

CoolMOS™ CE for TV and desktop PC SMPS

October 2016



Agenda

1 CoolMOS™ CE for TV and Desktop PC

2 Market trend for TV and desktop PC

3 CoolMOS™ CE in 150 W TV SMPS

4 CoolMOS™ CE in desktop PC SMPS

5 Replacing Planar MOS with CoolMOS™ CE

6 Success stories

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2 Market trend for TV and desktop PC

3 CoolMOS™ CE in 150 W TV SMPS




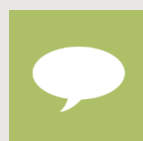


4 CoolMOS™ CE in desktop PC SMPS

5 Replacing Planar MOS with CoolMOS™ CE


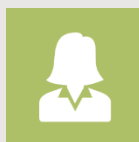
6 Success stories

What can we do with TV and desktop PC? ...

Having fun with TV

	Educating kids	
	Family event	
	Social lives	
Et al.		

Working fun with PC

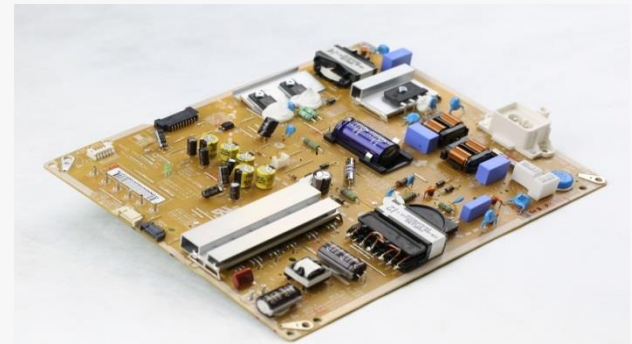
	Making movies, TVs, cartoons	
	Making games, daily work	
	Storaging photos, documents	
Et al.		

TV and desktop PC make a **better high quality life** for today and future

What is the pre-condition to make this happen?

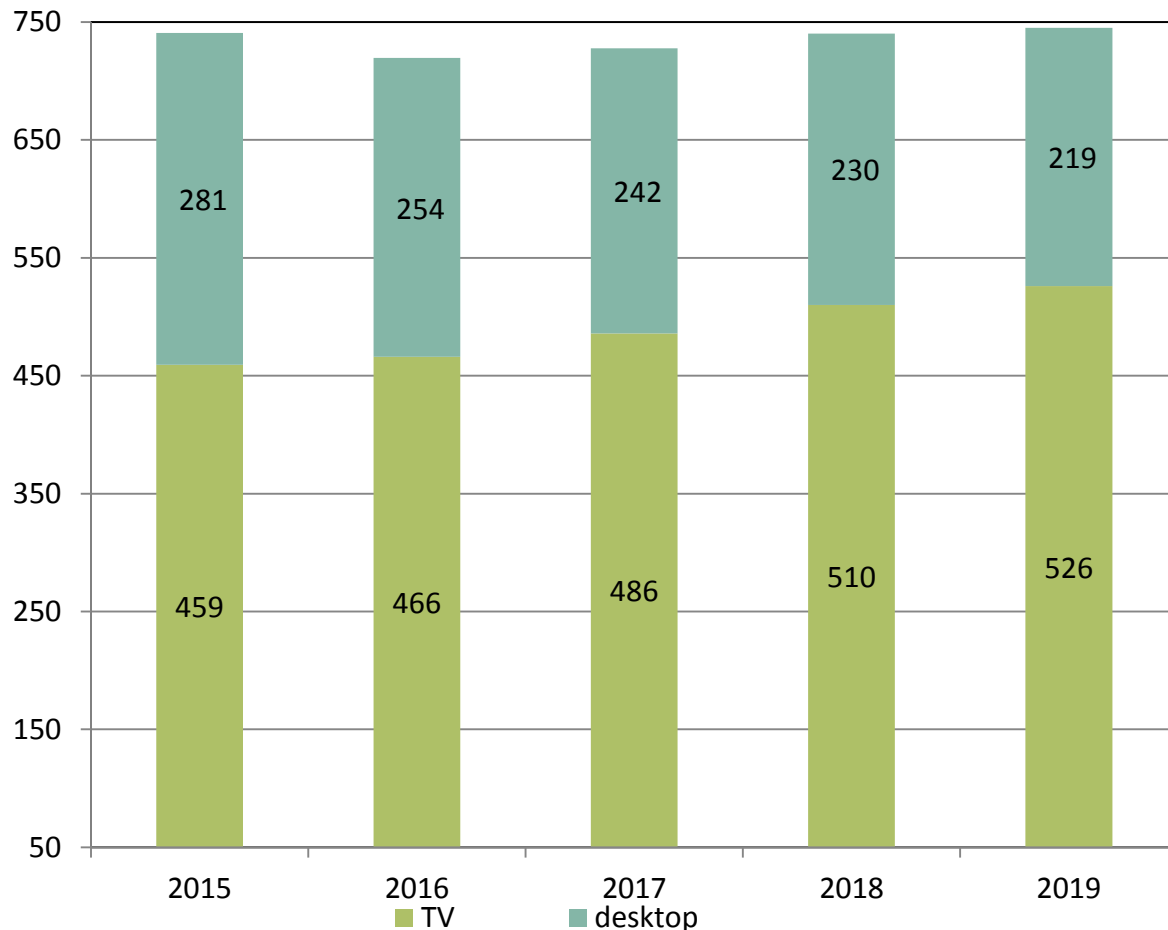


HV MOSFET:
a key to SMPS



How is this relevant to your business?

