge
300 mm
Technology & Production

25% $R_{DS(on)}$ reduction
vs. OptiMOS™ 6 40 V

40% $R_{DS(on)}$ reduction
vs. OptiMOS™ 5 80 V/100 V

Infineon's **unique copper metallization**
Outstanding electrical and thermal conductivity

Ruggedness improvement
High avalanche
current capability

Reduction of Switching losses

OptiMOS™ 7 Overview
Features, Benefits & Applications

Key features

- Very low $R_{DS(on)}$
- High Avalanche capability
- High SOA ruggedness
- Fast switching times (turn on/off)
- Leadless Packages w/ Cu-Clip
- Leading thin wafer Cu-technology
- Leading 300 mm in-house production
- Extended qualification beyond AEC-Q101
- Infineon Automotive design and quality
- New top-side cooled package offering

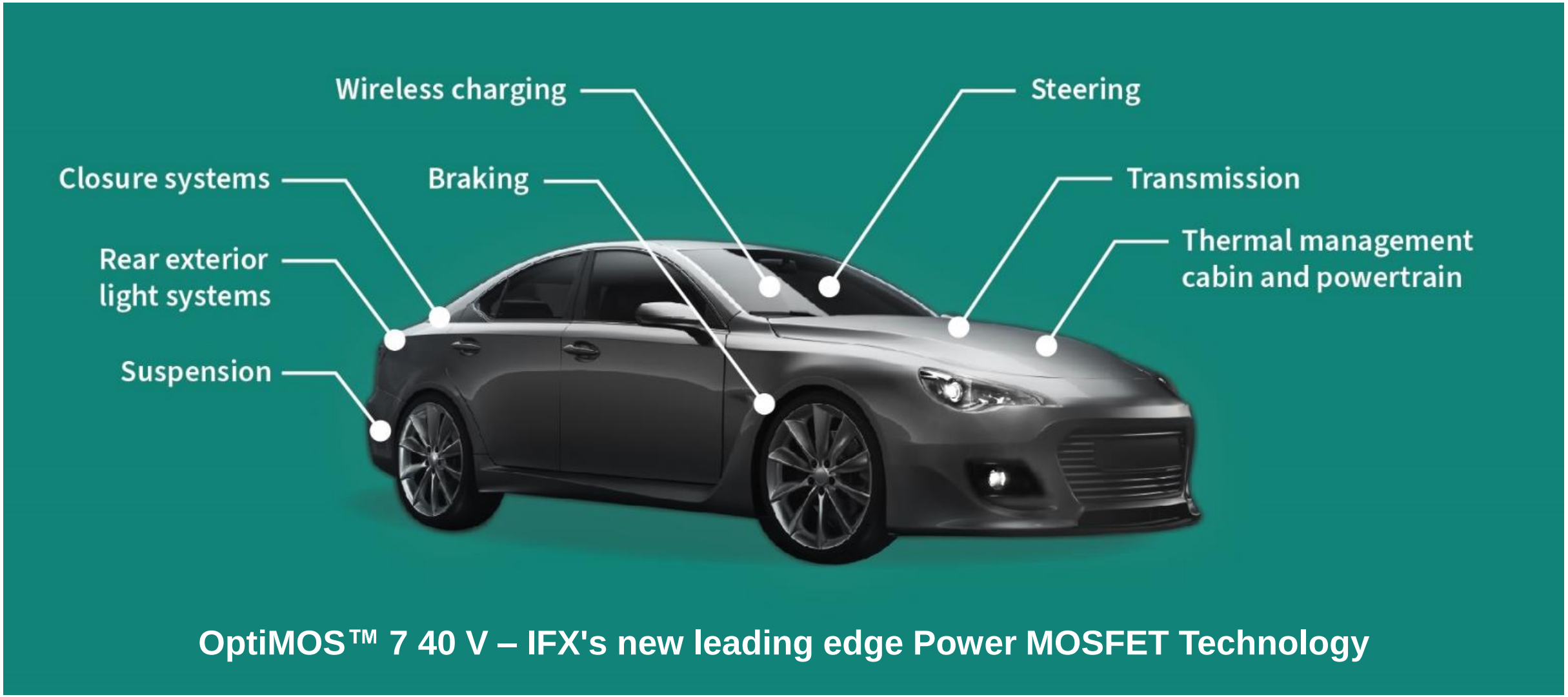
Key benefits

- High power density & efficiency
- Increased current capability
- Improved design ruggedness
- Superior switching performance
- Small footprint & efficient cooling
- Automotive quality product design
- High automotive quality production

Key advantages

- $R_{DS(on)}$ reduction
  - 25% vs OptiMOS™ 6 40 V
  - 40% vs OptiMOS™ 5 80 V/100 V
- ID current increased from prior gen.

