

CoolMOS™ CE - powering consumer electronics, lighting and home appliances in a green world

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CoolMOS™ CE power consumer markets AND contributes to our environment



Electricity consumption leads to worldwide pollution ...



... which Infineon helps to reduce with CoolMOS™ CE



- > Higher efficiency
- > Innovative product offering
- > Fast and reliable business partner

CoolMOS™ CE has been developed for consumer electronics, lighting and home appliances

Selected CoolMOS™ CE target applications (not exhaustive)



Smartphone charger



Notebook adapter



PC silverbox



Television



LED lighting



Air purifiers

Customer needs

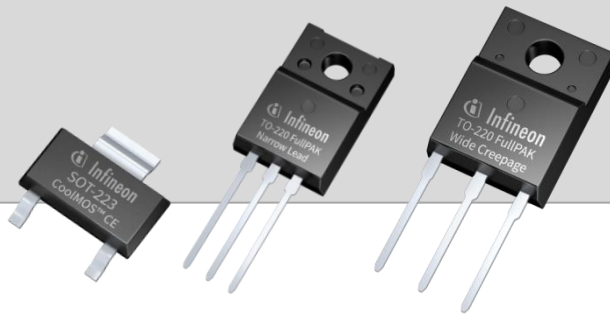
- > **Thermals & efficiency**
- > **Ease of use** for fast design-in
- > **Cost effective** solutions
- > **Reliable supplier**
 - Quality
 - Supply security
 - Quote response
 - Lead time

Infineon addresses customer needs with CoolMOS™ CE on product level & as a supplier



Product benefits of CoolMOS™ CE

- 1** **Superjunction MOSFET** technology with improved switching
- 2** Better **efficiency and thermals**
- 3** **Innovative packages** resulting in BOM cost savings



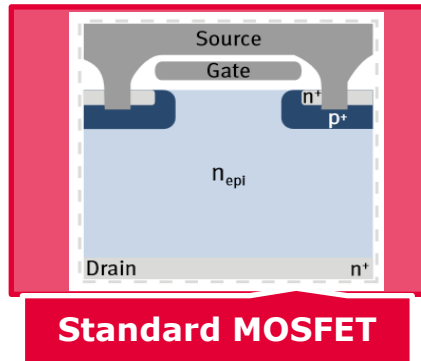
Benefits from supplier Infineon

- 4** **Supply security** from 3 front-end sites (silicon manufacturing) and >5 back-end plants (packaging)
- 5** **Unrivalled quality** in the industry:
 - > Proven track record
 - > Highest testing level
- 6** **Fast quoting and lead time**
 - > Multisource business model
 - > Fast stock replenishment

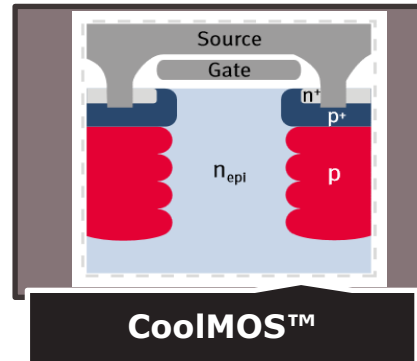


1 CoolMOS™ CE is a Superjunction MOSFET technology that offers improved switching and is rapidly growing

Planar MOSFET



Superjunction MOSFET



Example 650V:

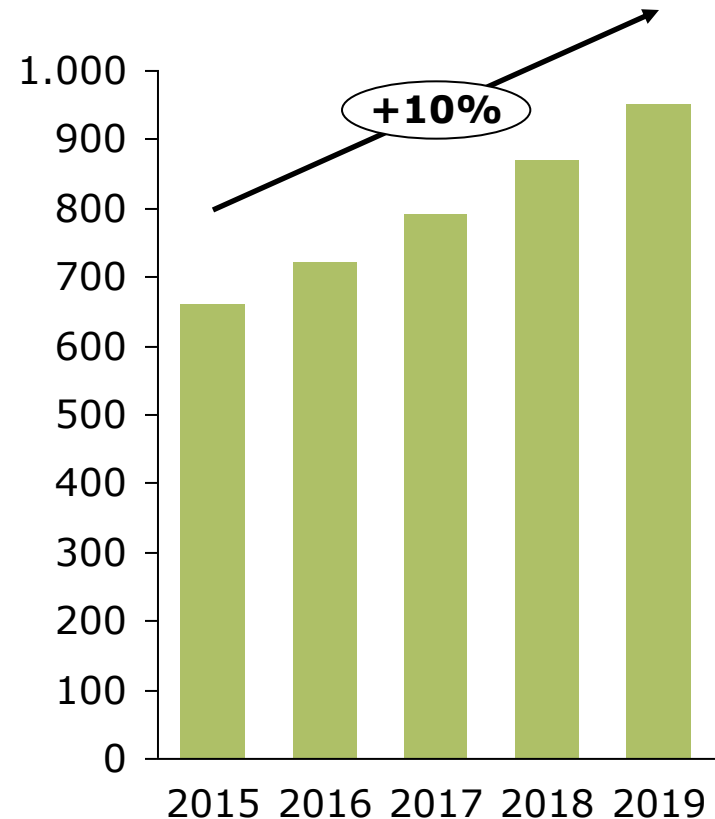
$R_{DS(ON)}$	1300	1500	[mΩ]
Q_{g*}	33	10.5	[nC]
E_{oss**}	1.6	0.78	[μJ]
C_{oss***}	60	18	[pF]

