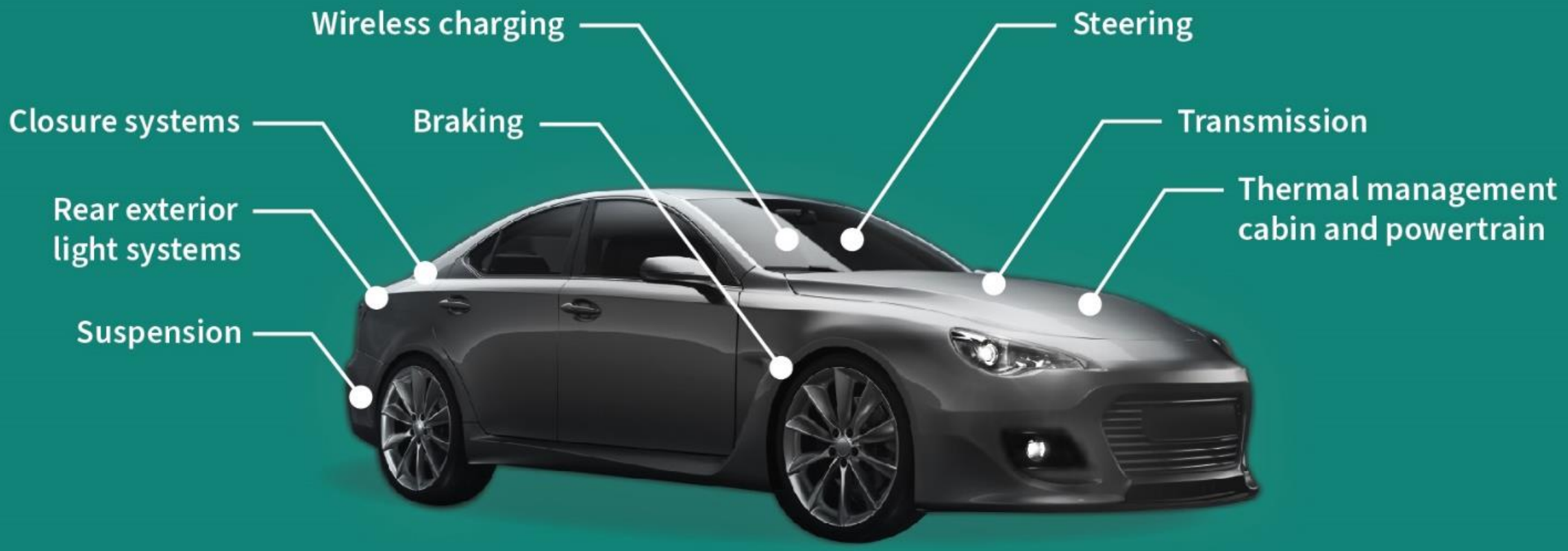


Infineon Automotive MOSFET

May 2024

restricted

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
300mm
Technology & Production



25% RDS(on) reduction
vs. OptiMOS™ 6 40V

40% RDS(on) reduction
vs. OptiMOS™ 5 80V/100V

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

Ruggedness improvement
High avalanche current capability

Reduction of Switching losses

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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 300mm in-house production
- Extended qualification beyond AEC-Q101
- Infineon Automotive design and quality
- Top-side cooled package offering