OptiMOS™ 7 40 V



OptiMOS™ 7 40 V Overview
Automotive Packages: Innovative & Robust Quality

OptiMOS™ 7 40 V – IFX's new leading edge Power MOSFET Technology
IFX's Industry benchmark in $R_{DS(on)}$*A, power-density, current capability, switching performance, chip ruggedness
Available in IFX's famous robust package portfolio of 3x3, 5x6, 5x6 Dual, 7x8, 10x12 packages
Extended by top-side cooling packages for most efficient Automotive designs
https://www.infineon.com/cms/en/product/promopages/OptiMOS7_40V/
https://www.infineon.com/SSO10T/

Infineon Automotive Packages Innovative & Robust				
S3O8 Single (TSDSON-8) 3x3	SSO8 Dual (TDSON-8) 5x6	SSO8 Single (TDSON-8) 5x6	sTOLL Single (HSOF-5) 7x8	TOLL Single (HSOF-8) 10x12
				
OptiMOS™ 7 40 V				

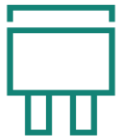
OptiMOS™ 7 40 V Overview
Focus Applications & Packages

Electric power steering

BMS

DC-DC HV/12V

Electric parking brake



Fuse Box

Application / Packages	Drives	Power Distribution Safety Switches	Power Conversion
S3O8 (3x3)	x		x
SSO8 (5x6 Dual)	x		x
SSO8 (5x6 Single)	x	x	x
sTOLL (7x8)	x	x	x
TOLL (10x12)	x	x	x

https://www.infineon.com/cms/en/product/promopages/OptiMOS7_40V/

OptiMOS™ 7 40 V – Leading Technology for Drives + Power Distribution + Power Conversion

- Highest Avalanche capability ever in a Trench FET
- Lowest Ron in portfolio available
- Small Qg for higher efficiency and less switching losses

	IPC100N04S4-02	IPC100N04S5-1R2	IAUC120N04S6N006	IAUCN04S7N004
$R_{DS(on)}$ max. 10 V	2.4 m Ohm (82%)	1.2 mOhm (63%)	0.6 mOhm (26%)	0.44 mOhm
Drain current	100 A	100 A	120 A	175 A
I_{AS}	100 A (175%)	100 A (175%)	120 A (146%)	175 A
E_{AS} @ 50 A	315 mJ (285%)	480 mJ (188%)	900 mJ (0%)	900 mJ
ID,PULSE	400 A (438%)	400 A (438%)	1500 A	1750 A
$V_{GS(th)}$ Deviation	2.0 V	1.2 V	0.8 V	0.8 V

OptiMOS™ 7 40 V – Highest Avalanche Current Rating + Lowest $R_{DS(on)}$ – Perfect Fit for Safety Switches and Power Distribution

- Highest avalanche current rating in portfolio (also at same $R_{DS(ON)}$)
- Perfect fit for Safety Switches / Power Distribution applications
- Easy replacement for OptiMOS™ 5 & 6
- More compact design for Power Distribution ECUs
- Low deviation in VGSTH – low parameter spread (good for MOSFET paralleling)

Battery disconnect

Zonal Power Distribution

Type	Package	Marking
IAUC120N04S6N006	PG-TDSON-8-53	6N04N006

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Drain current	I_D	V_{GS}=10V, Chip Limitation[1,2)]	405	A
		V_{GS}=10V, DC current[3)]	120	
		T_a=85°C, V_{GS}=10V, R_{thJA} on 2s2p[4,5)]	55	
Pulsed drain current[5)]	$I_{D,pulse}$	T_C=25°C, t_p=100µs	1500	
Avalanche energy, single pulse[2)]	E_{AS}	I_D=60A, R_G=25Ω	750	mJ
Avalanche current, single pulse	I_{AS}	R_G=25Ω	120	A