- > Lateral structure
- > Larger die size, thus larger capacitance
- > Higher switching loss

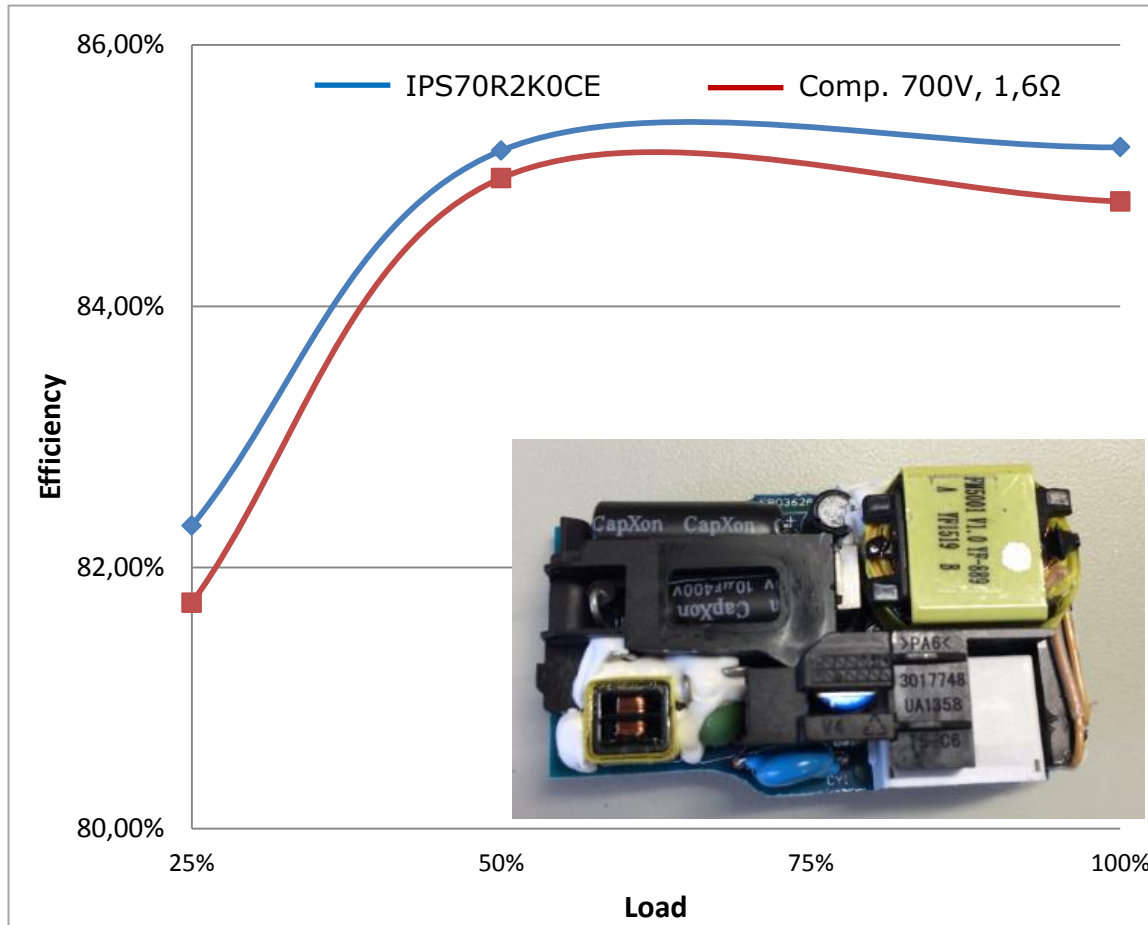
- > Vertical structure
- > Smaller die size, thus smaller capacitance
- > Lower switching loss