This is a market with ~750 Mio pcs HV MOSFET consumption per year



*IHS report and Infineon analysis

You have a stable but huge market to address

TV

- › Reach 526 mio pcs in 2019
- › CAGR: 3%

Desktop PC SMPS

- › Reach 219 mio pcs in 2019
- › CAGR: -6%



Fast adoption of CoolMOS™

- › High performance
- › Proven quality and reliability

We are already successful at worldwide top players



Hisense



CHANGHONG



TPV

LITEON

Seasonic



AcBel

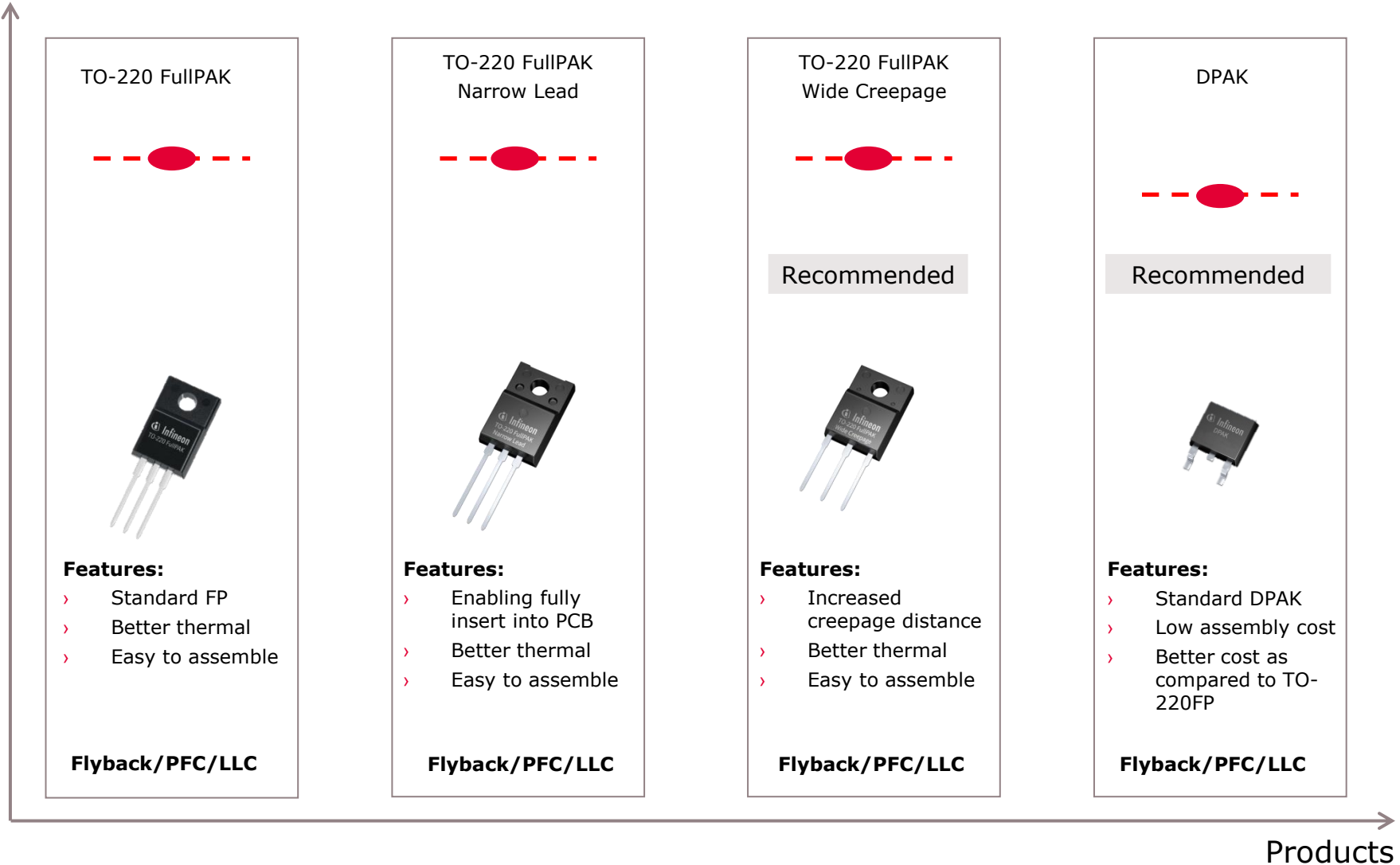
5 reasons CoolMOS™ CE is chosen

- › Fully optimized portfolio
- › High performance
- › 4-6 weeks lead time
- › High quality and reliability
- › Fast quote response

We fully support you to copy our success to your local customers through Infineon multi-source program

We offer you full guideline on CoolMOS™ CE selection in TV and desktop PC SMPS

Price



CoolMOS™ CE series for TV and desktop PC

500 V portfolio



R _{DS(on)} [mΩ]	TO-220 FullPAK	TO-220	TO-252 DPAK	TO-251 IPAK	TO-247	SOT-223
3000			IPD50R3K0CE	IPU50R3K0CE		IPN50R3K0CE
2000			IPD50R2K0CE	IPU50R2K0CE		IPN50R2K0CE
1400			IPD50R1K4CE	IPU50R1K4CE		IPN50R1K4CE
950	IPA50R950CE		IPD50R950CE	IPU50R950CE		IPN50R950CE
800	IPA50R800CE		IPD50R800CE			IPN50R800CE
650	IPA50R650CE		IPD50R650CE			IPN50R650CE
500	IPA50R500CE	IPP50R500CE	IPD50R500CE			
380	IPA50R380CE	IPP50R380CE	IPD50R380CE			
280	IPA50R280CE	IPP50R280CE	IPD50R280CE		IPW50R280CE	
190	IPA50R190CE	IPP50R190CE			IPW50R190CE	



Highly recommended
for TV and Desktop PC

- > 10 R_{DS(on)}
- > 6 Packages
- > New SOT-223 products for cost down

CoolMOS™ CE series for TV and Desktop PC

600 V portfolio



R _{DS(on)} [mΩ]	TO-220 FullPAK	TO-220 FullPAK Narrow Lead	TO-252 DPAK	TO-251 IPAK SL	TO-251 IPAK	SOT-223	TO-220 FullPAK Wide Creepage
3300			IPD60R3K4CE	IPS60R3K4CE	IPU60R3K4CE	IPN60R3K4CE	
2100			IPD60R2K1CE	IPS60R2K1CE	IPU60R2K1CE	IPN60R2K1CE	
1500	IPA60R1K5CE		IPD60R1K5CE	IPS60R1K5CE	IPU60R1K5CE	IPN60R1K5CE	
1000	IPA60R1K0CE		IPD60R1K0CE	IPS60R1K0CE	IPU60R1K0CE	IPN60R1K0CE	
800	IPA60R800CE	IPAN60R800CE	IPD60R800CE	IPS60R800CE			
650/600	IPA60R650CE	IPAN60R650CE	IPD60R650CE	IPS60R650CE			IPAW60R600CE
460	IPA60R460CE		IPD60R460CE	IPS60R460CE			
400/380	IPA60R400CE		IPD60R400CE	IPS60R400CE			IPAW60R380CE
280							IPAW60R280CE
190							IPAW60R190CE

Highly recommended
for TV and desktop PC



- > 12 R_{DS(on)} in 6 packages
- > New SOT-223 products (mainly for lighting)
- > TO-220 FP Wide Creepage (mainly for TV)

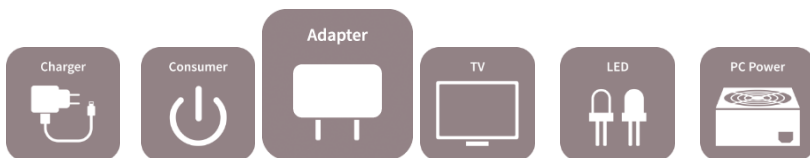
CoolMOS™ CE series for TV and Desktop PC

650 V portfolio



$R_{DS(on)}$ [mΩ]	TO-220 FullPAK	TO-220 FullPAK Narrow lead	TO-252 DPAK	TO-251 IPAK SL	SOT-223
1500	IPA65R1K5CE		IPD65R1K5CE	IPS65R1K5CE	IPN65R1K5CE
1000	IPA65R1K0CE		IPD65R1K0CE	IPS65R1K0CE	
650	IPA65R650CE	IPAN65R650CE	IPD65R650CE	IPS65R650CE	
400	IPA65R400CE		IPD65R400CE	IPS65R400CE	