OptiMOS™ 7 Automotive Power MOSFET, 40 V

IAUCN04S7N006

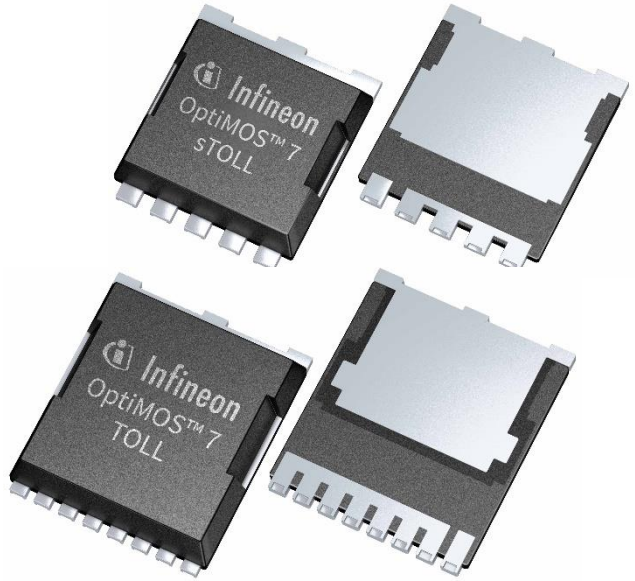
Maximum ratings

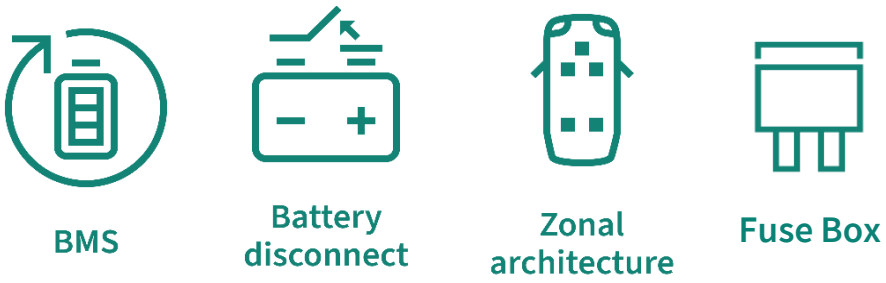
at Tj=25 °C, unless otherwise specified

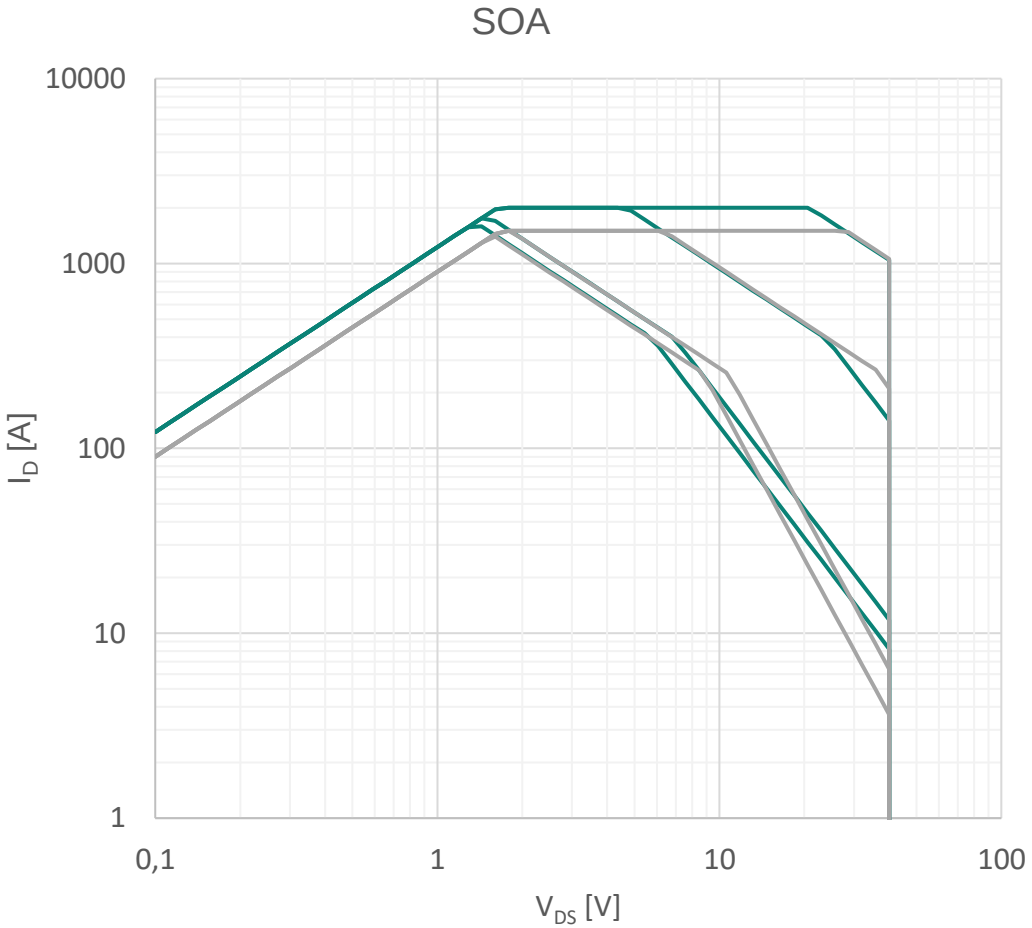
Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	V_{GS}=10 V, Chip limitation[1,2)]	410	A
		V_{GS}=10V, DC current[1)]	175	
		T_a=85 °C, V_{GS}=10 V, R_{thJA} on 2s2p[2,3)]	60	
Pulsed drain current[2)]	$I_{D,pulse}$	T_C=25 °C, t_p= 100 µs	1500	
Avalanche energy, single pulse[2)]	E_{AS}	I_D=75 A	358	mJ
Avalanche current, single pulse	I_{AS}	–	150	A
Gate source voltage	V_{GS}	–	±20	V
Power dissipation	P_{tot}	T_C=25 °C	164	W
Operating and storage temperature	T_j, T_{stg}	–	-55 ... +175	°C
IEC climatic category; DIN IEC 68-1	–	–	55/175/56	

OptiMOS™ 7 40 V with 25% better SOA ruggedness
Perfect Fit for Power Distribution & Safety Switches

– Average 25% and up to 35% SOA improvement vs. OptiMOS™ 6
– Perfect fit to reduce steady on losses or enable higher currents