Key benefits

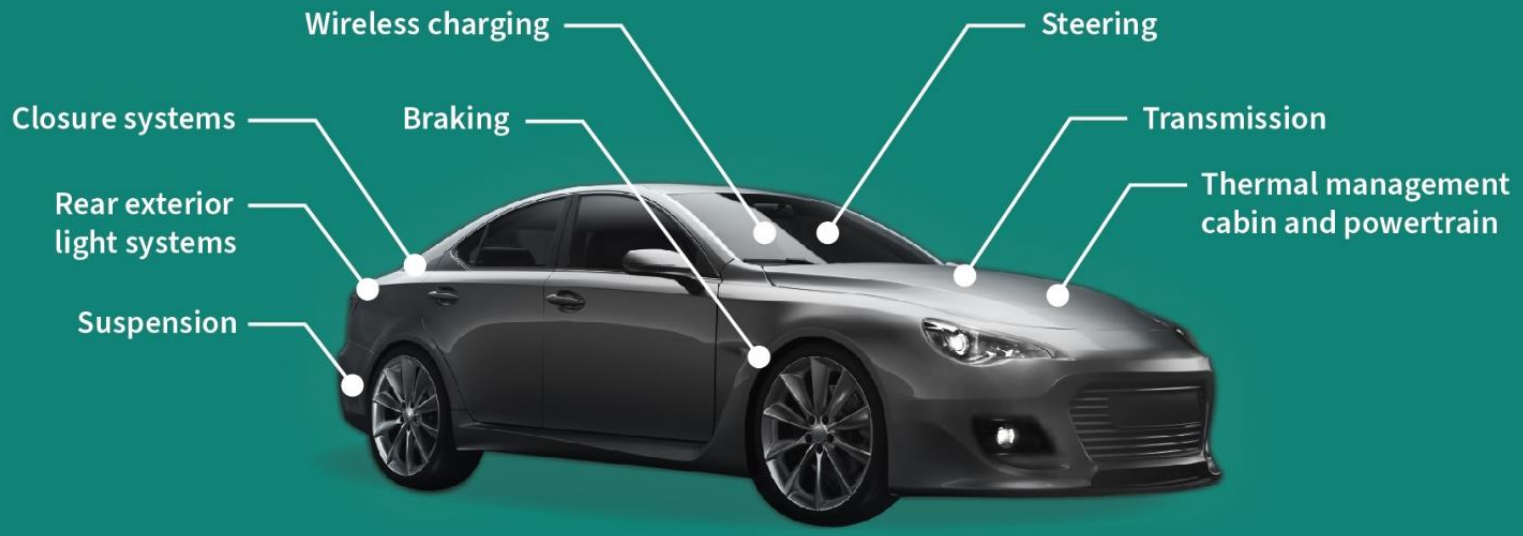
- High power density & efficiency
- Increased current capability
- Improved design ruggedness
- Superior switching performance
- High automotive quality production
- Small footprint & efficient cooling
- Automotive quality product design
- Minimized conduction losses

Key Advantages

- $R_{DS(on)}$ reduction
  - 25% vs OptiMOS™ 6 40V
  - 40% vs OptiMOS™ 5 80V/100V
- I_D current increased from prior gen.
- Industry best $R_{DS(on)}$ for each package class in 80V and 100V
- Industry best FoM ($R_{DS(on)}$ x Q_g) in most package classes at 80V & 100V

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OptiMOS™ 7 40V



OptiMOS™ 7 40V – IFX's new leading edge Power MOSFET Technology

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

OptiMOS™ 7 40V – IFX's new leading edge Power MOSFET Technology

IFX's Industry benchmark in Rdson*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 40V

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OptiMOS™ 7 40V Overview
Focus Applications & Packages



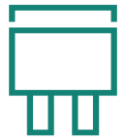

Electric power steering


BMS


DC-DC HV/12V




Electric parking brake


Fuse Box

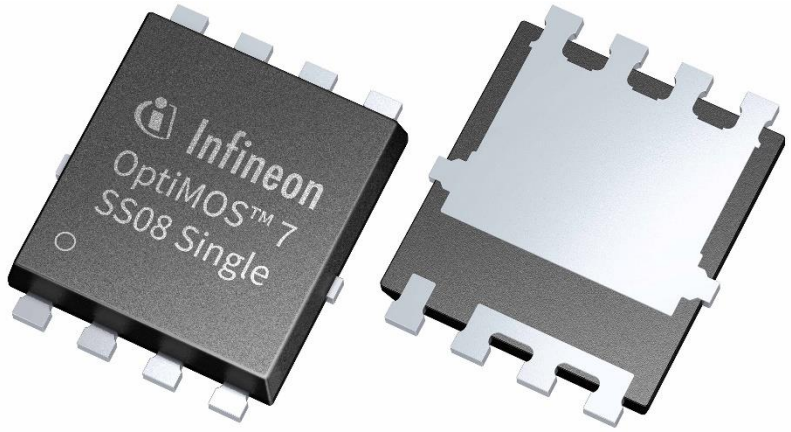
Application / Packages	Drives	Power Distribution Safety Switches	Power Conversion
S3O8 (3x3)	x		x
SSO8 (5x6 Dual)	x		x
SSO8 (5x6 Single)	x	x	x
sTOLL (7x8)	x	x	x
TOLL (10x12)	x	x	x

