

A green road sign on a wooden post stands on the left side of a road. The road stretches into the distance towards a city skyline at sunset. The sky is filled with white and yellow clouds, and the sun is low on the horizon, creating a warm glow. The sign contains the text 'eGaN® FET' and '继续阔步向前'.

eGaN® FET
继续阔步向前

第四代氮化镓 (eGaN®) 技术

宜普电源转换公司

IIC China 9.2014

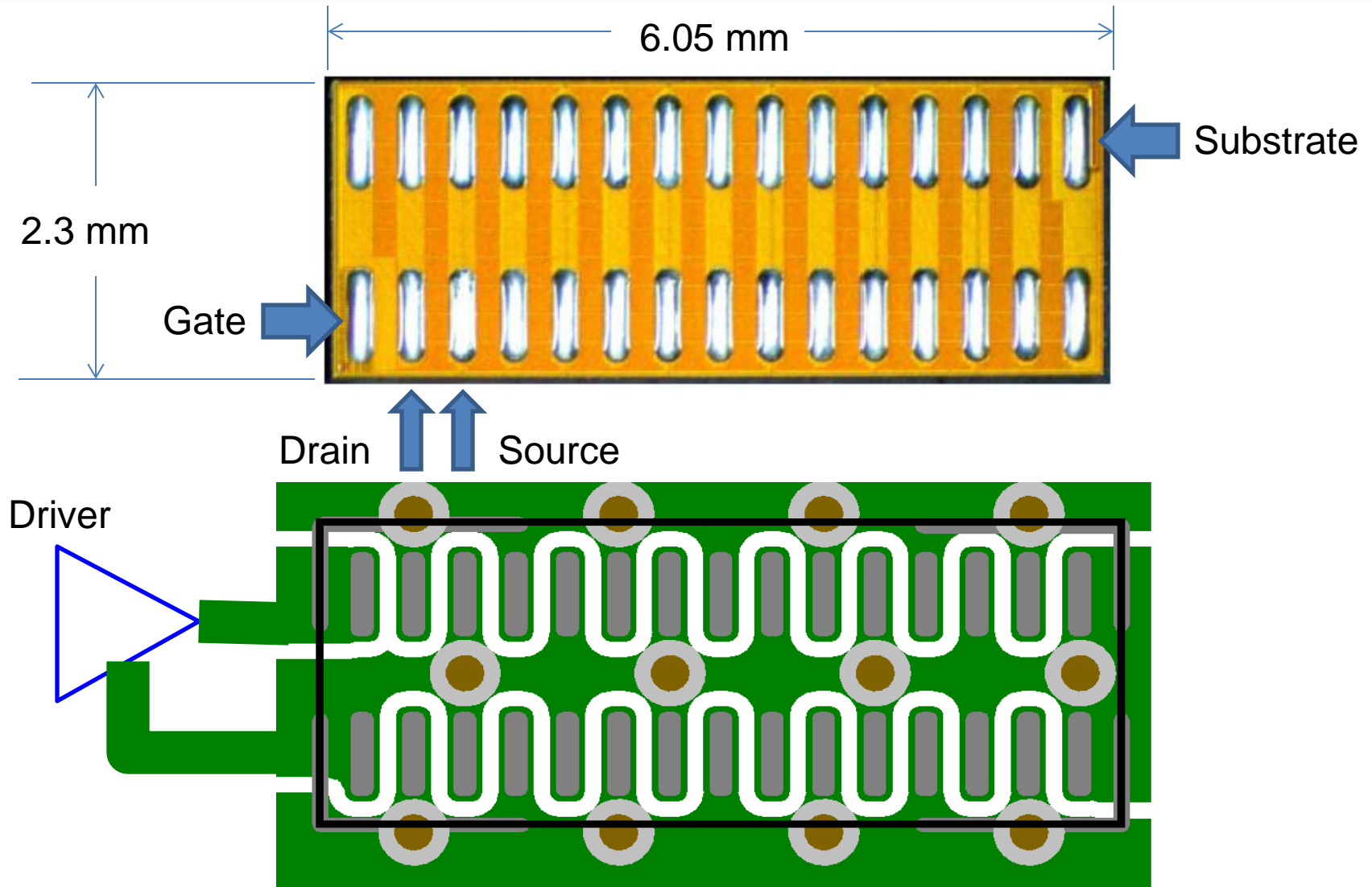
- 第四代氮化镓场效应晶体管 (eGaN®FET)
简介
- 进一步降低导通电阻 ($R_{DS(ON)}$)
- 改善品质因数 (FOM)
- 改善米勒比
- 增加直流-直流转换器的效率
- 总结

第四代产品数据表一览

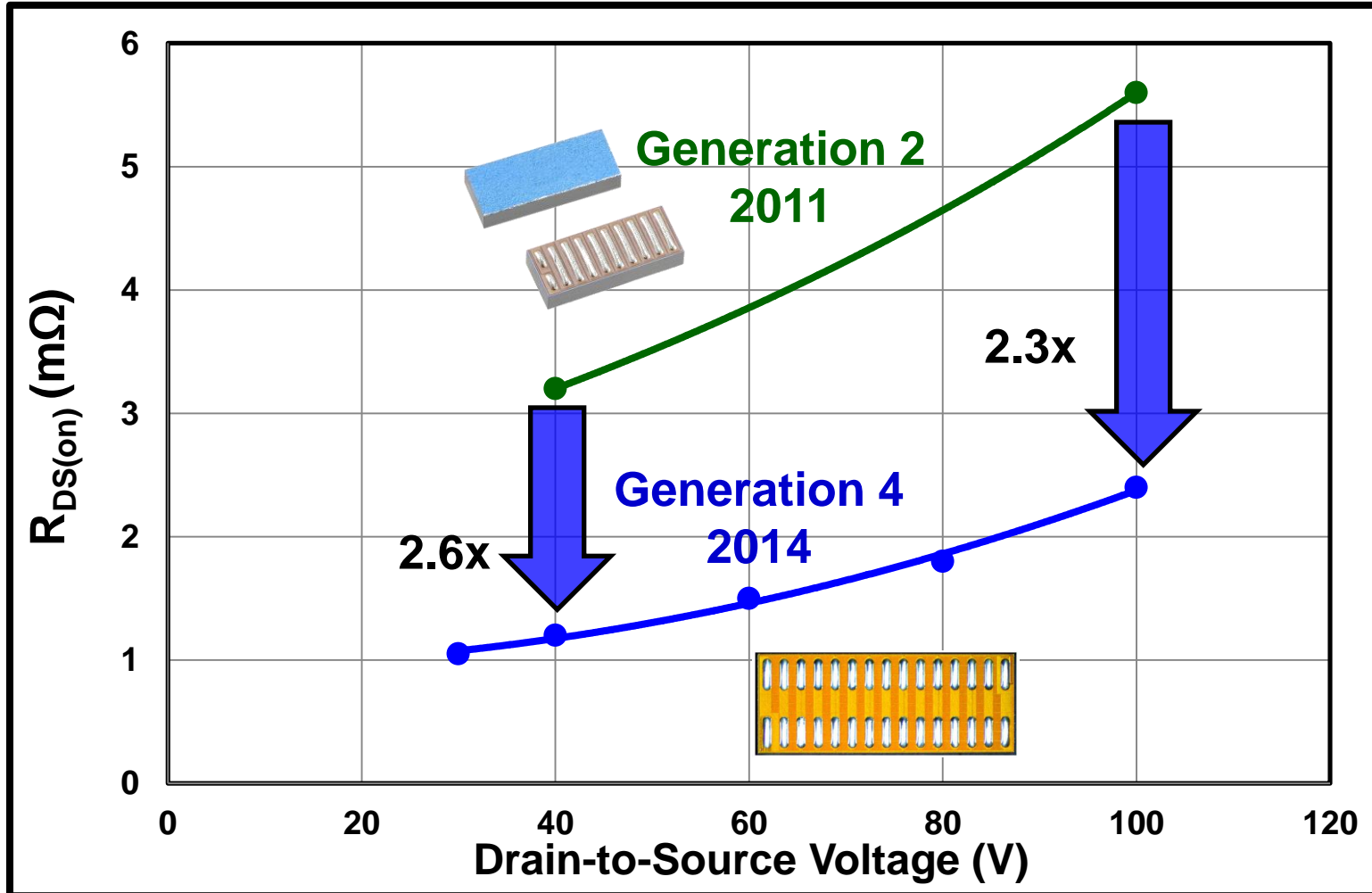


Part Number	Gen	BV (V)	R _{DS(on)} (mΩ) (V _{GS} = 5V, at I _D Cont.)		Peak I _D (A) (Pulsed 25°C)	Max T _J	Typical Charge (nC) @ V _{ds} = BV/2;					Typ R _g (Ω)	Cont. I _D (A)
			Typ.	Max			Q _G	Q _{GD}	Q _{GS}	Q _{OSS}	Q _{RR}		
EPC2023	4	30	1.0	1.3	590 A	150°C	27.5	1.9	5.8	27	0	0.3	60
EPC2024	4	40	1.2	1.5	550 A	150°C	26	2.0	6.4	32	0	0.3	60
EPC2020	4	60	1.5	2.0	470 A	150°C	22	2.0	5.0	42	0	0.3	60
EPC2021	4	80	1.8	2.5	420 A	150°C	20	2.1	3.8	60	0	0.3	60
EPC2022	4	100	2.4	3.2	360 A	150°C	17	2.0	3.7	60	0	0.3	60
EPC2019	4	200	33	43	42 A	125°C	2	0.33	0.63	17.5	0	0.3	9
EPC2015	2	40	3.2	4	150 A	125°C	10.5	2.2	3	18.5	0	0.3	33
EPC2001	2	100	5.6	7	100 A	125°C	8	2.2	2.3	35	0	0.3	25
EPC2012	2	200	70	100	15 A	125°C	1.5	0.57	0.33	11	0	0.3	3