Highly recommended
for TV and desktop PC

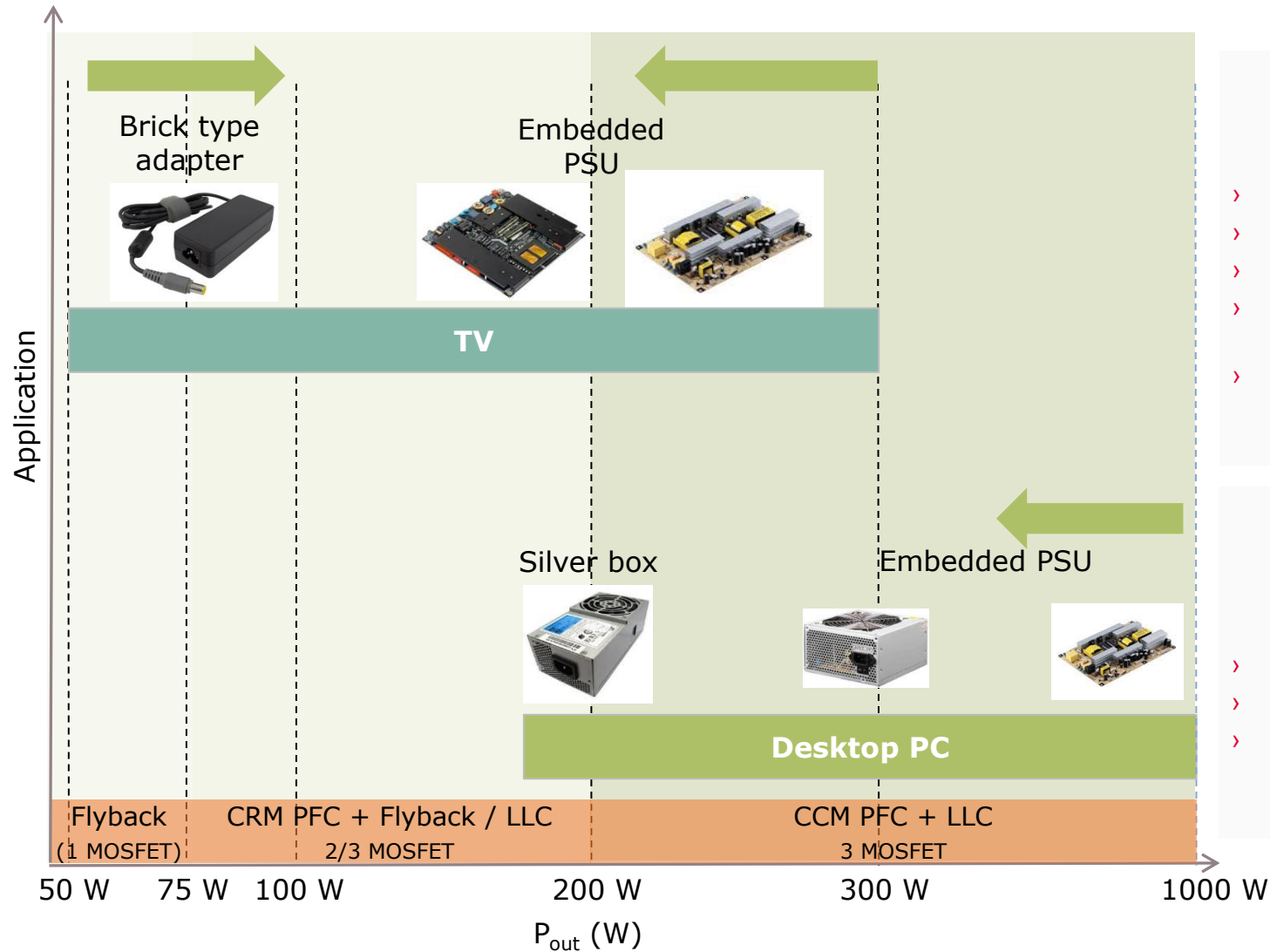


- > 8 $R_{DS(on)}$ in 7 packages
- > New SOT-223 products for charger
- > 700 V products for charger/adapter

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Topologies and market trend for TV and desktop PC power supplies ...



TV Market trend

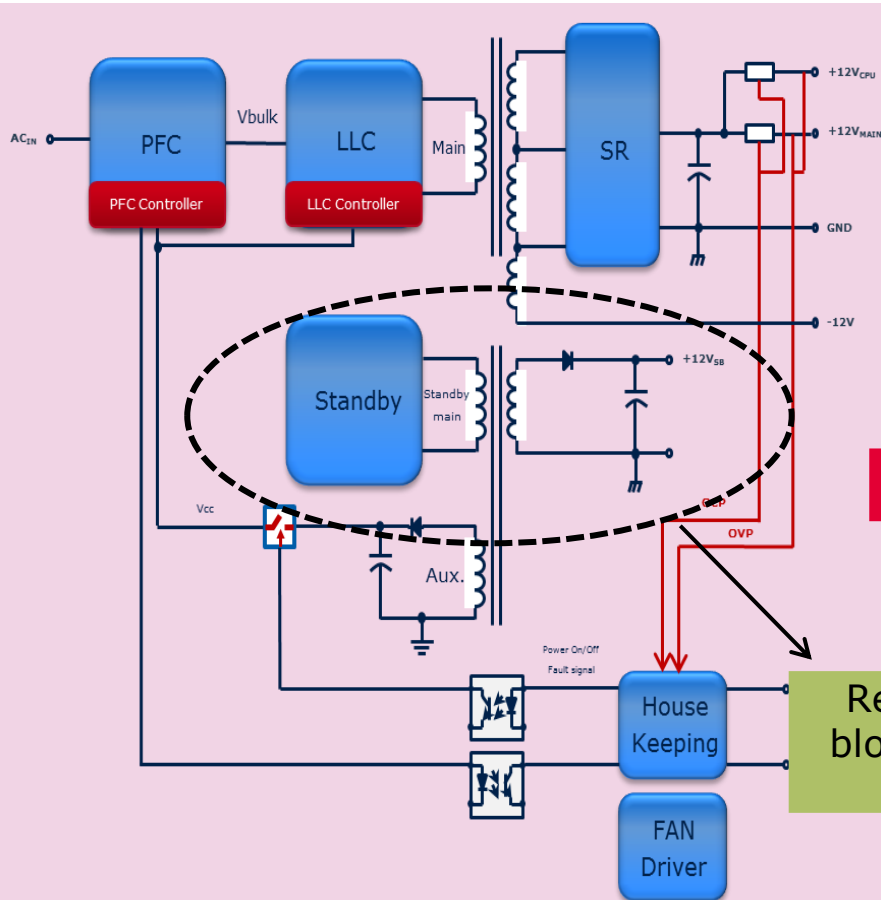
- › Bigger screen size
- › Slim SMPS
- › Higher efficiency
- › Power clustered around 100-200 W
- › Elimination of AUX unit