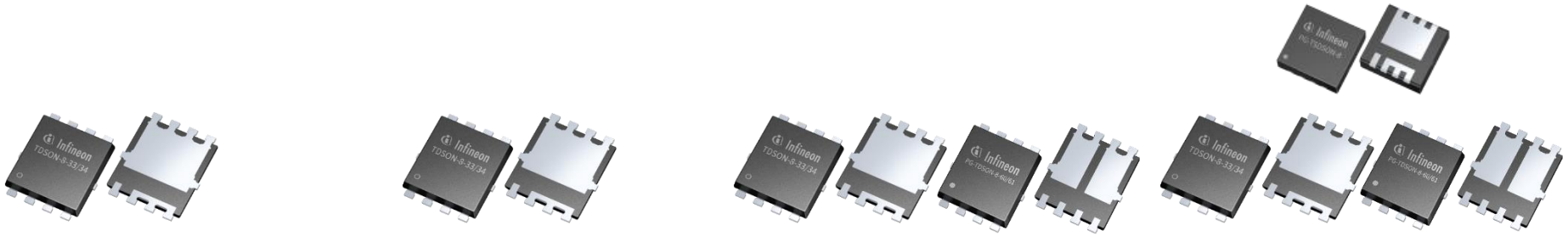


OptiMOS™ 7 40 V – Low Gate Charge for high Frequency Switching – Perfect Fit for efficient Drives and Power Conversion

- Small gate charge for lowest gate drive currents
- Optimized for current source gate drivers with low Rg
- Small Qg for higher efficiency and less switching losses

Electric power steering

DC-DC



	IPC80N04S4-03	IPC100N04S5-2R8	IAUC100N04S6N028	IAUZN04S7N028 IAUCN04S7N030(D)
Q_{gtot}	71 nC	45 nC	29 nC	26 nC
Q_{gs}	32 nC	12 nC	8 nC	5 nC
Q_{gd}	18 nC	11 nC	7.4 nC	6 nC
FOM	213	126	81.2	72.8
Rg	1.4	2.18	3.2	1.5
T (Tau) V_{GS} = 10 V	10 ns	9.8 ns	9.3 ns	3.9 ns

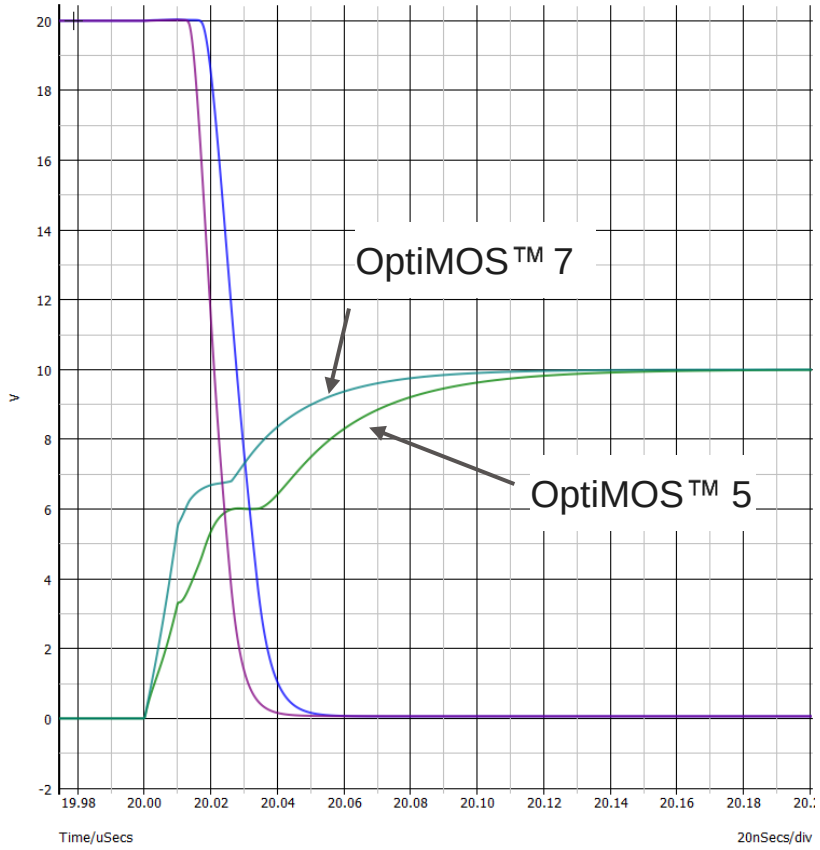
OptiMOS™ 7 40 V with optimized Turn On / Off Switching Perfect Fit for efficient Drives and Power Conversion