晶片版图

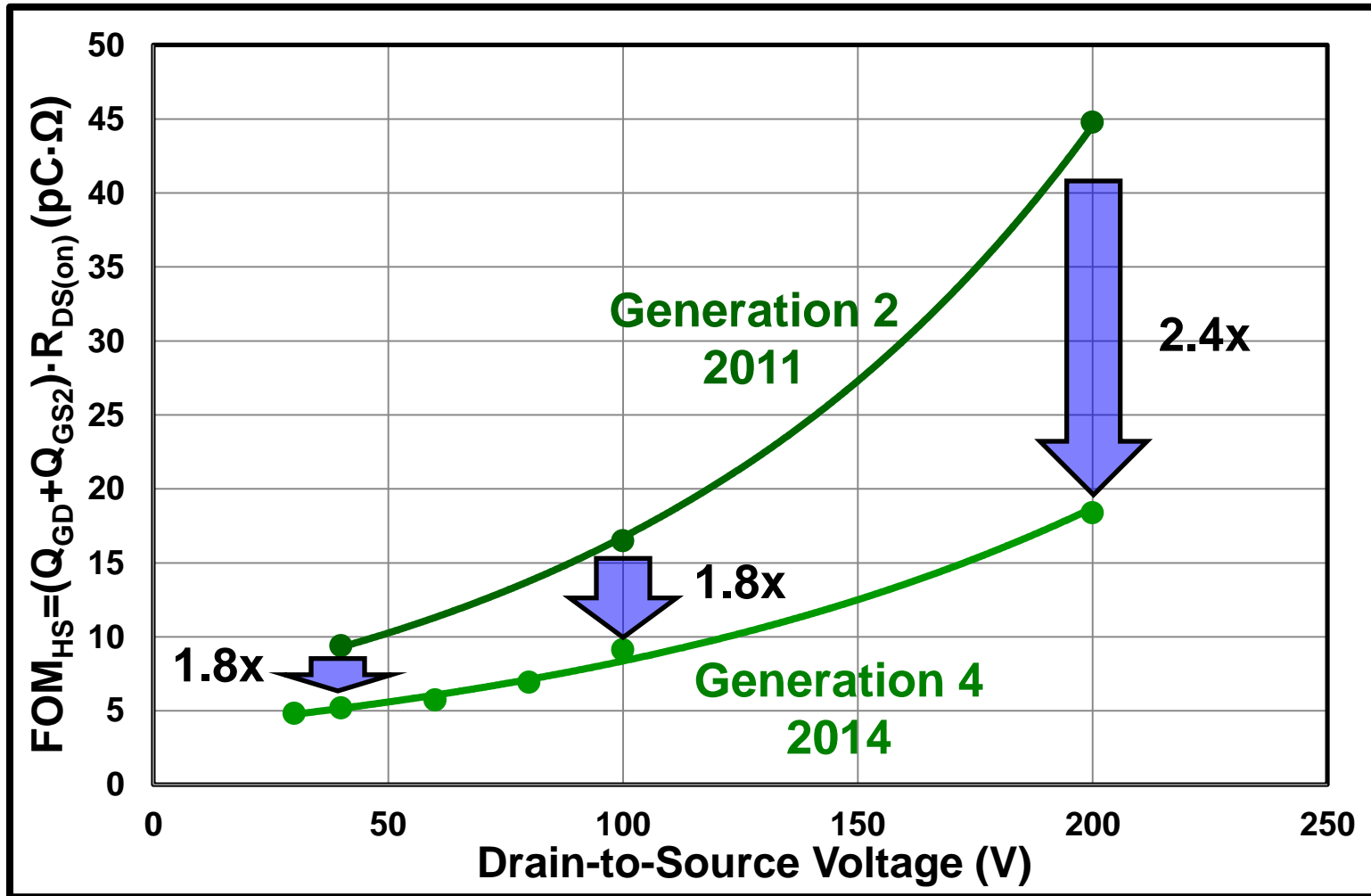


阻抗的比较



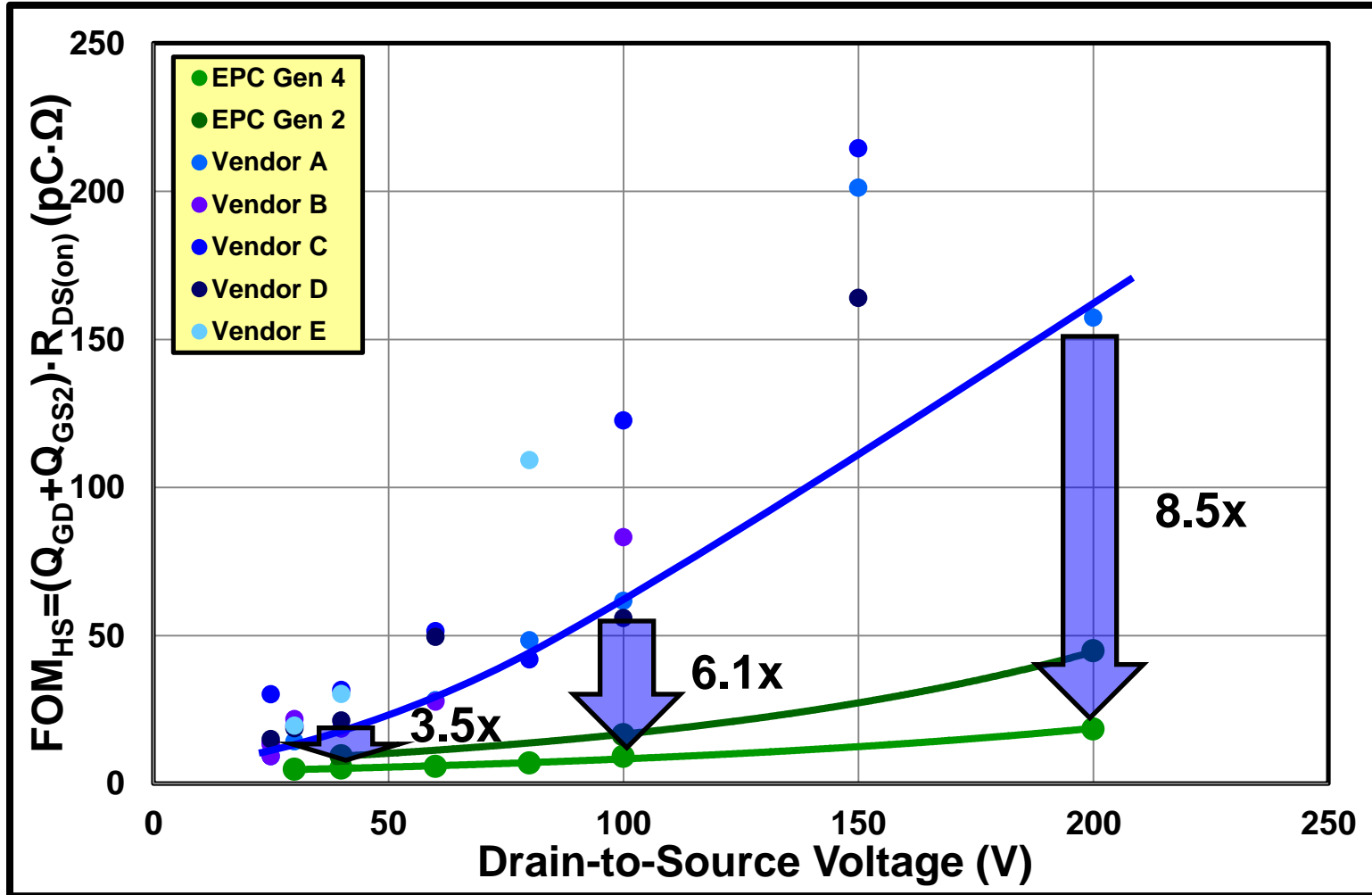
$V_{GS}=5\text{ V}$

硬开关的品质因数 FOM_{HS}



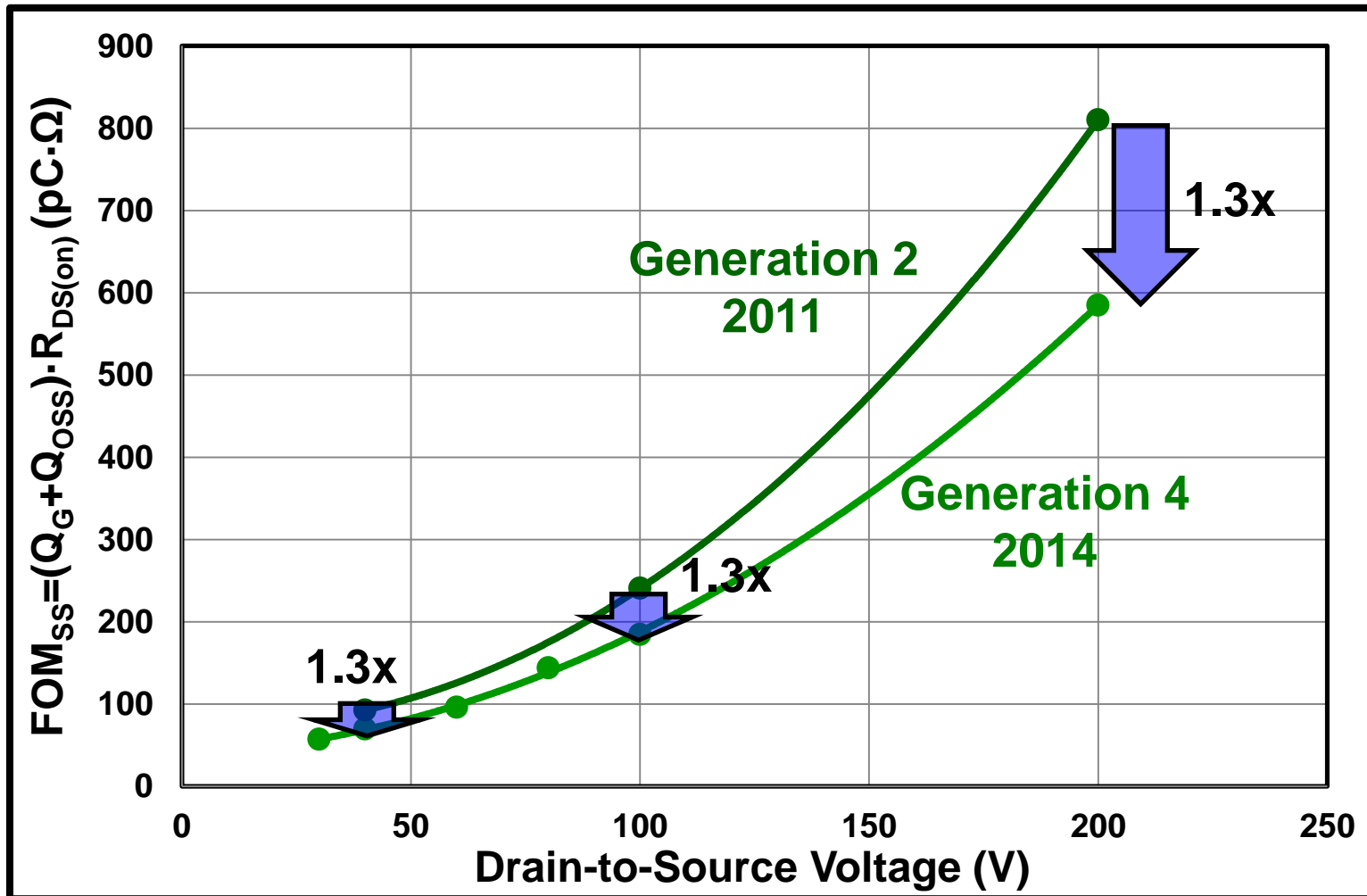