PC desktop PC market trend

- › Higher efficiency
- › Slim design
- › Elimination of AUX Unit

Application towards non-Aux SMPS for cost saving up to 0.8 USD

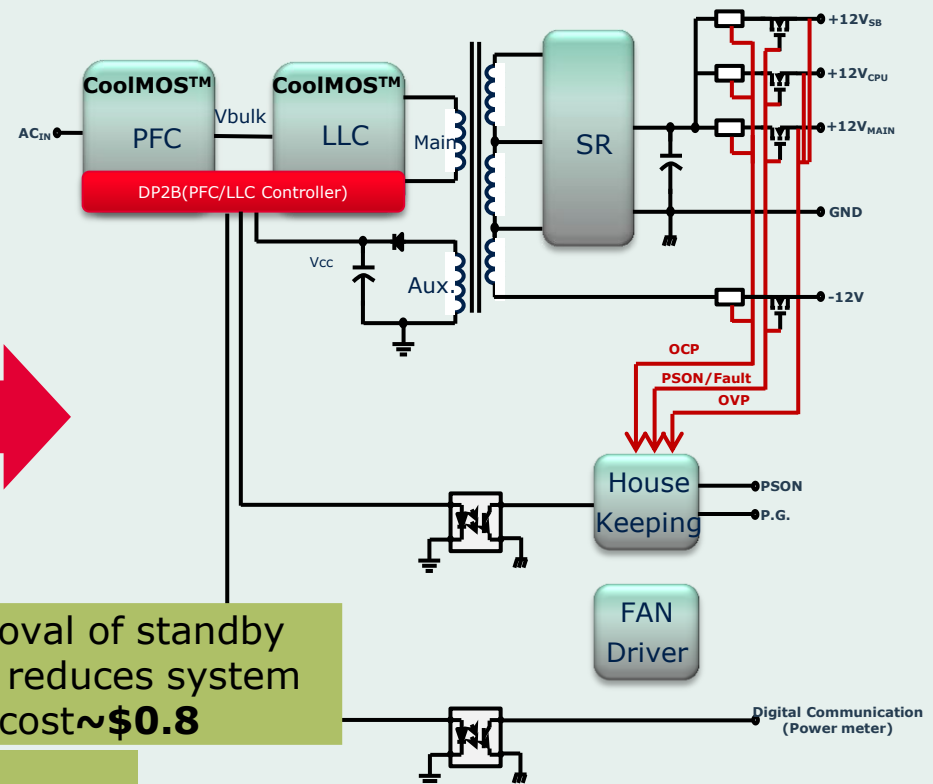
Standard SMPS



Removal of standby block reduces system cost ~\$0.8



Non auxiliary SMPS



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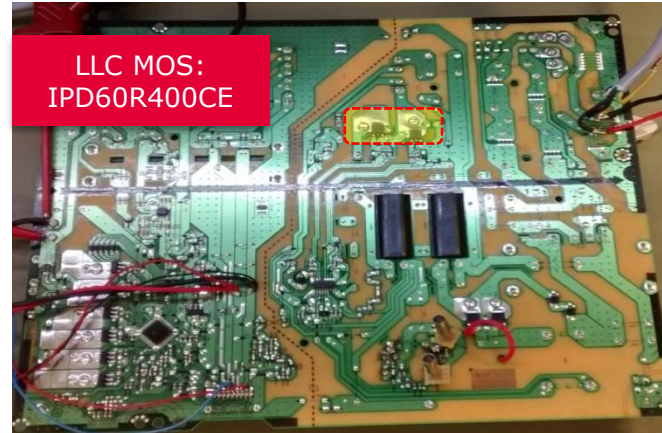
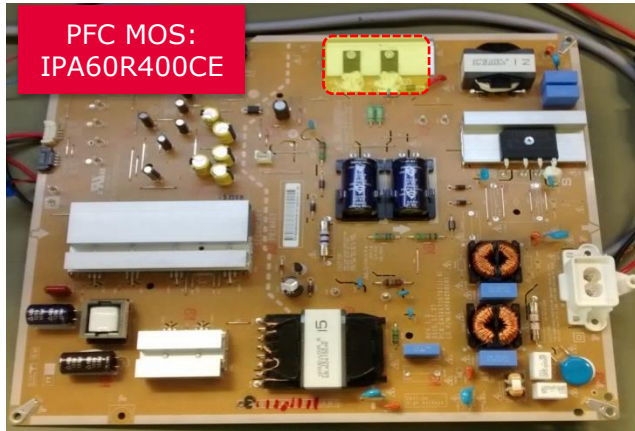
3 CoolMOS™ CE in 150 W TV SMPS

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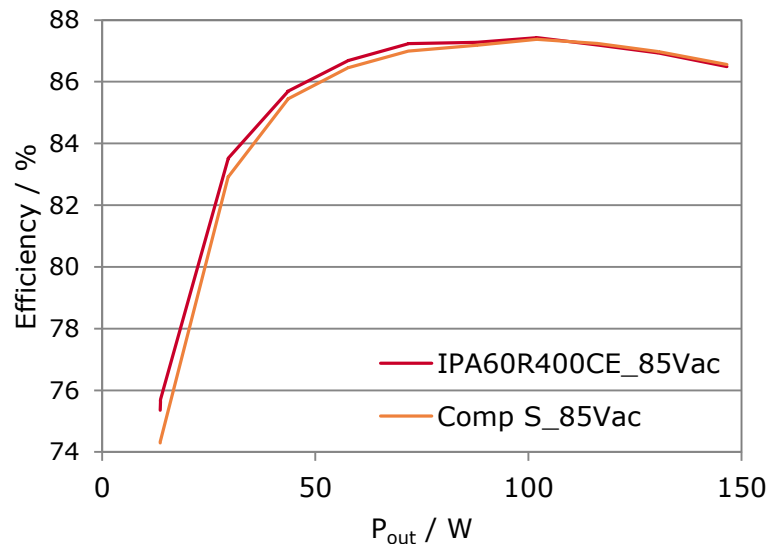
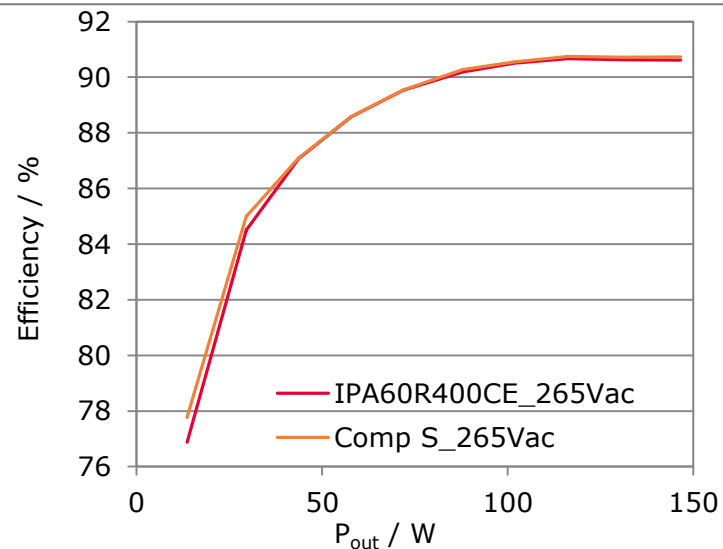
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IPA60R400CE in a 150 W TV SMPS Efficiency