Better switching vs. planar (conventional) FET

Superjunction MOSFET forecast (mio USD, Yole Développement)







Rapid growth projected



Better efficiency and better thermal performance vs. planar MOSFET

Test condition: 15 W quick charger, low line (115 V) plug and play

3 CoolMOS™ CE brings a package innovation addressing consumer markets – selected examples

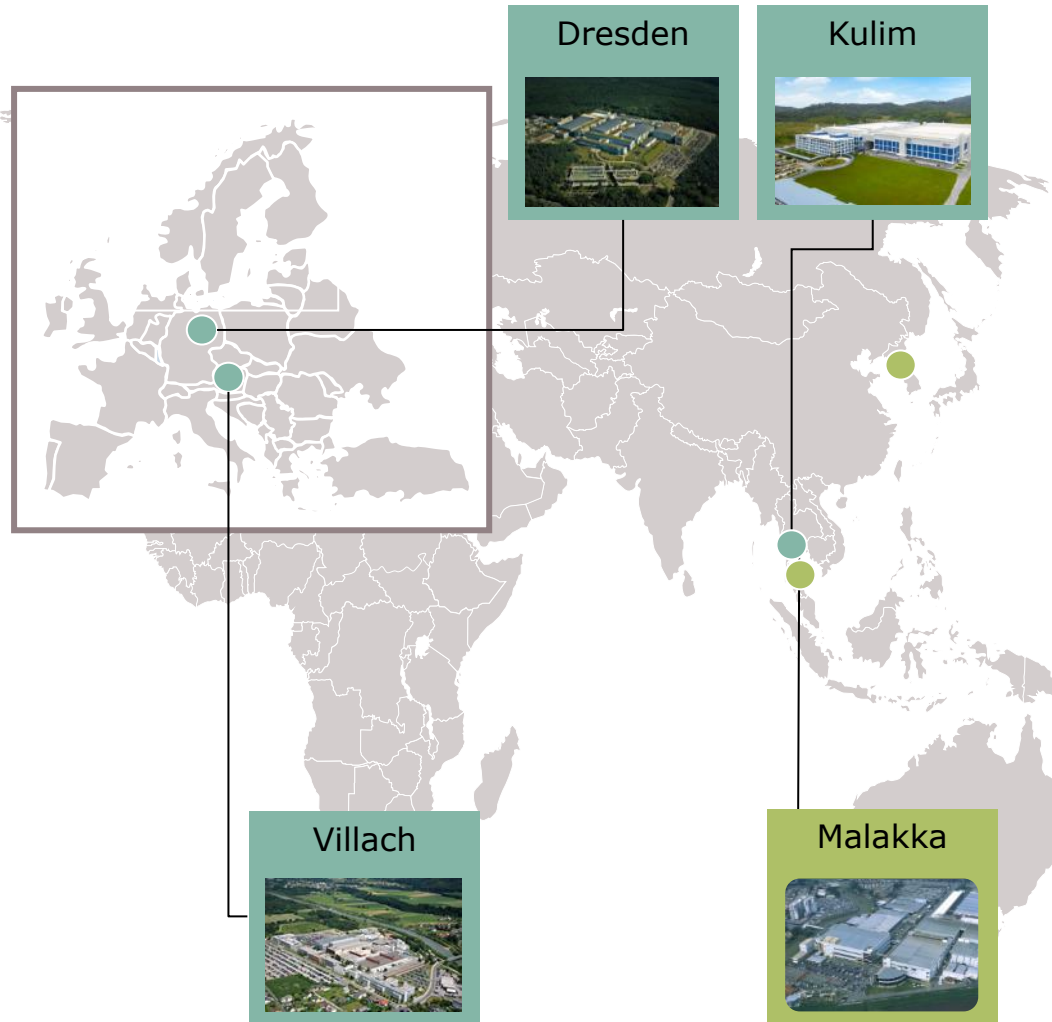
Smartphone charger	 <p>IPAK SL mold stopper</p>	<ul style="list-style-type: none"> > Defined standoff between package body and PCB > Higher production yield as no residue after cleaning
Notebook adapter	 <p>TO-220 FullPAK Narrow Lead</p>	<ul style="list-style-type: none"> > Reduced standoff height > Lower height for semi slim adapters as MOSFET can be fully inserted into the PCB
Television	 <p>TO-220 FullPAK Wide Creepage</p>	<ul style="list-style-type: none"> > Increased creepage distance (4,25 vs 2,54 mm) between legs > No arching and no electrical failure even if dust and dirt comes into the power supply
Lighting	 <p>SOT-223</p>	<ul style="list-style-type: none"> > Lower cost DPAK replacement > Enabled by smaller dies of superjunction MOSFET

Innovative package solutions...