$$V_{DS} = 0.5 \cdot V_{DSS}, I_{DS} = 20 \text{ A}$$

硬开关的品质因数 FOM_{HS}



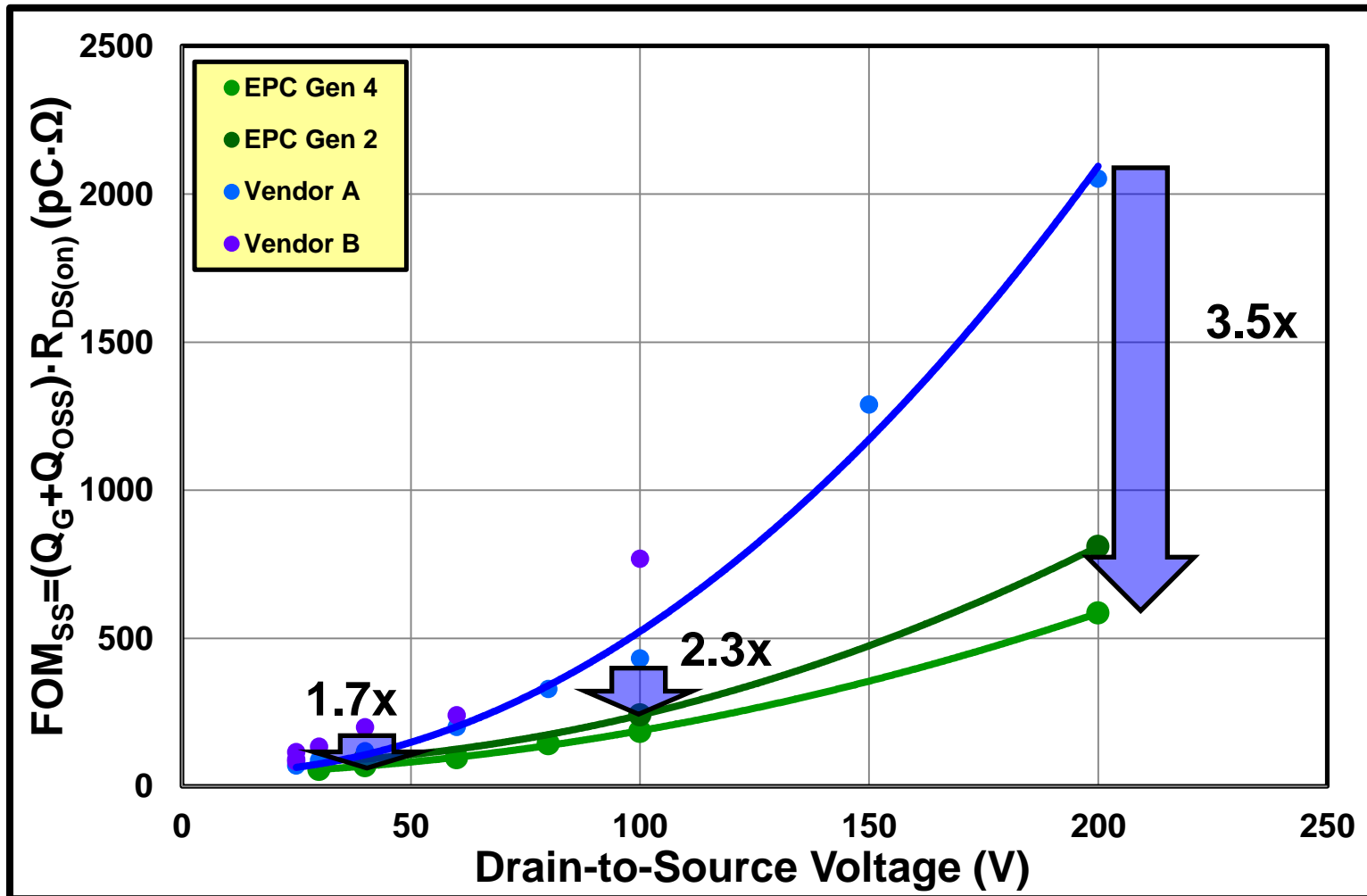
$$V_{DS} = 0.5 \cdot V_{DSS}, I_{DS} = 20 \text{ A}$$