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

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OptiMOS™ 7 40V - 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
RDSON max. 10V	2.4mOhm (82%)	1.2mOhm (63%)	0.6mOhm (26%)	0.44mOhm
Drain current	100A	100A	120A	175A
I_{AS}	100A (175%)	100A (175%)	120A (146%)	175A
E_{AS} @ 50A	315mJ (285%)	480mJ (188%)	900mJ (0%)	900mJ
ID,PULSE	400A (438%)	400A (438%)	1500A	1750A
$V_{GS(th)}$ Deviation	2.0V	1.2V	0.8V	0.8V

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OptiMOS™ 7 40V - Highest Avalanche Current Rating + Lowest R_{DSON} Perfect Fit for Safety Switches and Power Distribution

- Highest avalanche current rating in portfolio (also at same R_{DSON})
- Perfect fit for Safety Switches / Power Distribution applications
- Easy replacement for OptiMOS™ 5 & 6
- More compact design for Power Distribution ECUs
- Low deviation in V_{GSTH} – 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

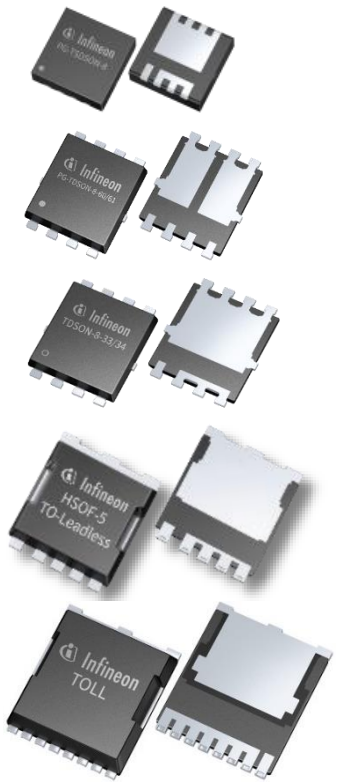
OptiMOS™ 7 Automotive Power MOSFET, 40 V

IAUCN04S7N006

Maximum ratings

at Tj=25 °C, unless otherwise specified

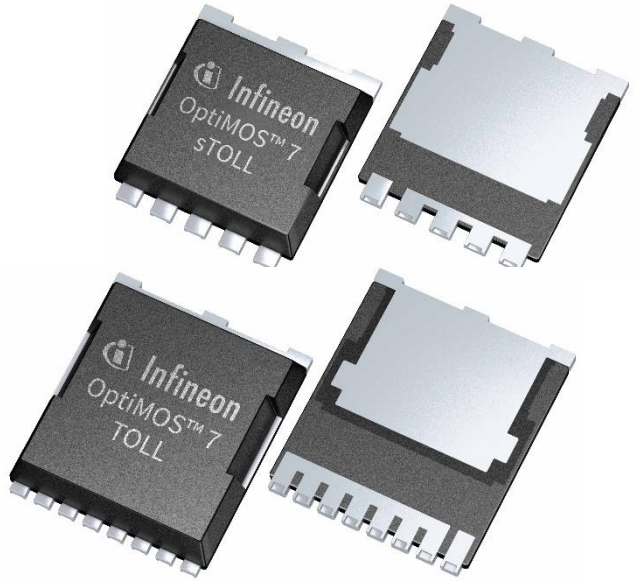
Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	V_{GS}=10 V, Chip limitation[1,2)]	410	A
		V_{GS}=10V, DC current[1)]	175	
		T_a=85 °C, V_{GS}=10 V, R_{thJA} on 2s2p[2,3)]	60	
Pulsed drain current[2)]	$I_{D,pulse}$	T_C=25 °C, t_p= 100 µs	1500	
Avalanche energy, single pulse[2)]	E_{AS}	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	