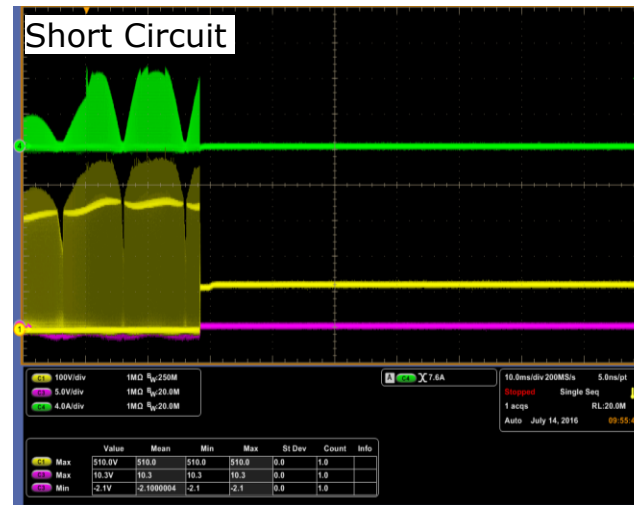
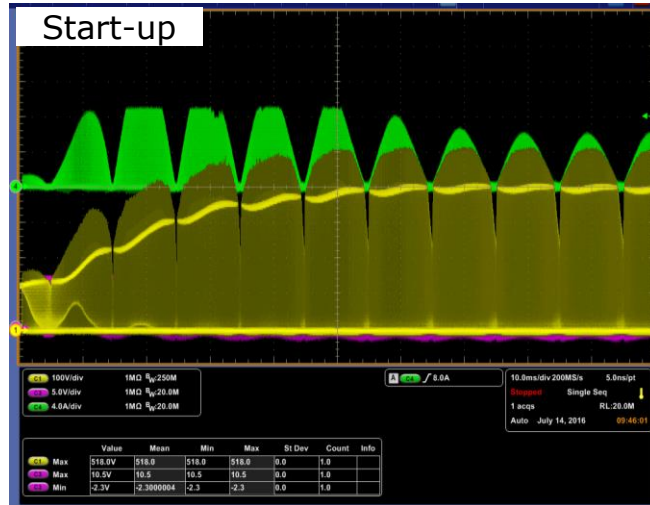
IPA60R400CE and
IPD60R400CE in a
150 W TV board



CoolMOS™ CE
efficiency meets
market requirements

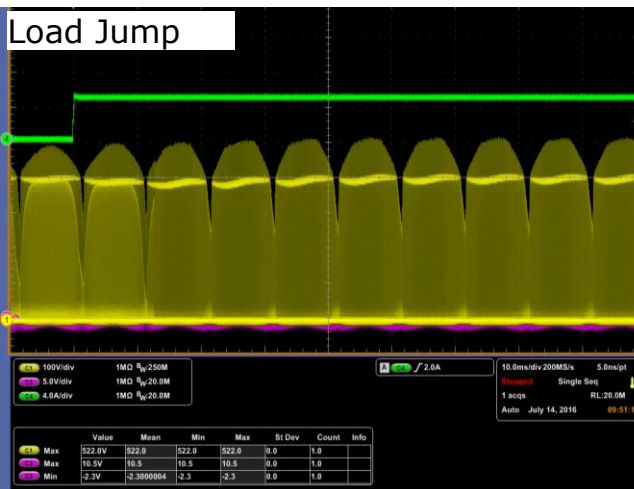
IPA60R400CE in a 150 W TV SMPS

V_{DS} and V_{gs} derating



$$V_{DS, \max} = 525 \text{ V}$$

$$V_{gs, \max} = \text{of } 15 \text{ V}$$



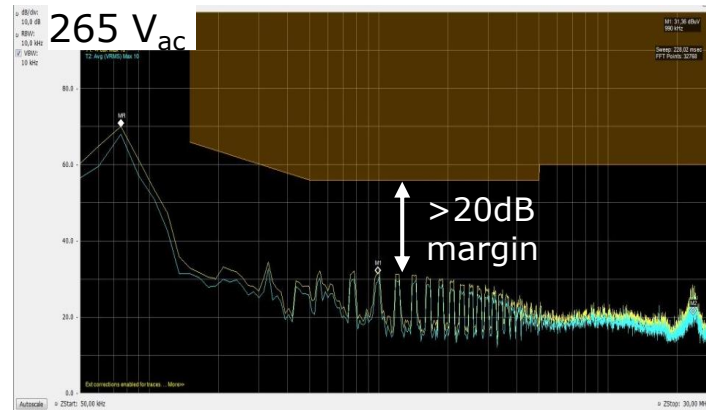
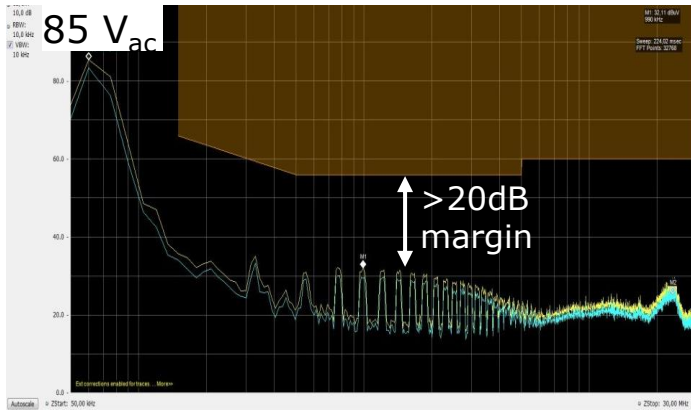
V_{DS} and V_{gs}
derating

Good job!



IPA60R400CE in a 150 W TV SMPS

EMI and thermal

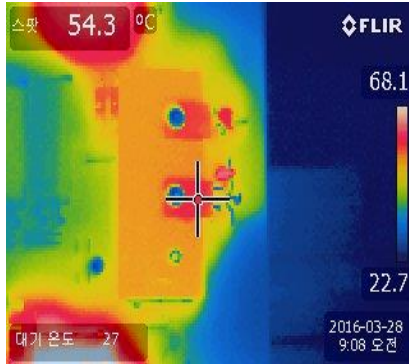


**Conductive EMI
margin >6 dB**

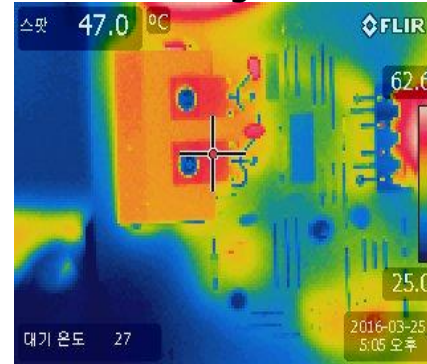
Good job!



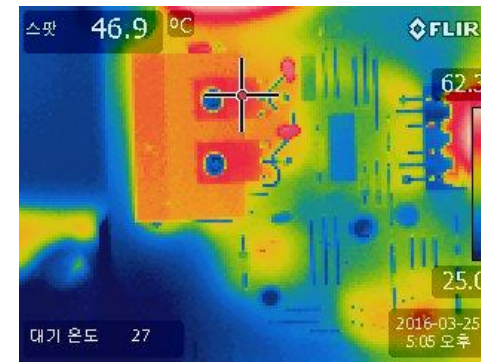
PFC MOS



LLC MOS high side



LLC MOS low side



Requirements:
 $T_{\max} = 80^{\circ}\text{C}$

Measured
 $T_{\max} = 55^{\circ}\text{C}$

Good job!