软开关的品质因数 FOM_{SS}



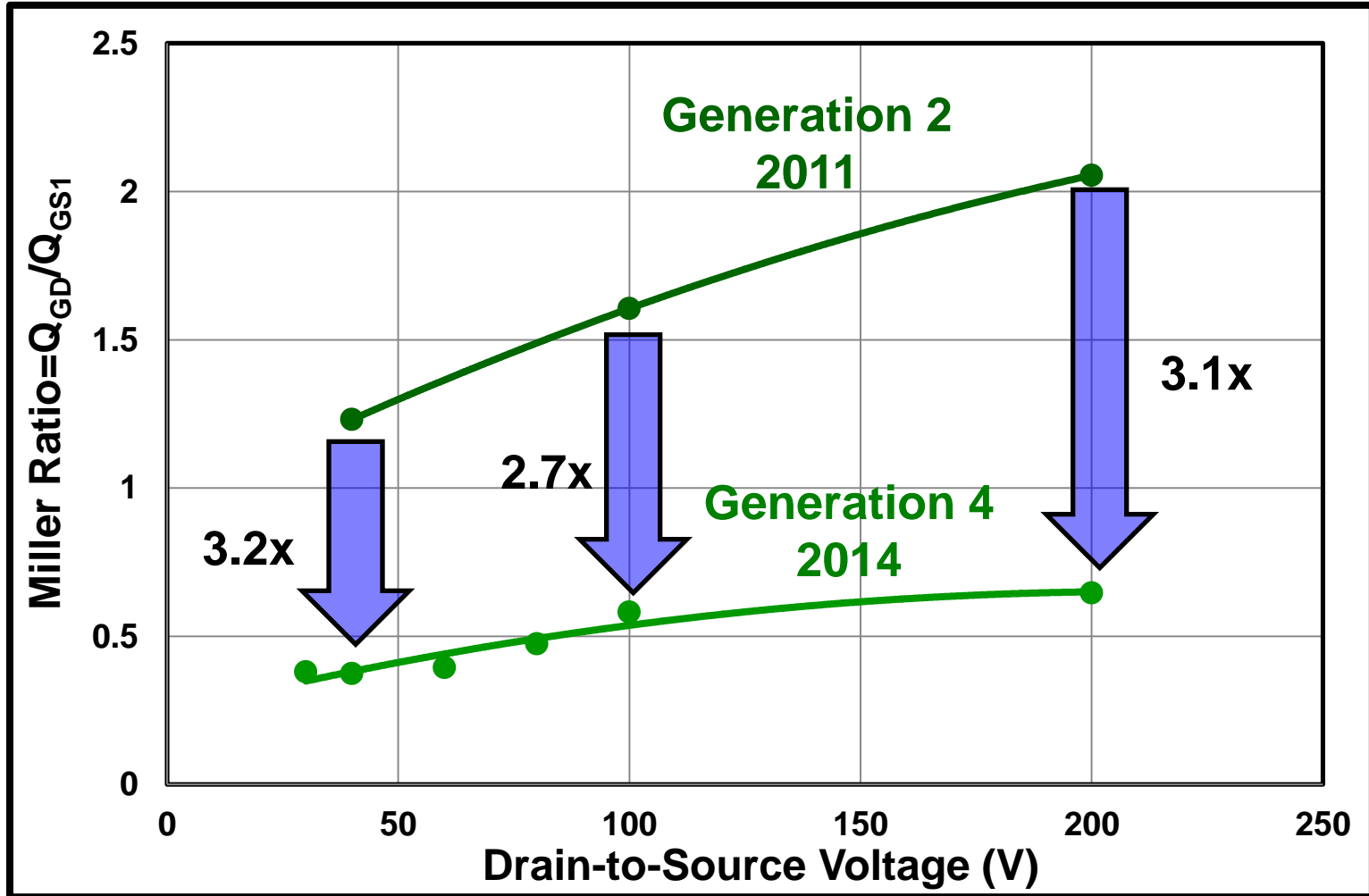
$$V_{DS} = 0.5 \cdot V_{DSS}$$

软开关的品质因数 FOM_{SS}



$$V_{DS} = 0.5 \cdot V_{DSS}$$

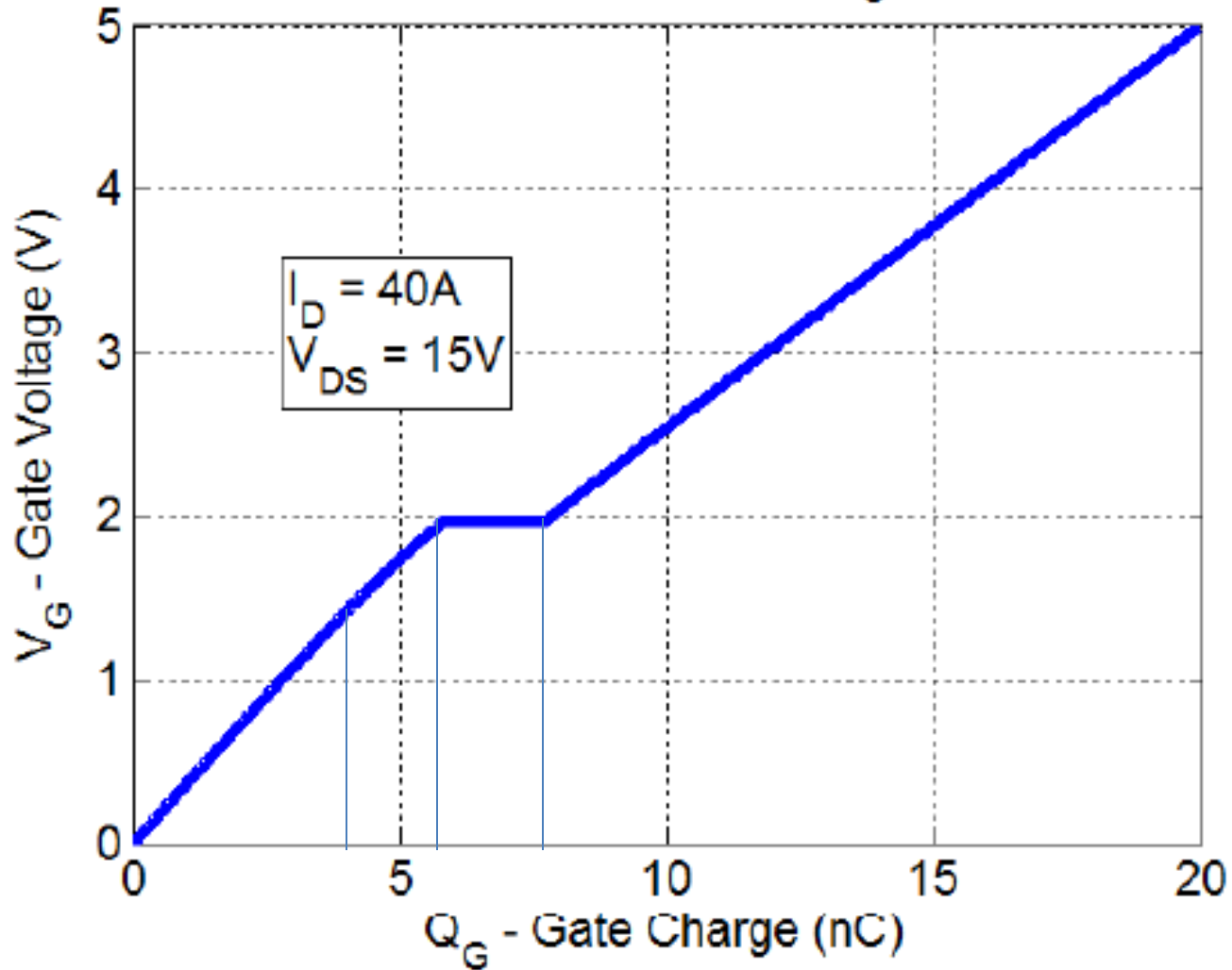
米勒比



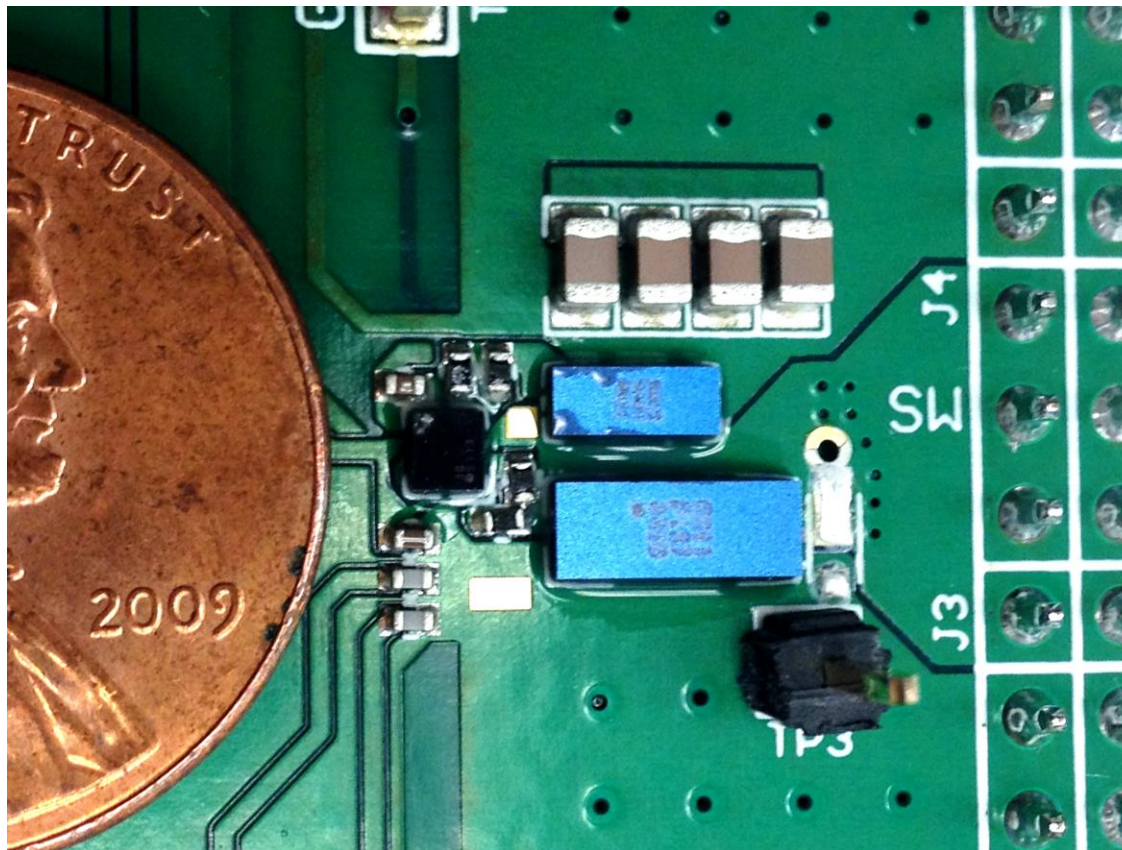
$$V_{DS}=0.5 \cdot V_{DSS}, I_{DS}=20 \text{ A}$$