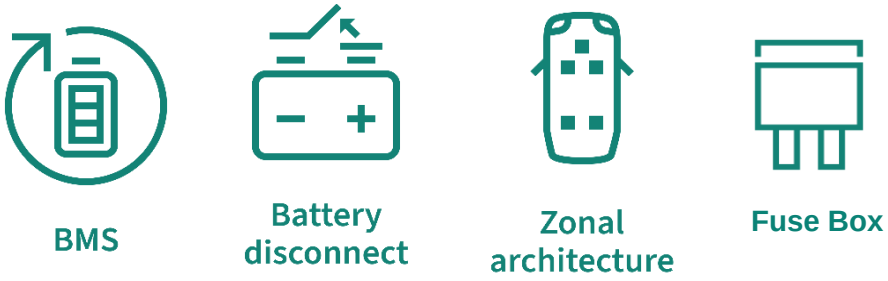


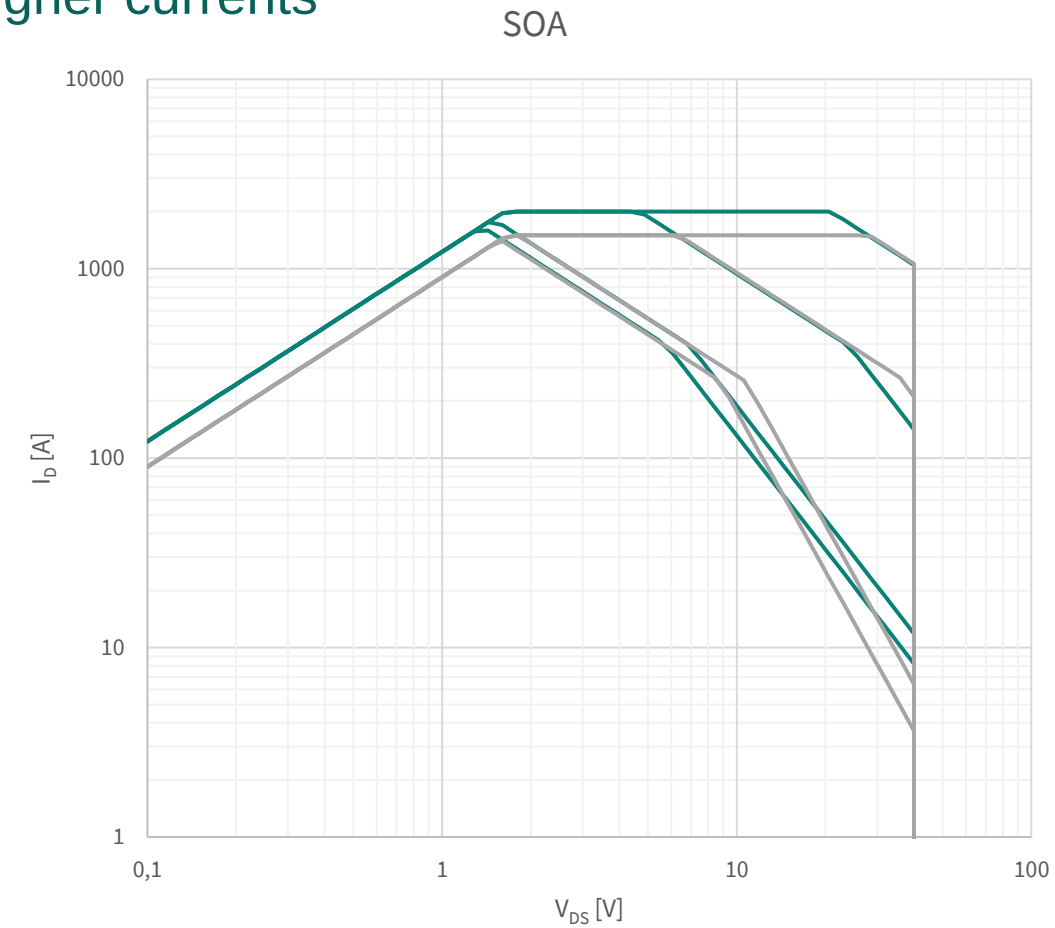
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OptiMOS™ 7 40V with 25% better SOA ruggedness
Perfect Fit for Power Distribution & Safety Switches