... enable customer BOM savings

CoolMOS™ CE offers supply security – production in 3 frontend (silicon) and >5 backend locations (packaging)



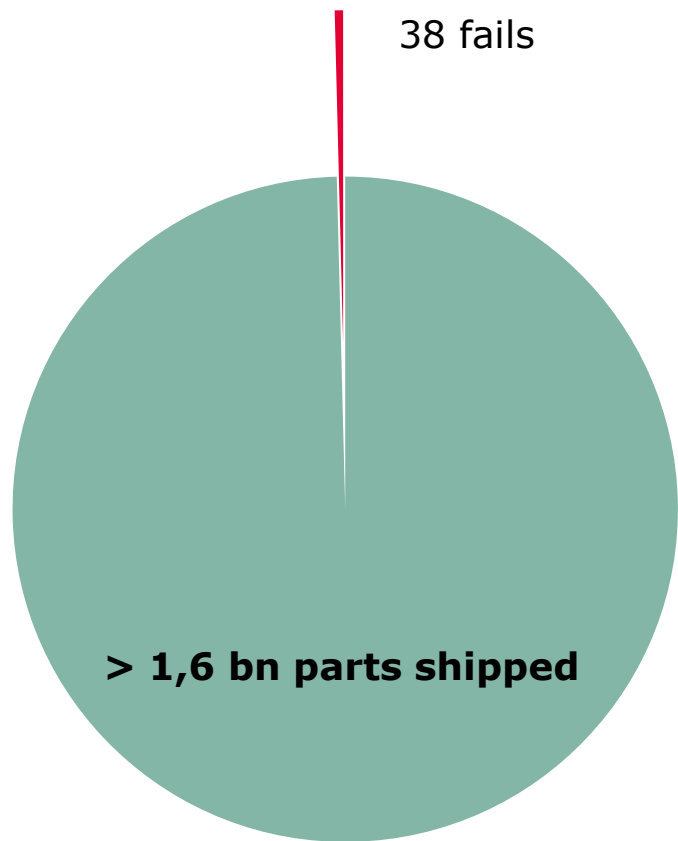
300 mm (12 inch) production in Dresden



- > World's largest power semicon production facility
- > World's first volume production of power semis on 12"
- > State-of-the art equipment from former DRAM maker, highest precision
- > CoolMOS™ main volume, flexible upside capacity

Inhouse production: ● Frontend ● Backend

CoolMOS™ offers unrivalled quality in the industry
Only 38 fails from >1,6 bn shipped parts

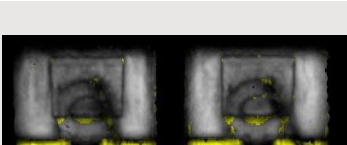
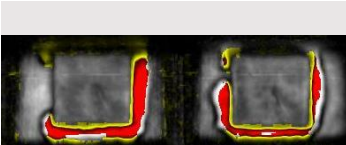

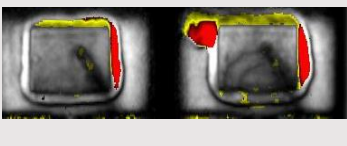




All CoolMOS™ technologies

- › 0,03 DPM on average
- › Only 38 fails over 1.6 bn parts shipped

Quality leadership in power MOSFETs – no other vendor offers such reliable parts

CoolMOS™ offers unrivalled quality in the industry:
Infineon keeps its quality promise - competitors break it

	Infineon	Competitor A	Competitor B
Initial	 <p>5/5 PASS</p>	 <p>5/5 show die pad delamination</p>	 <p>5/5 show die pad delamination</p>
TC 500c	 <p>5/5 show die pad delamination</p>	 <p>5/5 show die pad delamination</p>	 <p>5/5 show die pad delamination</p>

Competitors with large delamination:

- › Risk of electrical failure
- › Not keeping promised reliability

Infineon invests into high reliability

- › Selection of higher grade package BOM
- › Regular quality monitoring after stressing