栅极电荷

EPC2023: Gate Charge

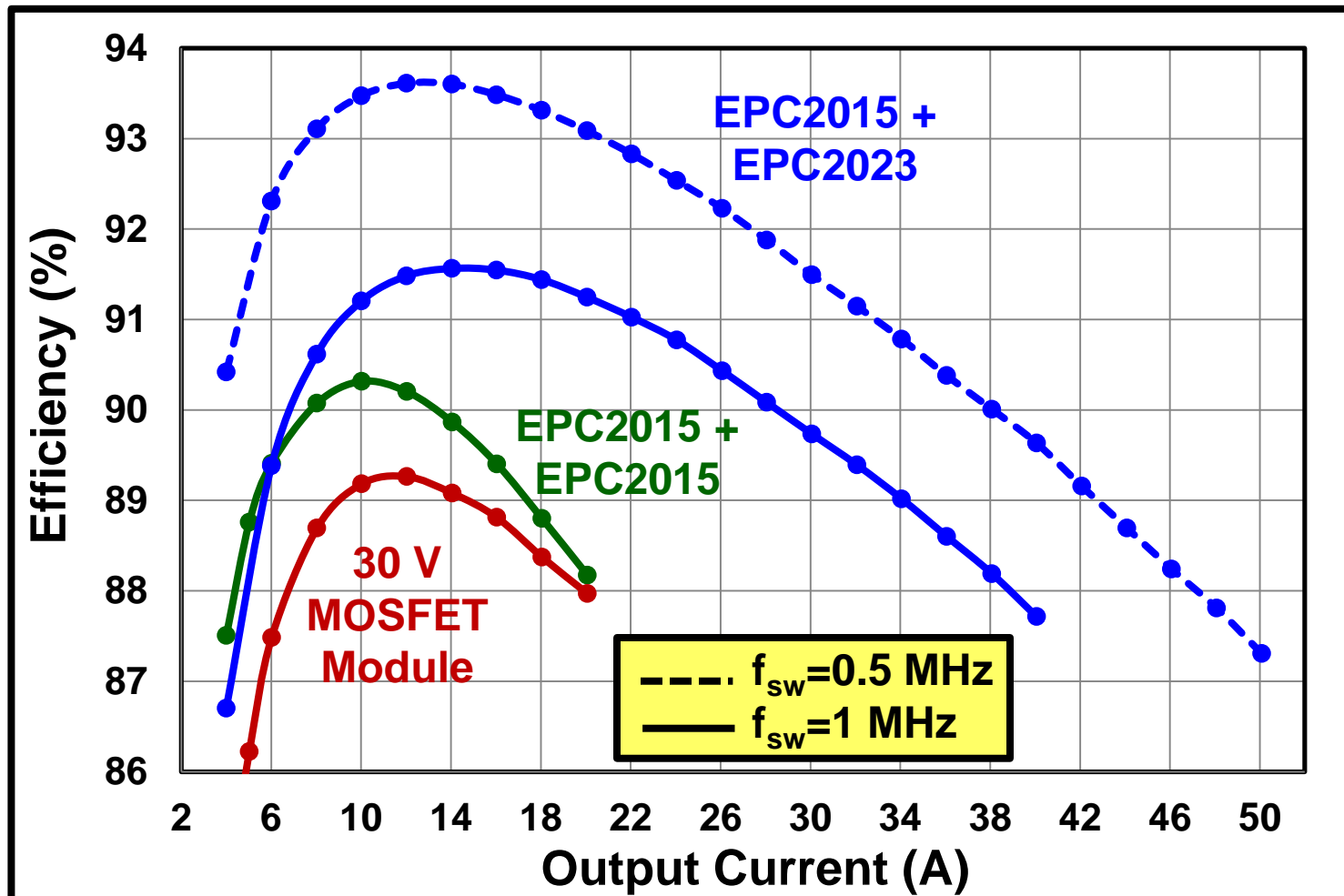


硬开关降压转换器



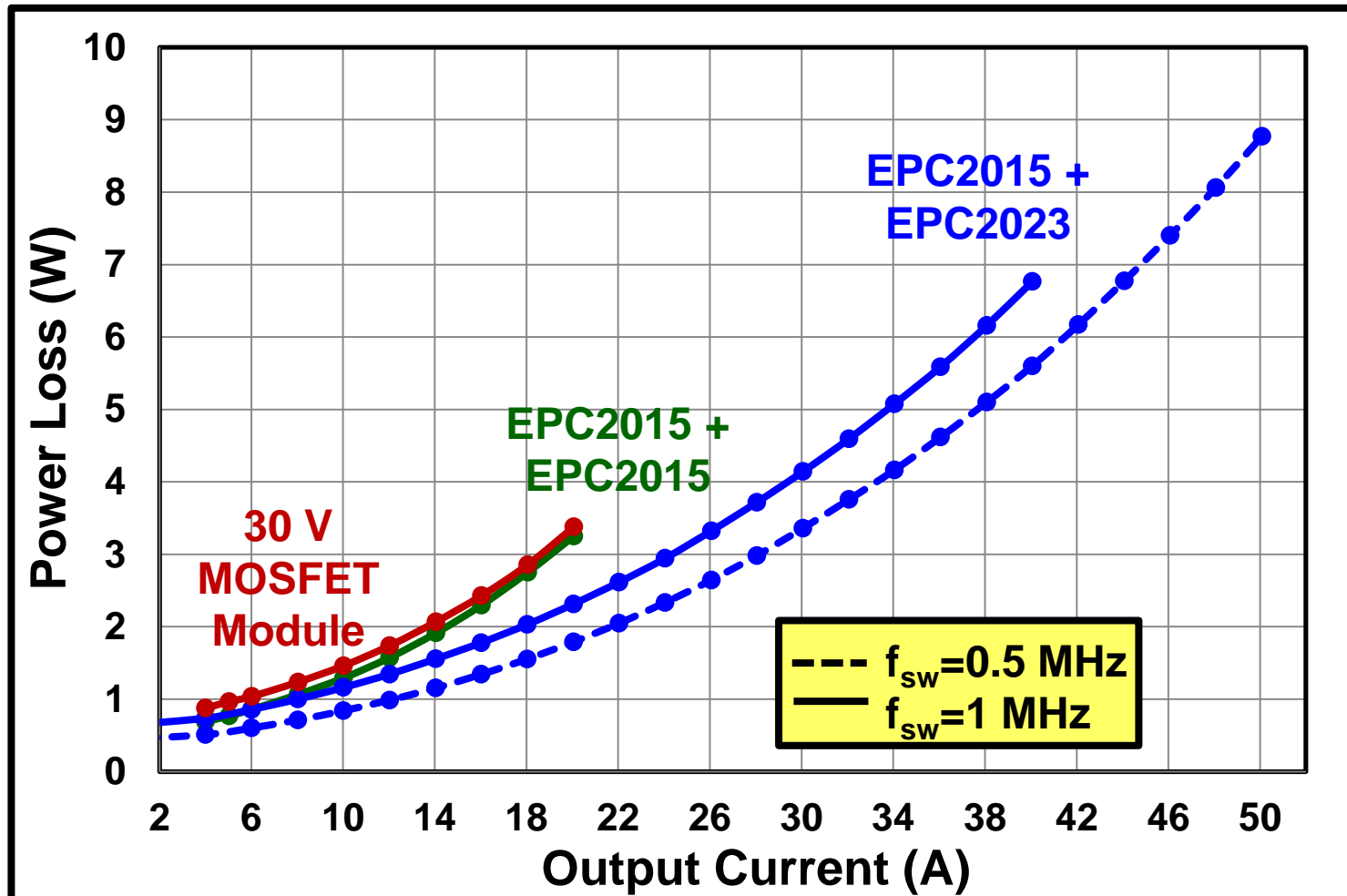
EPC9018, EPC2015 + EPC2023
EPC9019, EPC2001 + EPC2021