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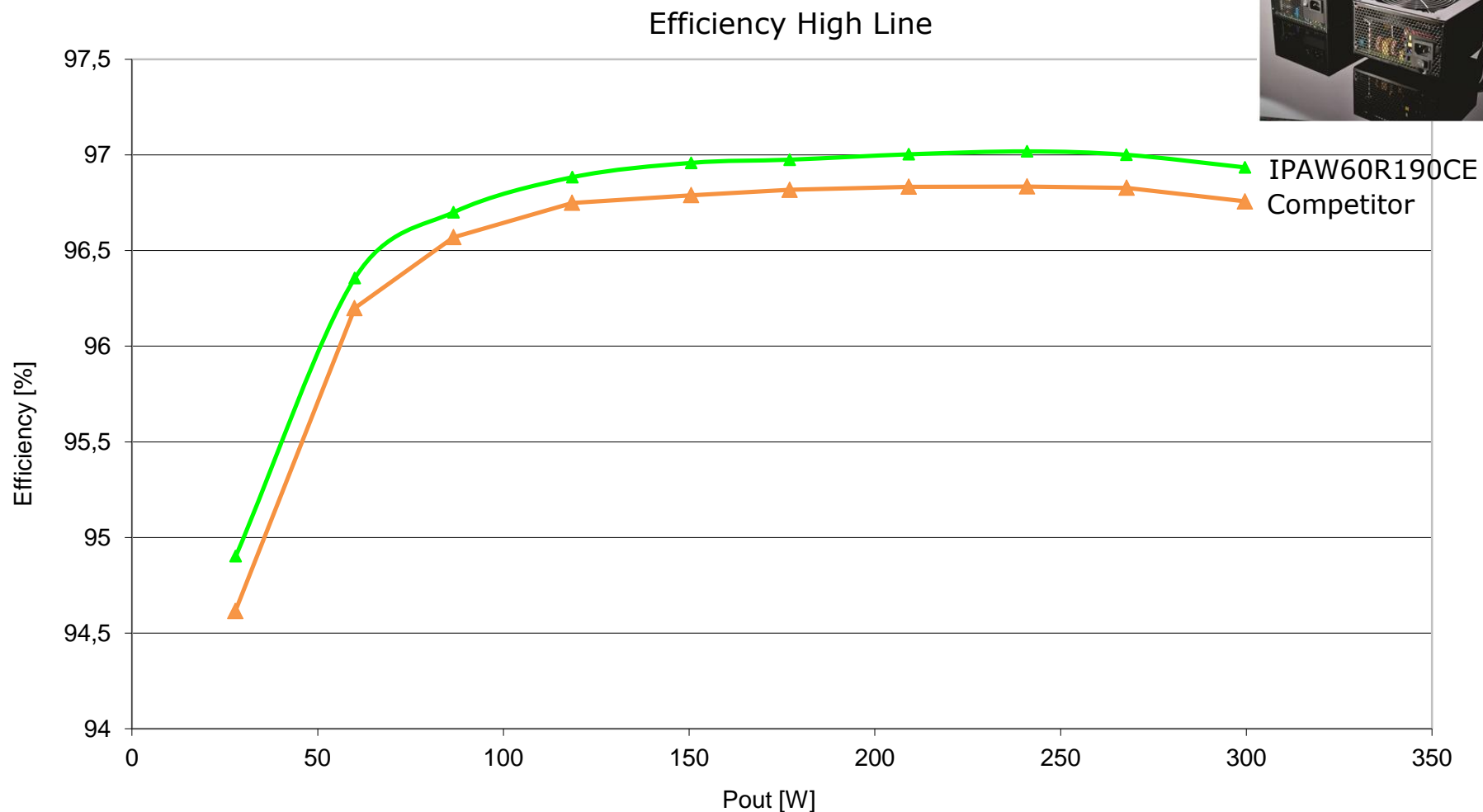
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CoolMOS™ in the PFC of a 300 W PC silverbox



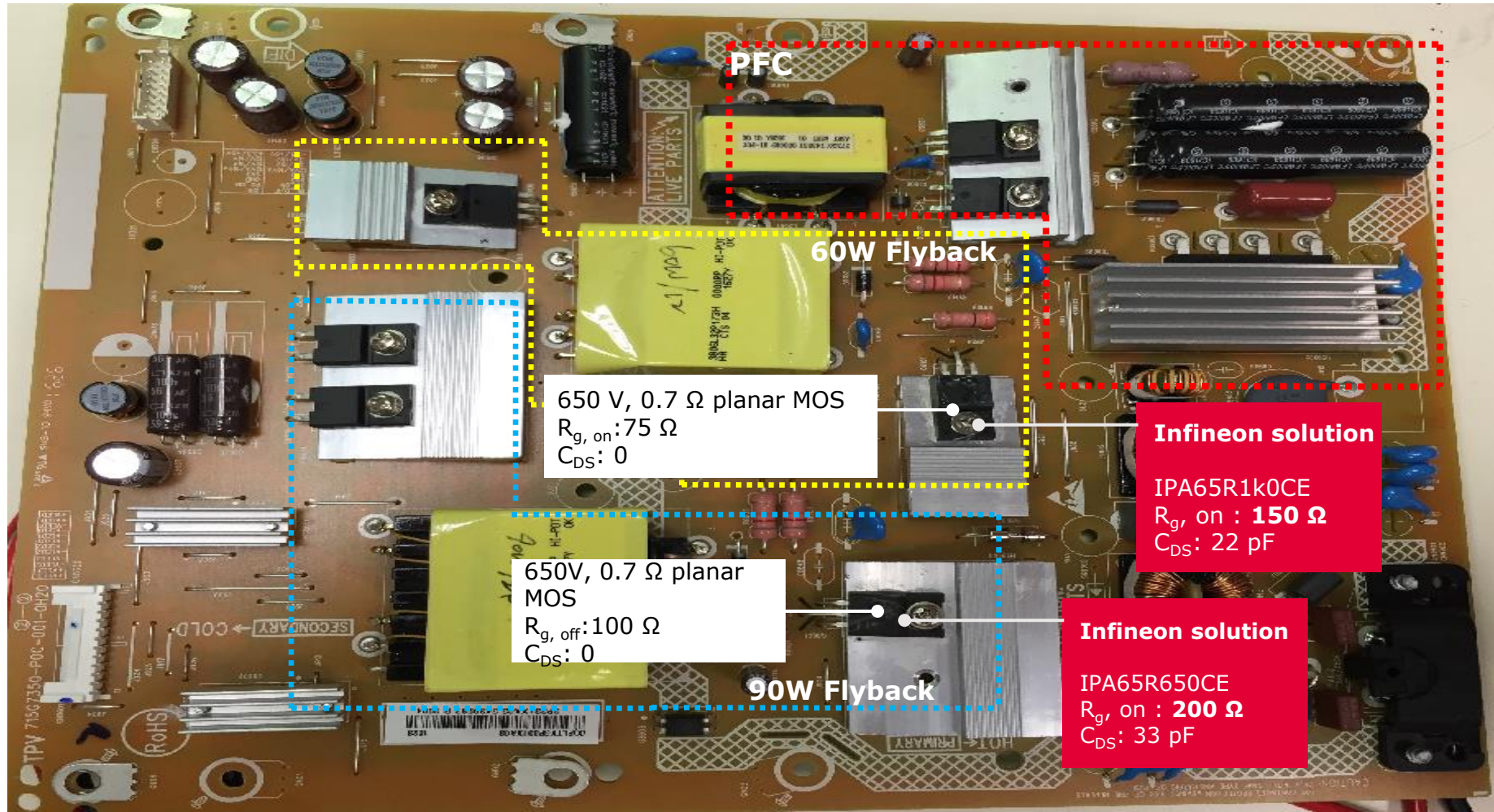
CoolMOS™ shows better efficiency as compared to competitors