Quality leadership in power MOSFETs – no other vendor offers such reliable parts

CoolMOS™ CE offers ease of business via fast quoting and low lead times

- > **Fast quote & price response**
- > Larger pricing freedom for distributor via multisource price list
- > Fast quote response from business manager
 - Target < 24 hrs for >80% requests
 - Up to 3 days in exceptions



- > **Short lead time**

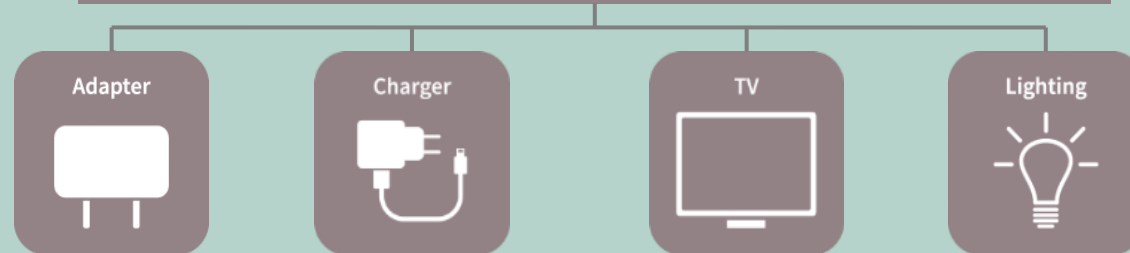
- > Faster than normal inventory replenishment to secure certain buffer level
- > 4-6 weeks lead time for large orders



Business model for CoolMOS™ CE tailored for speed & ease of business

CoolMOS™ CE revenue push is supported with a large set of collaterals

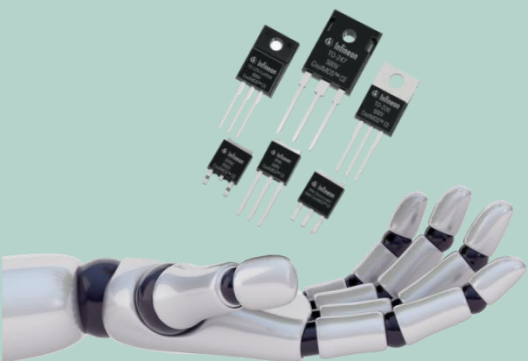
Overall CE presentation



Additional MCOM Material

- › Overall CE presentation
- › 4 application specific presentations
- › Updated CoolMOS™ CE Selection Guide
- › CE Cross Reference Guide
- › CE Sample box
- › EMI Application note
- › Distri CE training in Taiwan, Shenzhen & Shanghai

CE Sample Box available now!



Where to find more: www.infineon.com/ce

CoolMOS™ CE

[Overview](#)
[Charger](#)
[Adapter](#)
[TV set](#)
[Lighting](#)

High voltage MOSFET for consumer applications

CoolMOS™ CE is a product family launched by Infineon to address consumer and lighting applications. It offers benefits in efficiency and thermal behavior versus standard MOSFETs and has been optimized for ease-of-use and costcompetitiveness, while at the same time delivering state-of-the-art performance and Infineon quality and supply security.

Powered by Infineon multi-source program, CoolMOS™ CE is determined to support customers' success in various consumer markets by full FAE (field application engineer) support, short lead time and fast quote response.

CE selection guide

500V 600V 650V
700V 800V

CE portfolios per voltage

CE portfolios per package

Infineon
Toshiba ST
Fairchild

CE cross reference table

Cross reference search

CE demoboard

CoolMOS™ CE in the applications

Tablet and smartphone charger

[Learn more >](#)

Notebook adapter

[Learn more >](#)

TV sets

[Learn more >](#)

Lighting

[Learn more >](#)

CoolMOS™ CE customer benefits

Capacity - we own the world's largest capacity for power devices with two fabs on 300mm production, two fabs on 200mm production and four backends.

Video: Infineon's superjunction MOSFET solution for low power applications

- > Product information (parts, selection, x-reference, ...)
- > Application information (benefits, demo boards, ...)

Powering a green world with CoolMOS™ CE starts with you



CoolMOS™ CE benefits:

Product

1

Superjunction MOSFET technology with improved switching

2

Better **efficiency and thermals**

3

Innovative packages resulting in BOM cost savings

Supplier

4

Supply security

5

Unrivalled quality in the industry

6

Fast quoting and lead time

CoolMOS™ CE comes in:

- › **5 voltage classes:** 500 V/600 V/ 650 V/700 V/800 V
- › **20 different $R_{DS(on)}$:** 190-3400 m Ω
- › **>100 parts**
- › **>10 packages**



Part of your life. Part of tomorrow.