在较低电压的性能



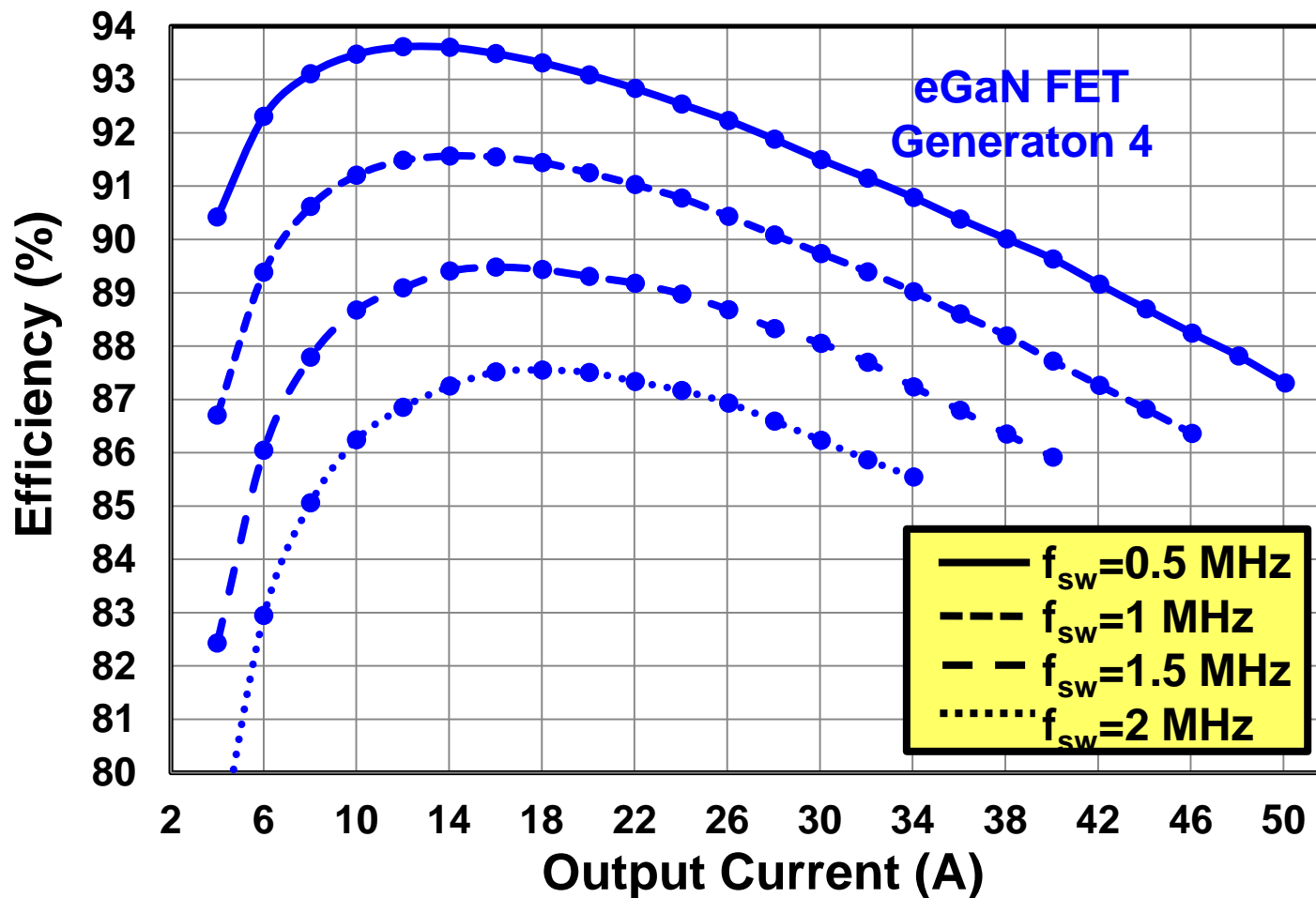
$V_{IN}=12$ V $V_{OUT}=1.2$ V

在较低电压的性能



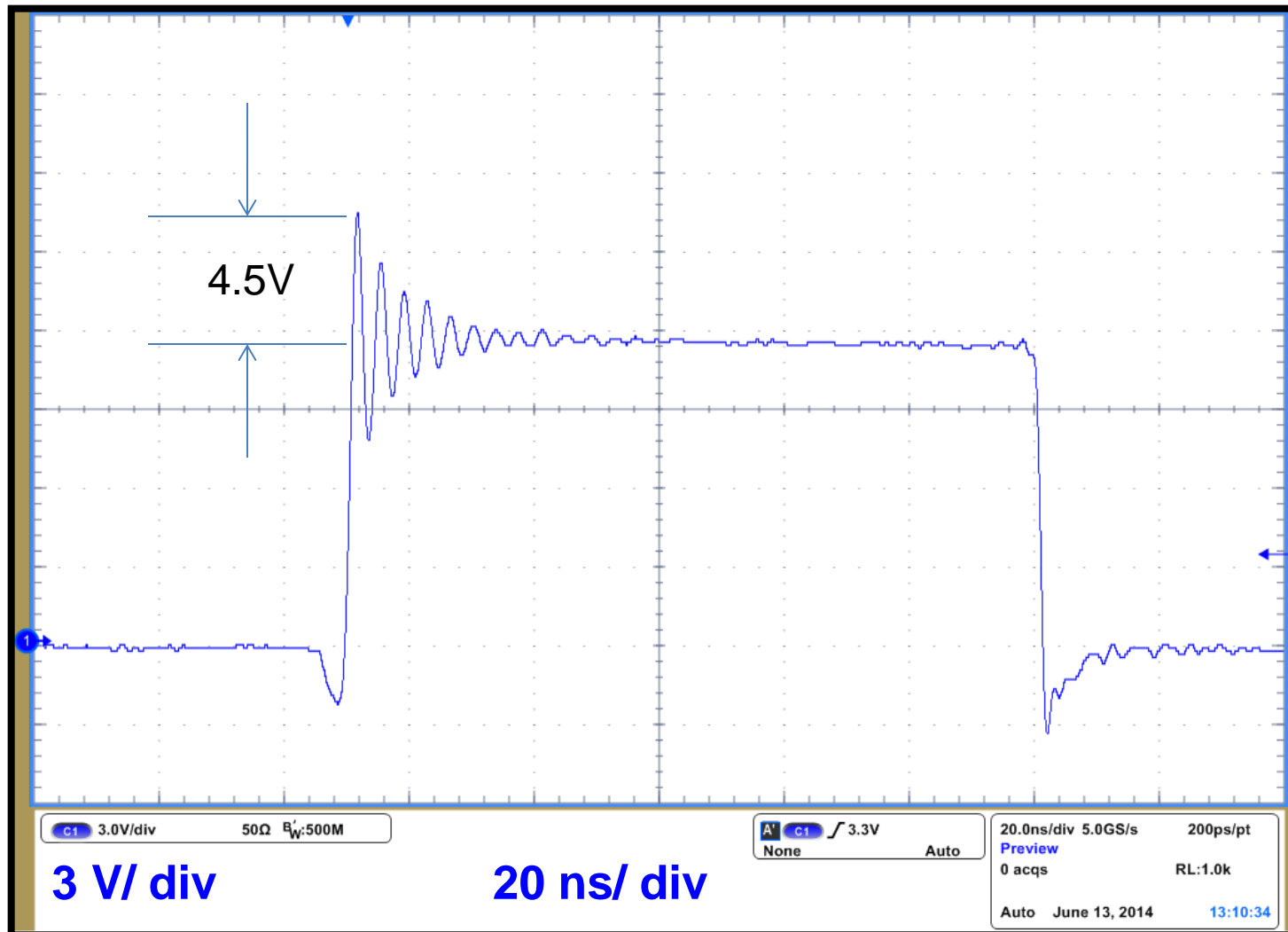
$V_{IN}=12$ V $V_{OUT}=1.2$ V

在较低电压的性能



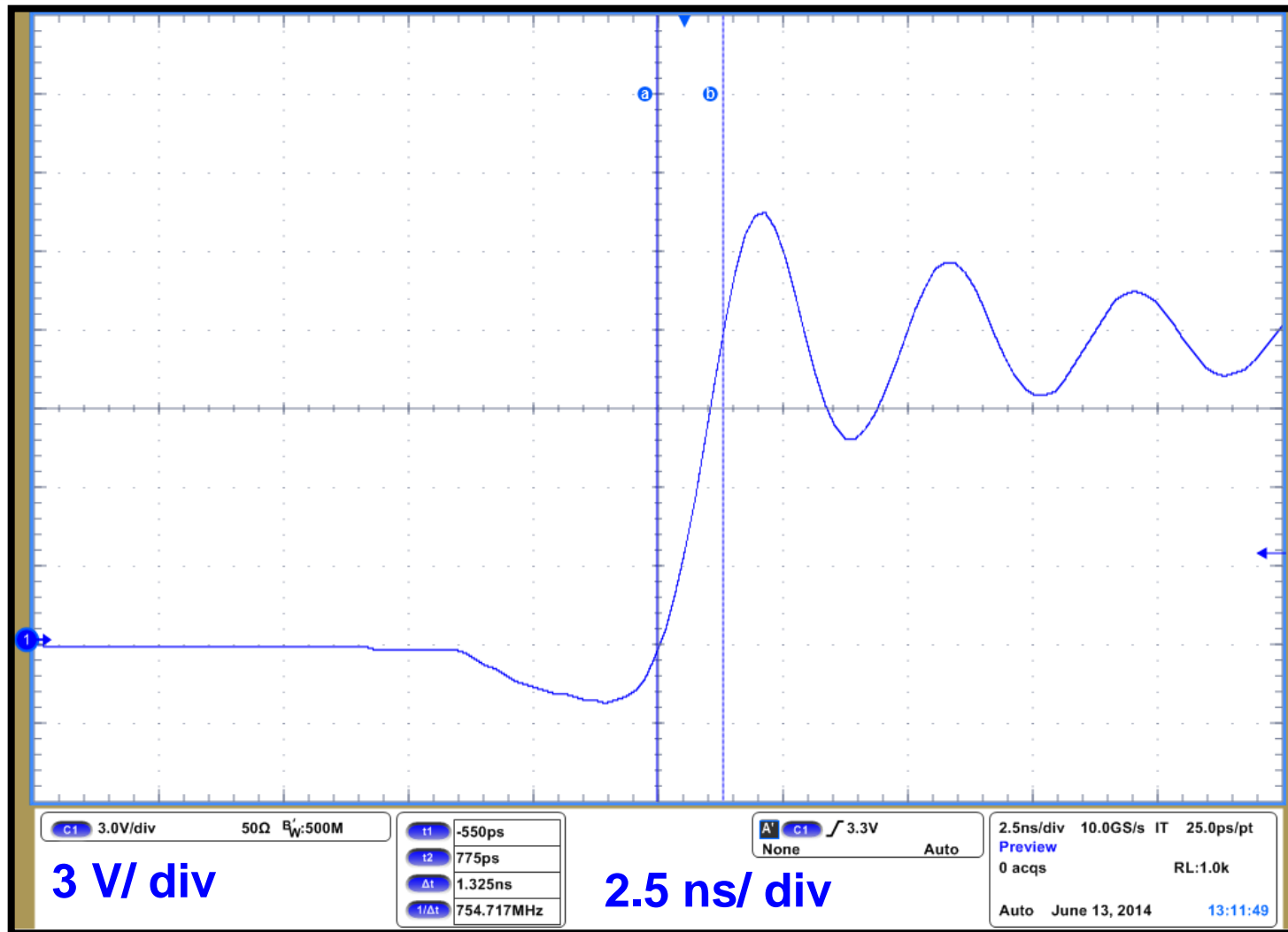
$V_{IN}=12$ V $V_{OUT}=1.2$ V

在较低电压的性能