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Replace planar MOSFET with CoolMOS™ CE-150 W LED SMPS from market

case 1



Replace planar MOSFET with CoolMOS™ CE 150 W LED SMPS from market

EMI

Site : 03CH01-HY
Condition : CNS/VCCI/CISPR-B 10m BILOG2678-20150801 VERTICAL
EUT : LED TV
Model : 150W
Power : 110VAC
Memo : IPA65R1K0+IPA65R650CE
Memo :
Memo :
Memo :

Fulfill 6 dB EMI margin



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Preamp Factor	Cable Loss	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	34.860	18.14	-11.86	30.00	34.32	15.68	32.59	0.73	---	QP
2	83.730	20.31	-9.69	30.00	43.96	7.82	32.58	1.11	---	QP
3	104.250	20.53	-9.47	30.00	40.53	11.34	32.59	1.25	---	QP
4	188.760	20.61	-9.39	30.00	42.58	8.86	32.50	1.67	---	Peak

Thermal

Customer SPEC		75°C
90 W Flyback	IPA65R650CE	68,8°C
60 W Flyback	IPA65R1K0CE	51,6°C

6°C
margin

23°C
margin

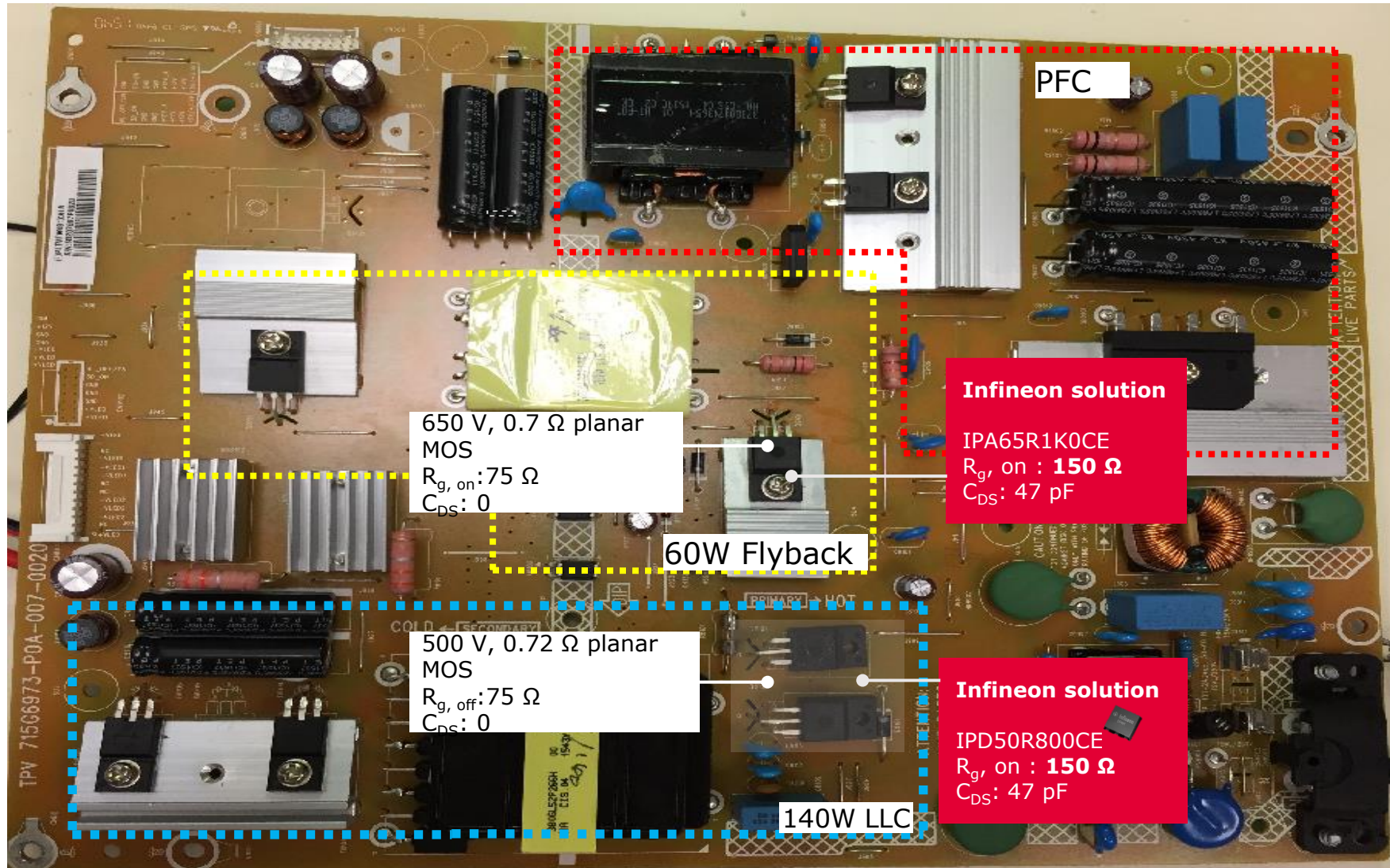


Customer benefits

- › Long term cost down enabled by CoolMOS
- › High quality and reliability
- › Better supply security enabled by 300mm line



Replace planar MOSFET with CoolMOS™ CE 200 W LED SMPS from market



Replace planar MOSFET with CoolMOS™ CE-200 W LED SMPS from market

case 2



Site : 03CH01-HY
 Condition : CNS/VCCI/CISPR-B 10m BILOG2678-20150801 VERTICAL
 EUT : LED TV
 Model : 200W
 Power : 110VAC
 Memo : IPA65R1K0+IPD50R800CE
 Memo :
 Memo :
 Memo :

EMI

Meet customer EMI requirement



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Preamp Factor	Cable Loss	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	30.270	19.49	-10.51	30.00	33.42	17.98	32.60	0.69	---	Peak
2	131.520	24.21	-5.79	30.00	43.62	11.76	32.56	1.39	---	QP
3	217.650	15.86	-14.14	30.00	37.35	9.17	32.45	1.79	---	Peak

Thermal

	Customer SPEC	75°C
60 W Flyback	IPA65R1k0CE	60°C
140 W LLC	IPD50R800CE (HS)	62°C
	IPD50R800CE (LS)	54°C

> 13°C margin



Customer benefits

- › **Cost down (> 0.02 USD) with DPAK**
 - Better BOM cost
 - Less assembly cost
- › Long term cost down enabled by CoolMOS™
- › High quality and reliability
- › Better supply security enabled by 300 mm line

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Success story

TV SMPS – IPD50R1K4CE

Customer: Leading Chinese TV maker
Application: 110/140 W TV SMPS

IFX Part Numbers: CoolMOS™ CE DPAK
IPD50R1K4CE

Competitor: AOS Planar MOS

SOP: July 2016
BW value: > **0.2** MEURO / year

What made us win:

- > Good local support
- > Better thermal and efficiency performance
- > Competitive price

To which type of projects can this success story replicated?