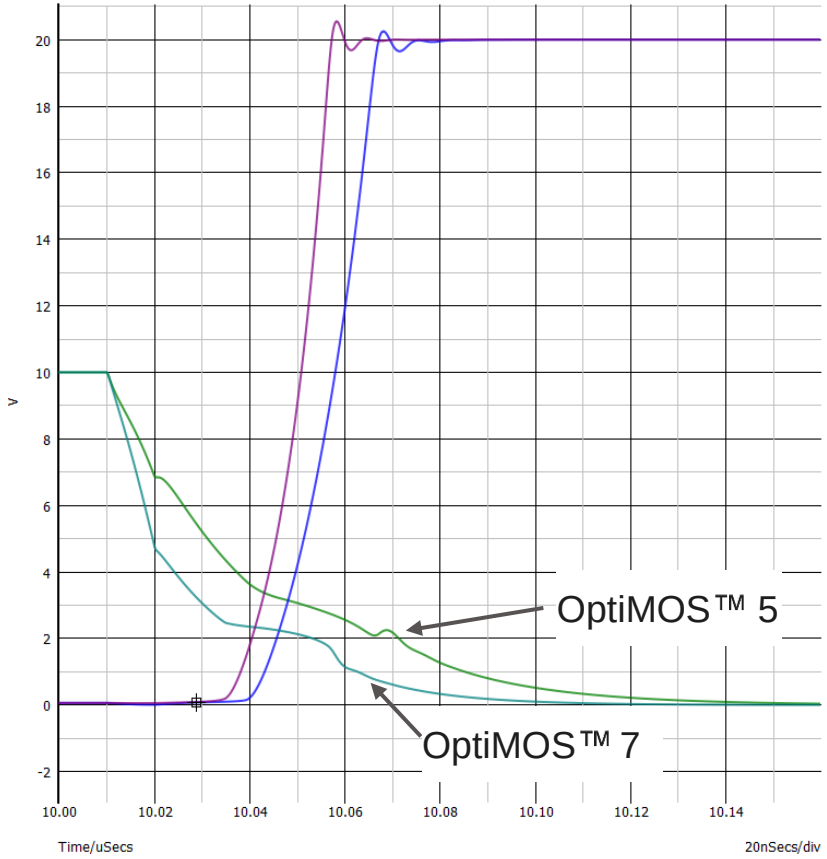
Up to 20% faster switching times

- enables higher frequency for DCDCs
- Higher duty cycle by achieving lower deadtimes