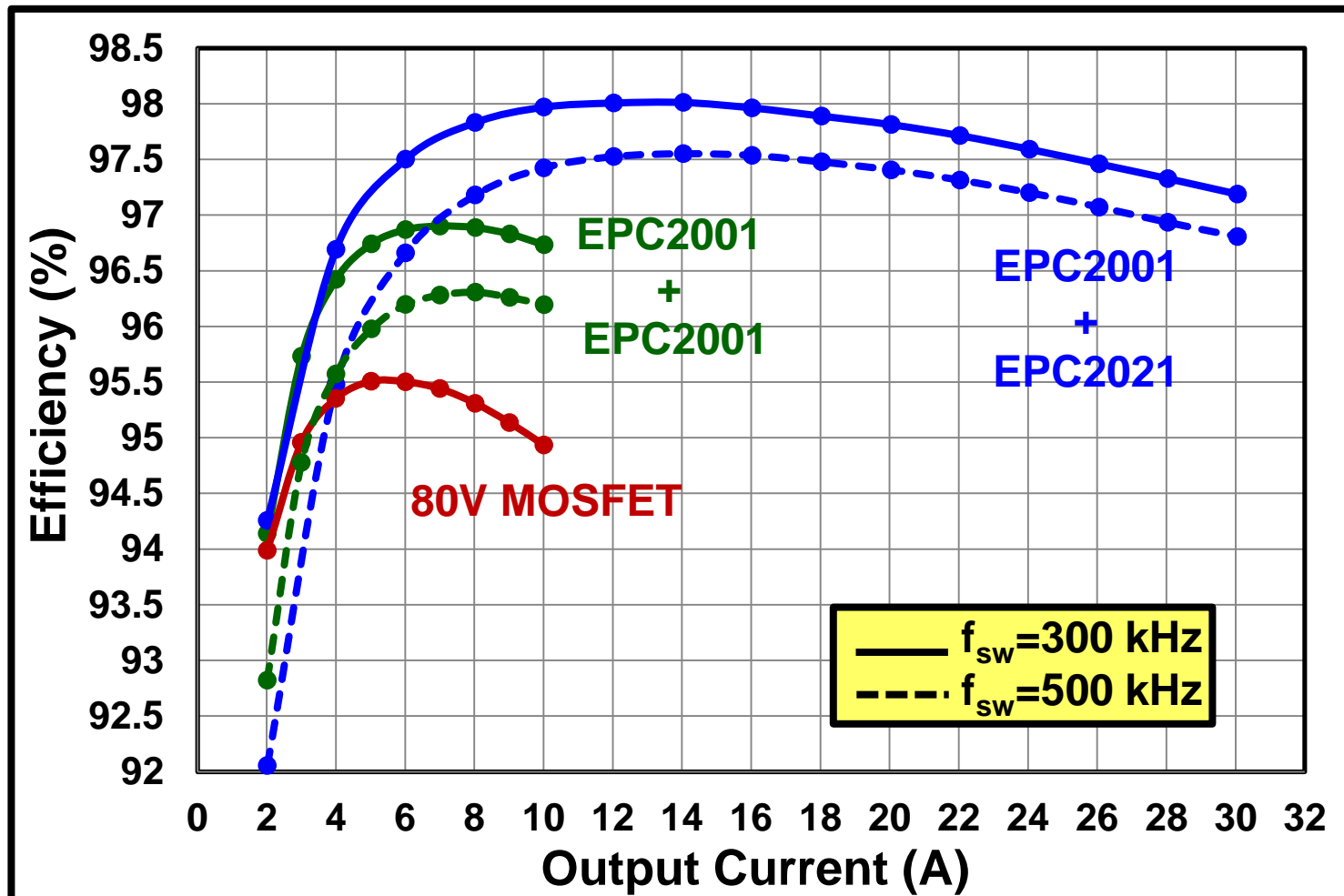
$V_{IN}=12\text{ V}$, $V_{OUT}=1.2\text{ V}$, $f_{sw}=1\text{ MHz}$, $I_{OUT}=40\text{ A}$

在较低电压的性能



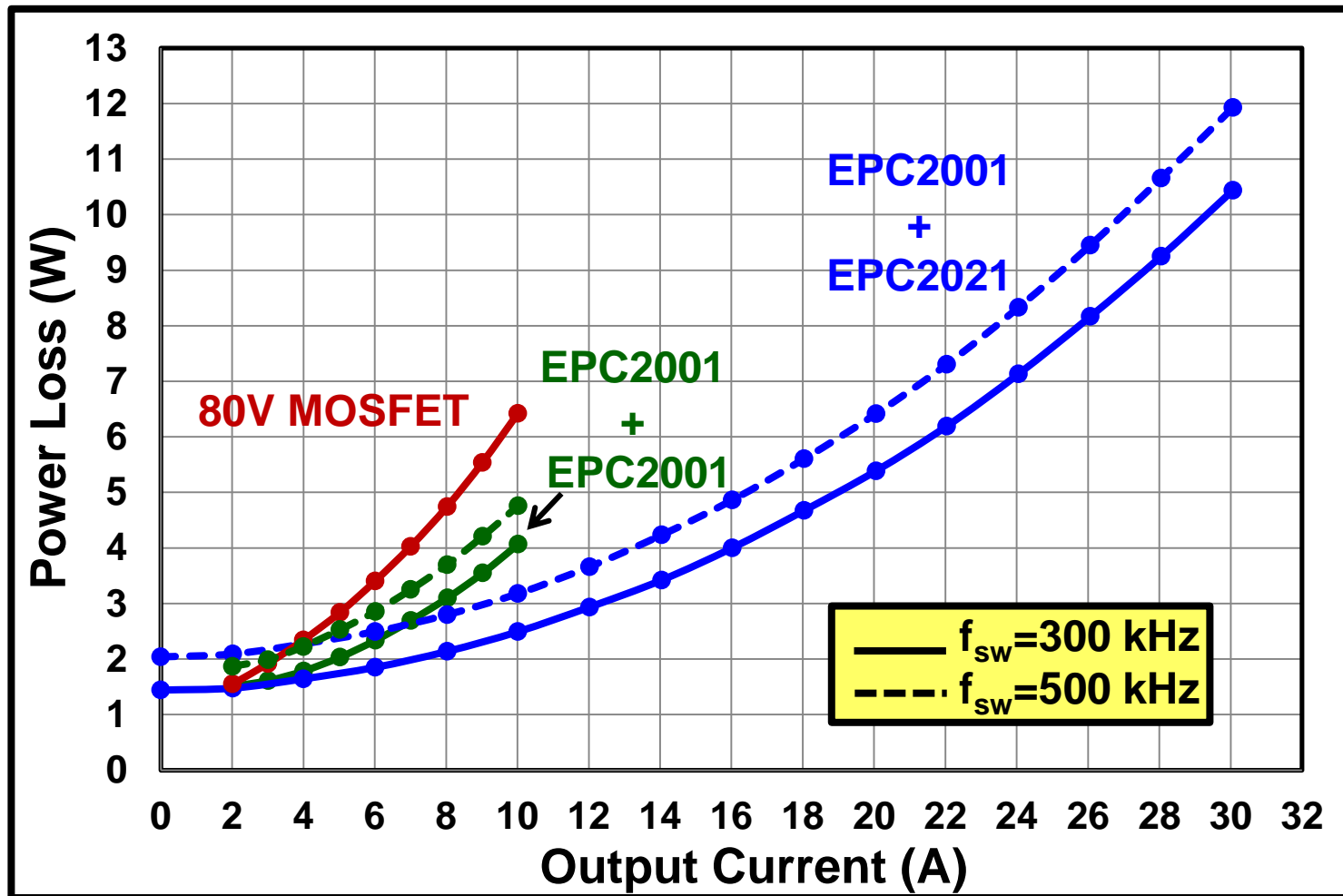
$V_{IN}=12\text{ V}$, $V_{OUT}=1.2\text{ V}$, $f_{sw}=1\text{ MHz}$, $I_{OUT}=40\text{ A}$