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







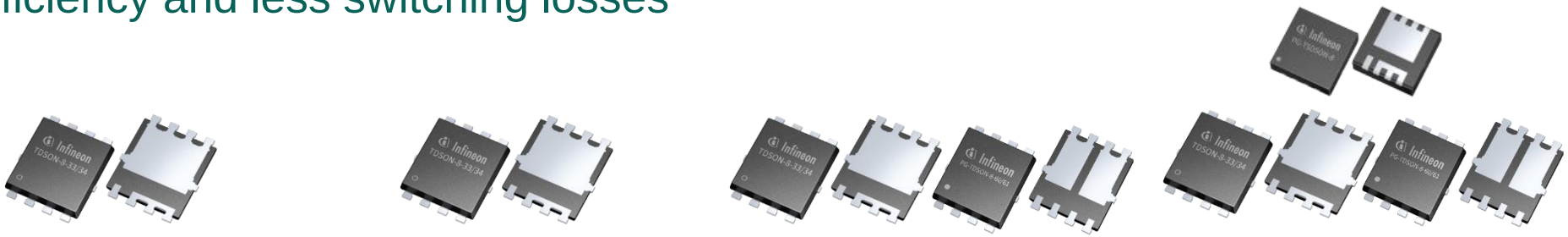
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OptiMOS™ 7 40V - Low Gate Charge for high Frequency Switching
Perfect Fit for efficient Drives and Power Conversion

- 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} = 10V	10 ns	9.8 ns	9.3 ns	3.9 ns