Electric power steering

DC-DC



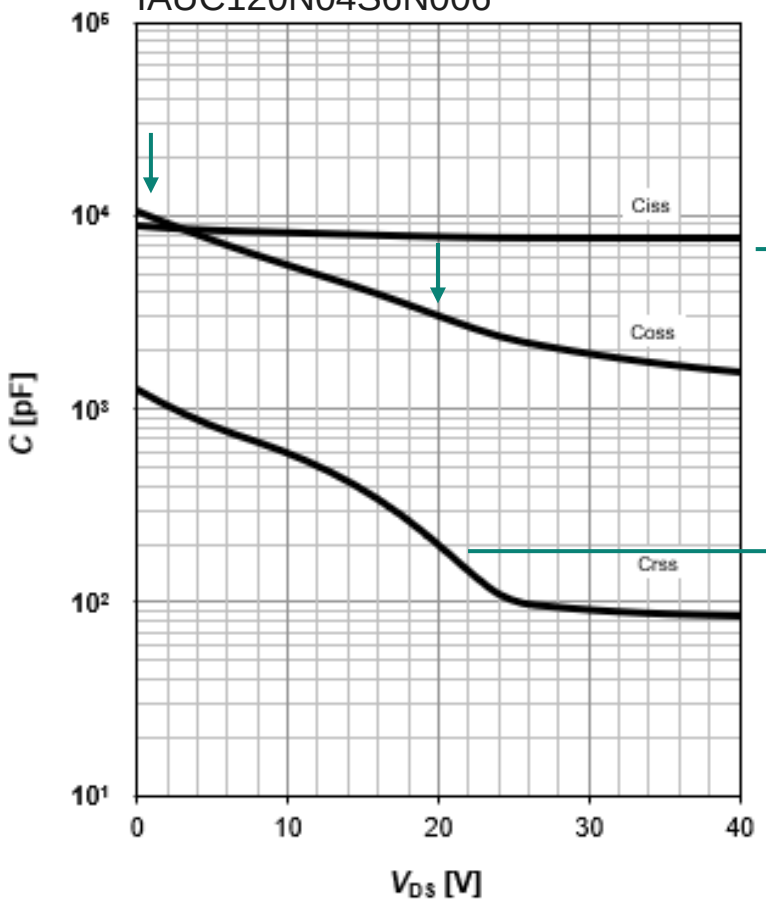


OptiMOS™ 7 40 V with optimized input & output capacitances

Lower values & better linearity for overall improved switching behavior

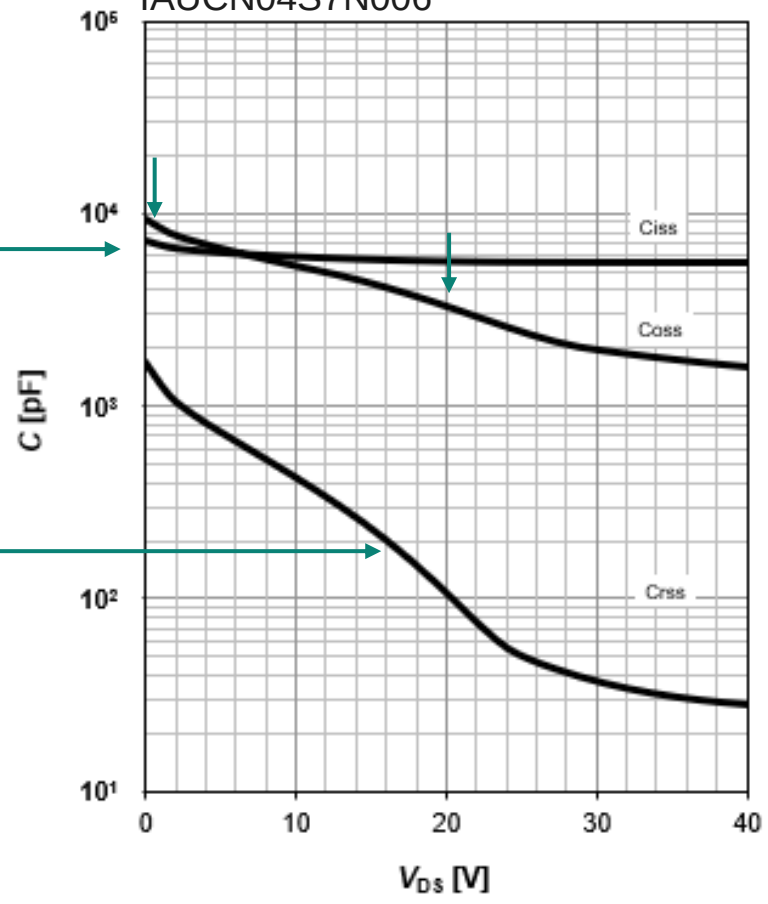
$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz

IAUC120N04S6N006



$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz

IAUCN04S7N006



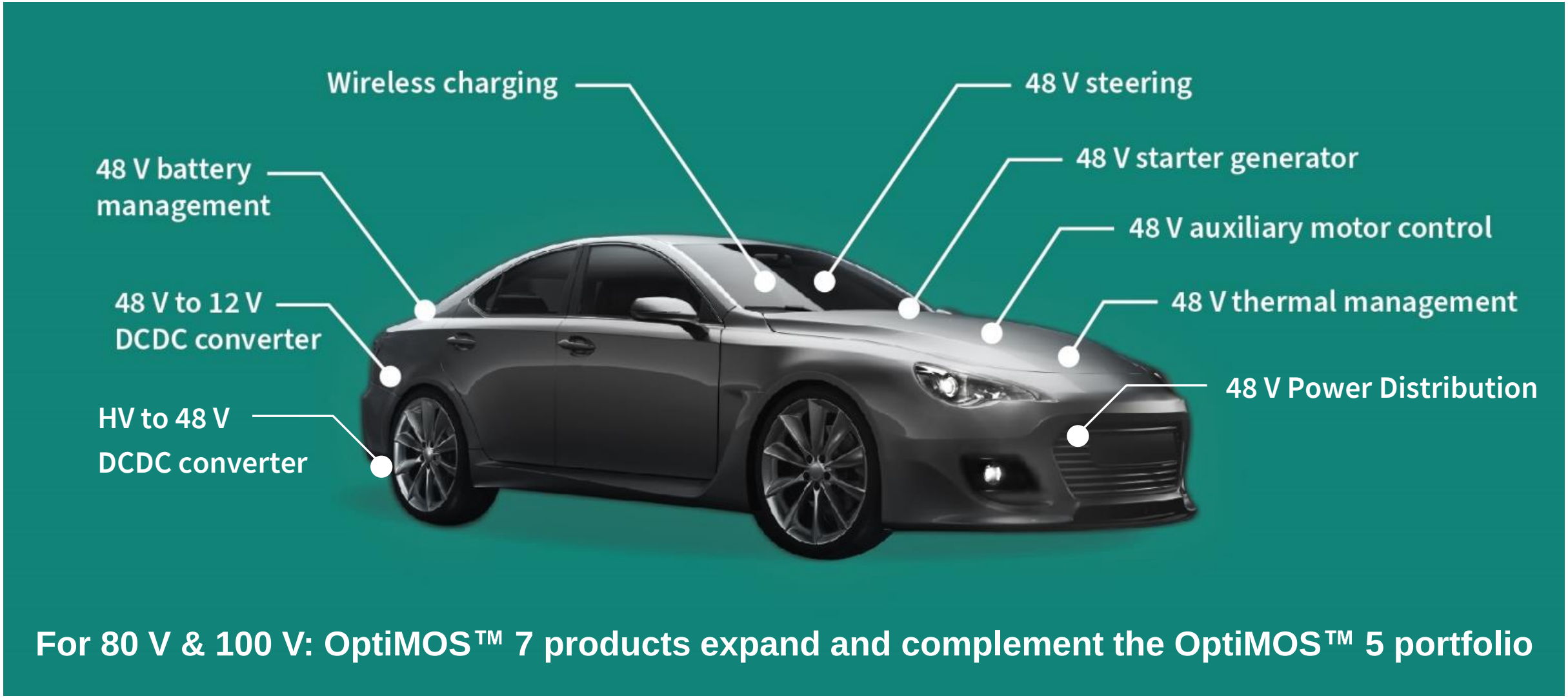
15% lower input capacitance (C_{iss})

10% lower output capacitance (C_{oss})

6% more stable output capacitance (C_{oss})

Up to 45% less reverse transfer capacitance (C_{rss})

OptiMOS™ 7 80 V and 100 V



For 80 V & 100 V: OptiMOS™ 7 products expand and complement the OptiMOS™ 5 portfolio