在较高电压的性能



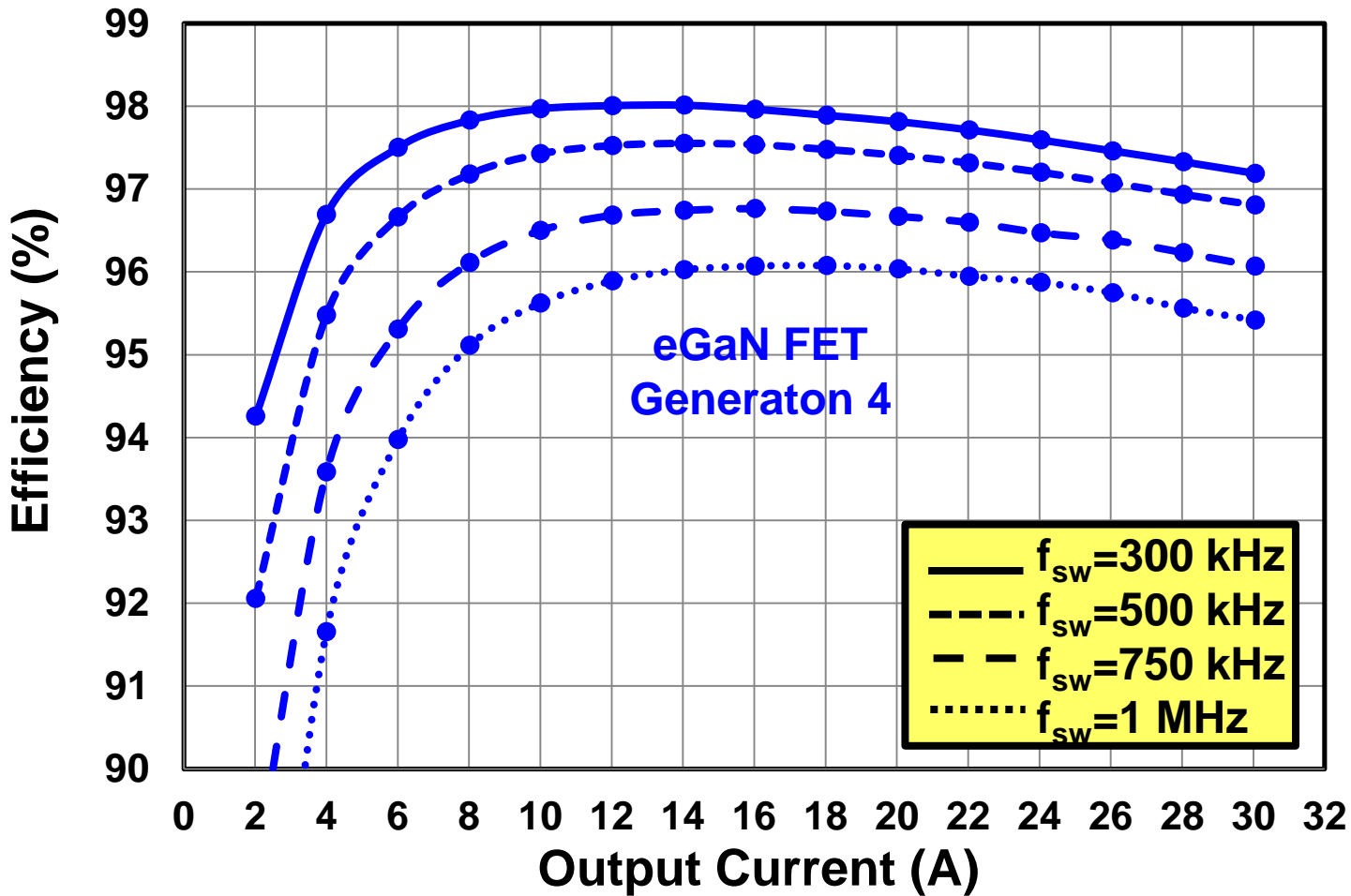
$V_{IN}=48\text{ V}$ $V_{OUT}=12\text{ V}$

在较高电压的性能

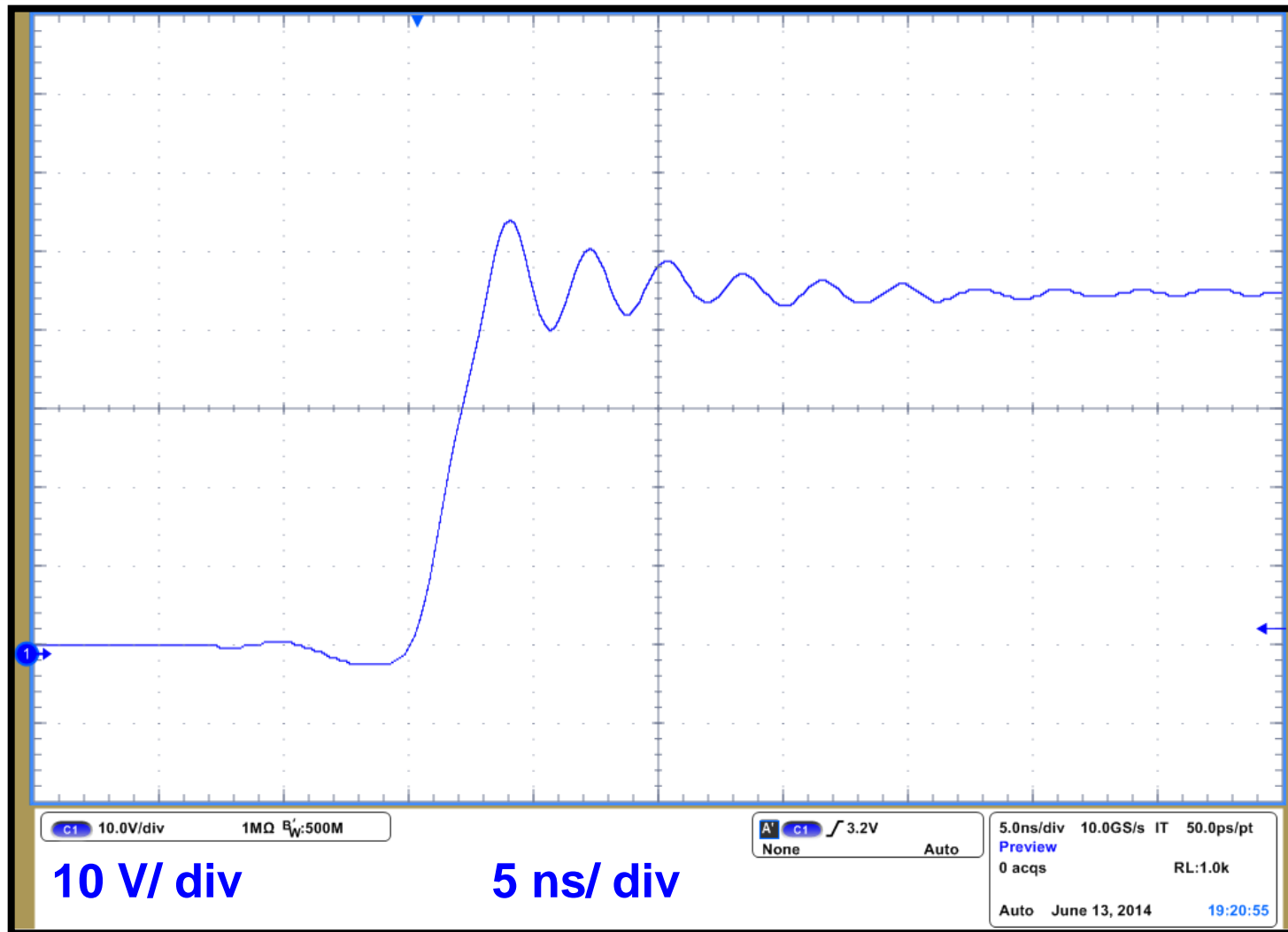


$V_{IN}=48\text{ V}$ $V_{OUT}=12\text{ V}$

在较高电压的性能



在较高电压的性能



$V_{IN}=48\text{ V}$, $V_{OUT}=12\text{ V}$, $f_{sw}=500\text{ kHz}$, $I_{OUT}=30\text{ A}$

总结

- 新一代氮化镓场效应晶体管（eGaN FET）现已推出
- 采用氮化镓器件的硬开关应用可降低阻抗达两倍及提高开关性能达两倍
- 与硅MOSFET器件相比，采用氮化镓场效应晶体管的硬开关负载点应用在效率方面可取得倍增的优势

开发板



EPC Part No.	Voltage	Max $R_{DS(on)}$ (m Ω) ($V_{GS} = 5\text{ V}$)	Min. Peak Pulsed I_D (A) (25°C , $T_{pulse} = 300\ \mu\text{s}$)	Half-Bridge Development Boards	
				Standard	Low Duty Cycle
EPC2023	30	1.3	590	EPC9031	EPC9018
EPC2024	40	1.5	550	EPC9032	
EPC2020	60	2	470	EPC9033	
EPC2021	80	2.5	420	EPC9034	EPC9019
EPC2022	100	3.2	360	EPC9035	
EPC2019	200	43	42	EPC9014	

A green road sign with white text is mounted on a wooden post. The sign reads 'eGaN® FET' and '继续阔步向前'. The background is a landscape with a road leading towards a city skyline at sunset, with a bright sun and large white clouds in a blue sky.

eGaN® FET
继续阔步向前

谢谢大家的支持！

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