- > TV manufactures in China

> 49"
> 4K



This case demonstrates CoolMOS™ CE could effectively fight against competitors in TV SMPS application

Success story

TV SMPS – CoolMOS™ CE TO-220 FP products



Customer: Leading Chinese TV maker
Application: 60-200 W TV SMPS

IFX Part Numbers: CoolMOS™ CE DPAK
500V TO-220 FP: 0.28, 0.5 and 0.8 Ω
600V TO-220 FP: IPA60R460CE
800V TO-220 FP: IPA80R1K0CE

Competitor: Toshiba and Magnachip

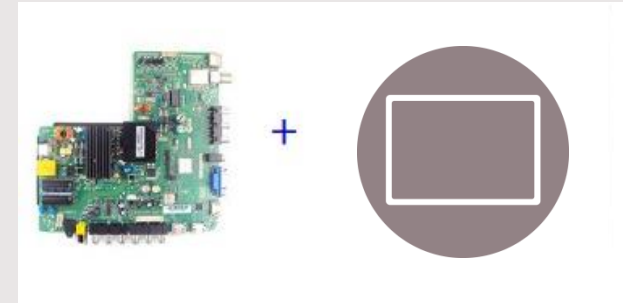
SOP: Q4 2016
BW value: > **0.5** M EURO / year

What made us win:

- > Wide range of portfolio
- > Good customer relationship
- > Competitive price

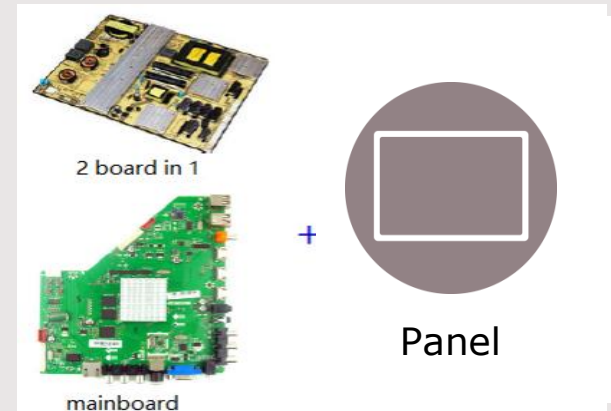
To Which type of projects can this success story replicated?

- > TV manufactures in China



3 board in 1

Panel



2 board in 1

mainboard

Panel

This case demonstrates CoolMOS™ CE could effectively fight against competitors in TV SMPS application

Success story

PC silver box– 500 V/600 V/650 V DPAK CE



Customer: Leading Taiwan PC silver box OEM
Application: PC silver box

IFX Part Numbers: CoolMOS™ CE DPAK
500V DPAK: 0.28, 0.38, and 0.5Ω
600V DPAK: 0.4, and 1.0Ω
650V DPAK: 1.0Ω

Competitor: Toshiba and ST

SOP: July 2016
BW value: 5 M EURO for 12 projects

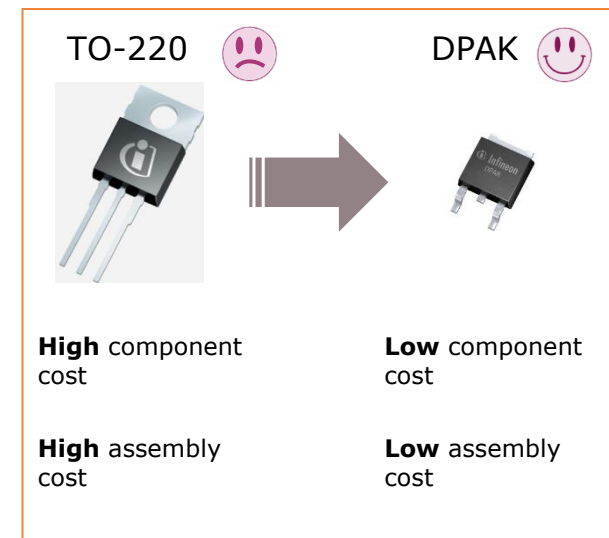


What made us win:

- › Help customer saving cost by:
 - Using DPAK rather than TO-220 products
 - 20% reducing PCB size reduction due to standardized platform

To Which type of projects can this success story replicated?

- › Addressing all the PC silver box manufactures
- › Setting a new trend in PC silver box by using DPAK products
- › Standardize PC silver box platform

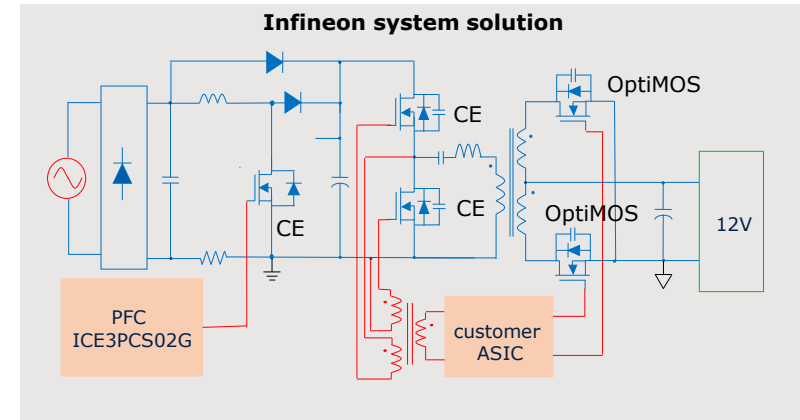


This case demonstrates a new way to save cost by moving to SMD package and standardize the platform

Success story

PC silver box – IPA50R190/280/380CE

Customer: Leading Taiwan PC silver box OEM
Application: PC silver box:450-650 W
IFX Part Numbers: IPA50R190/280/380CE
Competitor: AOS Planar MOSFET
SOP: Nov, 2016
BW value: > **0.3** M EURO / YEAR



What made us win:

- › Higher efficiency as compared to competitors
- › Good local support
- › Wide range of portfolio
- › Infineon system solution for both PFC and LLC

To Which type of projects can this success story replicated?

- › Addressing all the PC silver box manufactures
- › Replacing planar MOSFET with CoolMOS™ CE



This case demonstrates CoolMOS™ CE could effectively replace planar MOSFET without cost concerns



Part of your life. Part of tomorrow.