Infineon's 80 V & 100 V Automotive MOSFETs
Applications Overview: Automotive

Powertrain (Vehicle Motion)	Safety (Vehicle Automation) (Chassis)	Body (User Experience) (Electrical/Electronic Architecture)
48 V Starter Generator	48 V Suspension	DC / DC (HV-48 V)
Fuel Injection	48 V EPS	DC / DC (48 V-12 V)
48 V – 96 V Traction Inverter	48 V Braking	48 V Power Distribution
48 V Pumps (Water, Oil, Fuel)		48 V Battery Main Switch
48 V eBooster, eTurbo		Wireless Charging
48 V Engine Cooling Fan		48 V eClimate Compressor
		LED Front / Rear Lighting

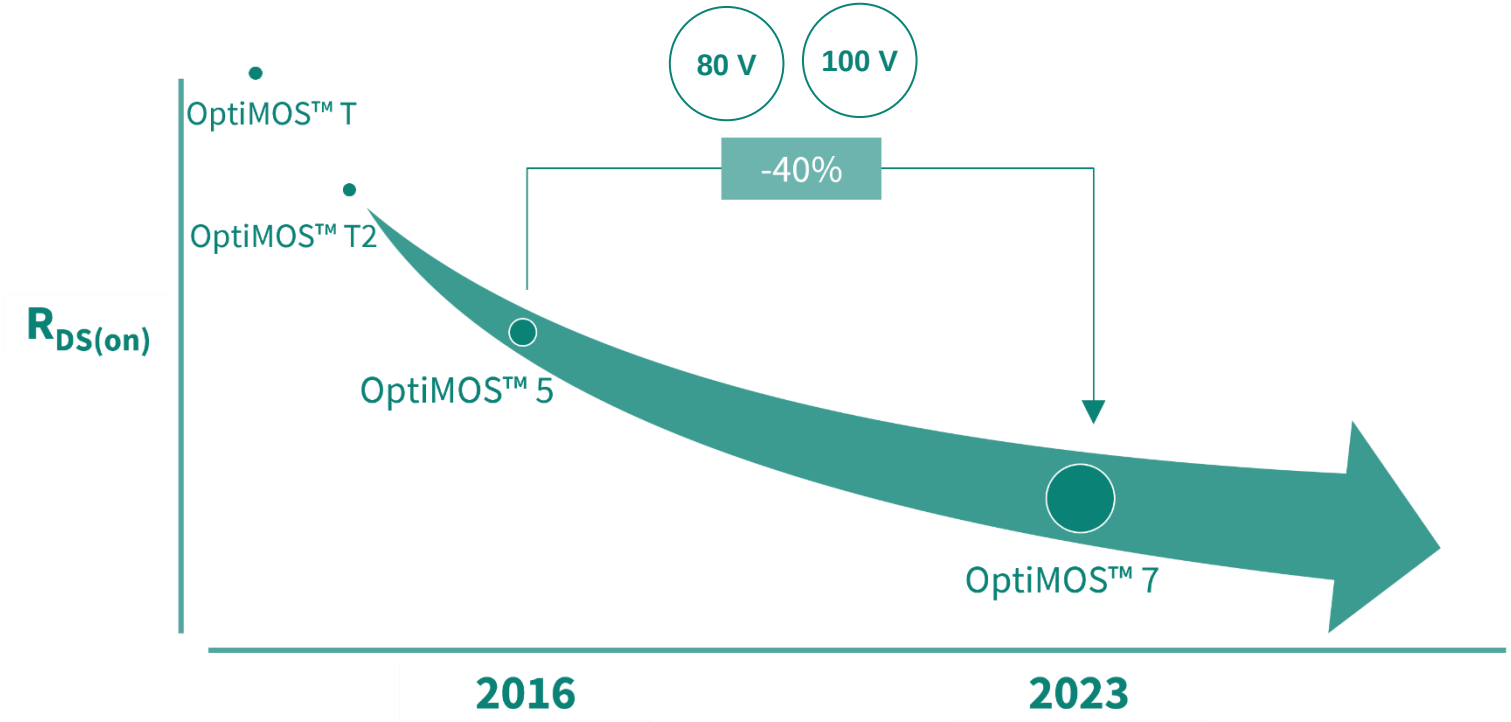
Automotive

More Transportation Applications

eMotorcycle Truck CAV

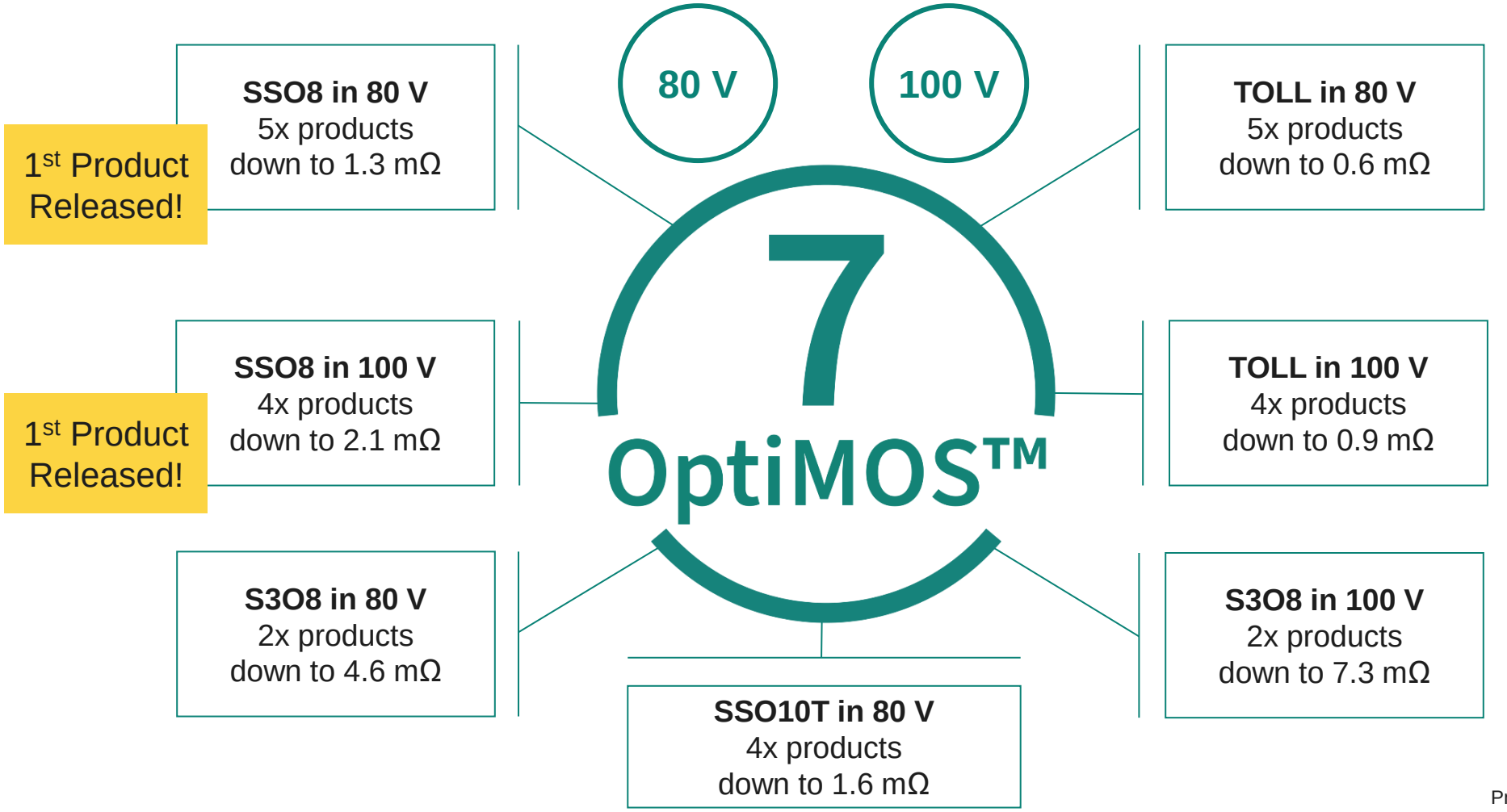
Infineon's OptiMOS™ 7 80 V and 100 V Automotive MOSFETs
The next power semiconductor technology is here: OptiMOS™ 7

$R_{DS(on)}$ improvement over time / technology



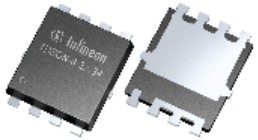
Infineon's OptiMOS™ 7 80 V and 100 V Automotive MOSFETs
26 new products for 80 V & 100 V in S3O8, SSO8, SSO10T and TOLL

First products released! The rest are coming soon.



Preliminary Information. Subject to change.