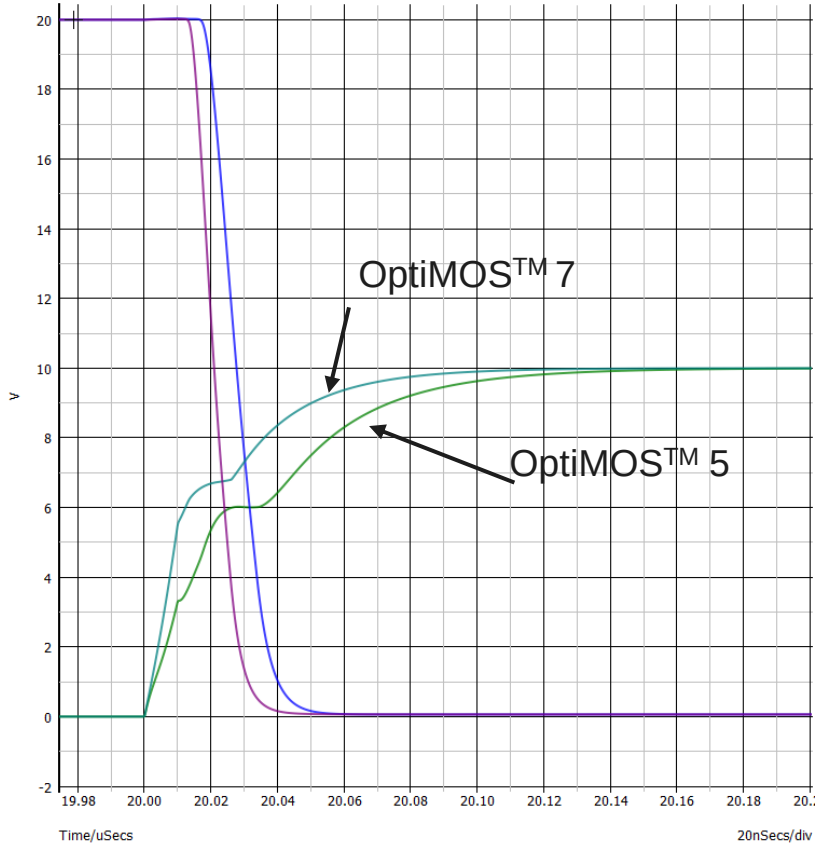
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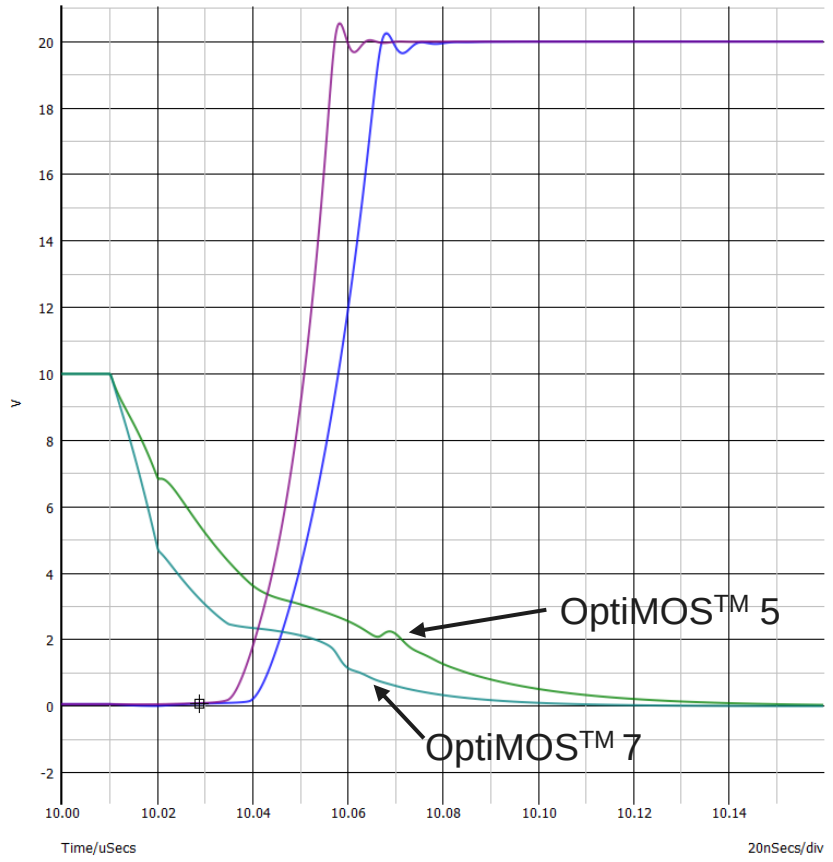
OptiMOS™ 7 40V with optimized Turn On / Off Switching
Perfect Fit for efficient Drives and Power Conversion

Up to 20% faster switching times
- enables higher frequency for DCDCs
- Higher duty cycle by achieving lower deadtimes