Automotive MOSFET Package Overview: OptiMOS™ 7
80 V & 100 V focus

	Leadless						Top side cooled
Name	**S3O8 (TSDSON-8)**		**SSO8 (TDSON-8)**		**TOLL (HSOF-8)**		**SSO10T (LHDSO-10)**
3D View							
Footprint	3x3 mm²		5x6 mm²		10x12 mm²		5x7 mm²
Configuration	Single		Single		Single		Single
Available in Si technology 80 V	OptiMOS™ 5		OptiMOS™ 5	**OptiMOS™ 7** NEW	OptiMOS™ 5		
In development Si technology 80 V		**OptiMOS™ 7**		**OptiMOS™ 7**		**OptiMOS™ 7**	**OptiMOS™ 7**
Available in Si technology 100 V	OptiMOS™ 5		OptiMOS™ 5	**OptiMOS™ 7** NEW	OptiMOS™ 5		
In development Si technology 100 V		**OptiMOS™ 7**		**OptiMOS™ 7**		**OptiMOS™ 7**	

7 OptiMOS™

First OptiMOS™ 7 80 V product released is available in SSO8 package, part number; IAUCN08S7N013

For more information go to https://www.infineon.com/IAUCN08S7N013/

First OptiMOS™ 7 100 V product released is available in SSO8 package, part number; IAUCN10S7N021

For more information go to https://www.infineon.com/IAUCN10S7N021/

Preliminary Information. Subject to change.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