Electric power steering

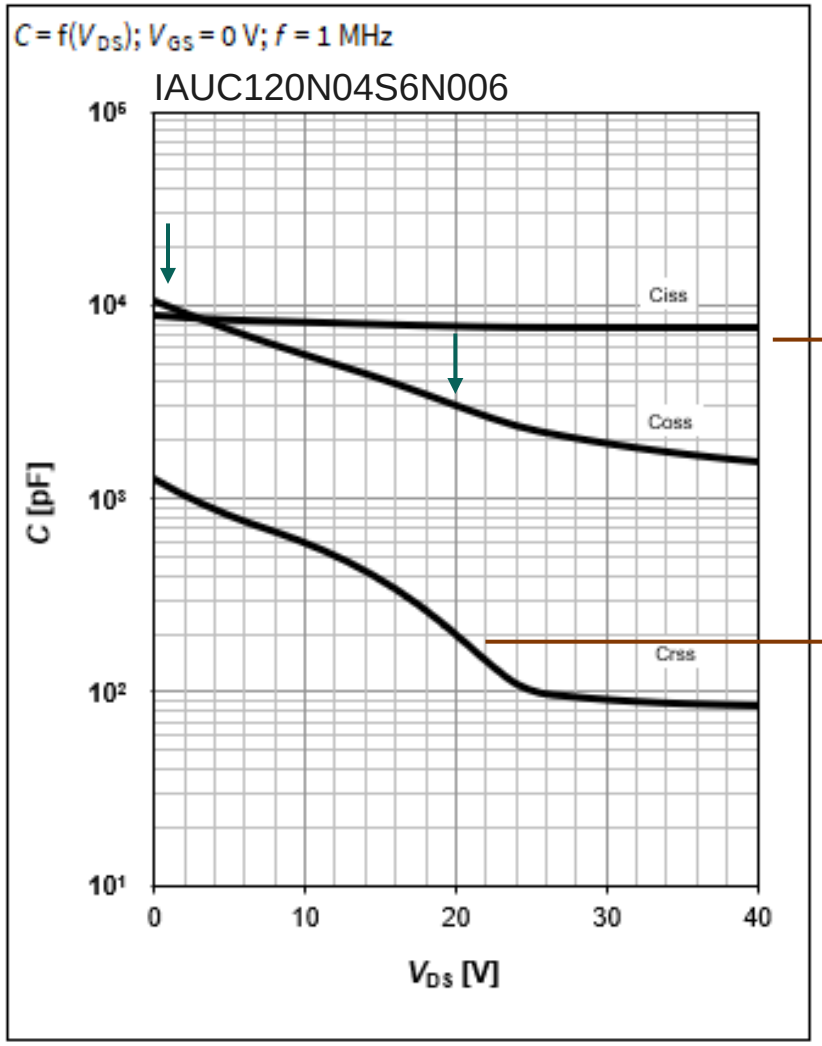
DC-DC

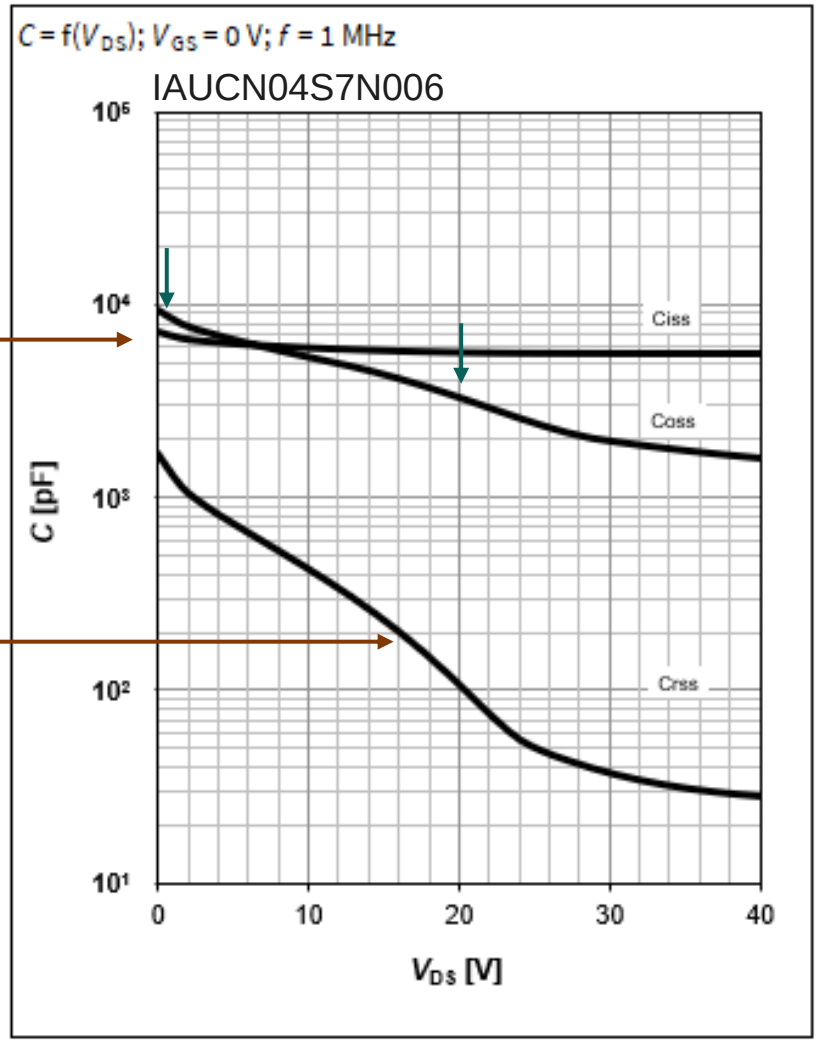




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OptiMOS™ 7 40V with optimized input & output capacitances
Lower values & better linearity for overall improved switching behavior





15 % lower input capacitance (C_{iss})

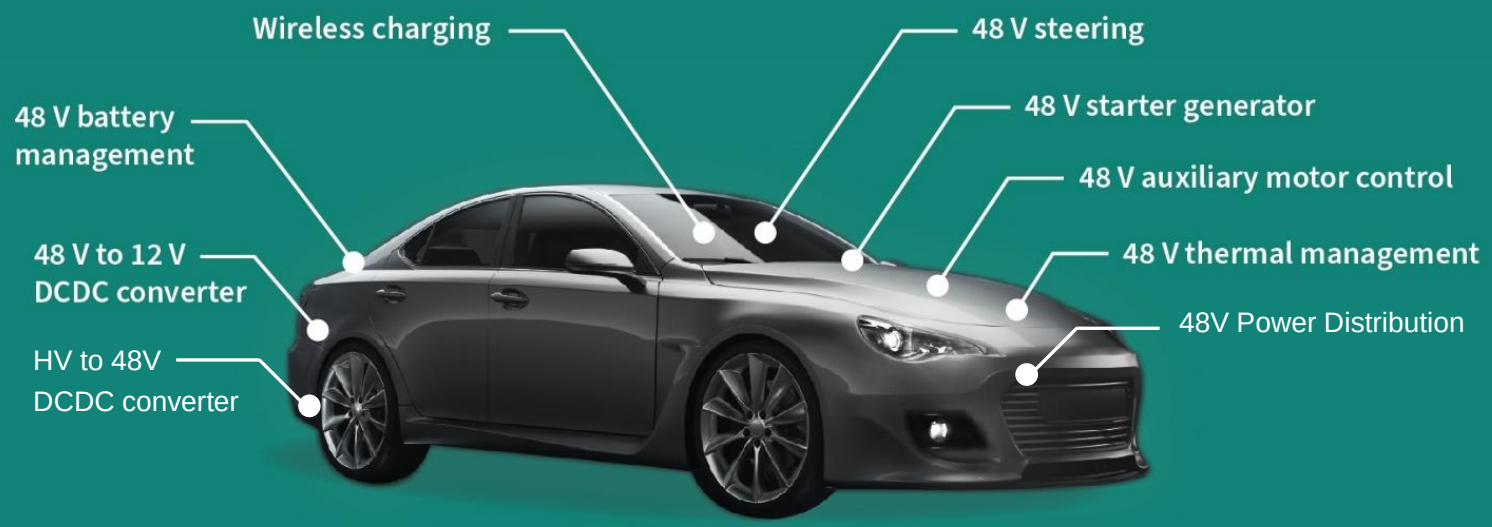
10 % lower output capacitance (C_{oss})

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

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

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OptiMOS™ 7 80V and 100V



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

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

Automotive

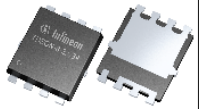
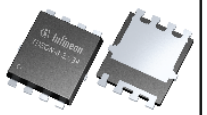
Powertrain (Vehicle Motion)	Safety (Vehicle Automation) (Chassis)	Body (User Experience) (Electrical/Electronic Architecture)
48V Starter Generator	48V Suspension	DC / DC (HV-48V)
Fuel Injection	48V EPS	DC / DC (48V-12V)
48V - 96V Traction Inverter	48V Braking	48V Power Distribution
48V Pumps (Water,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

More Transportation Applications

eMotorcycle Truck CAV

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

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

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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