



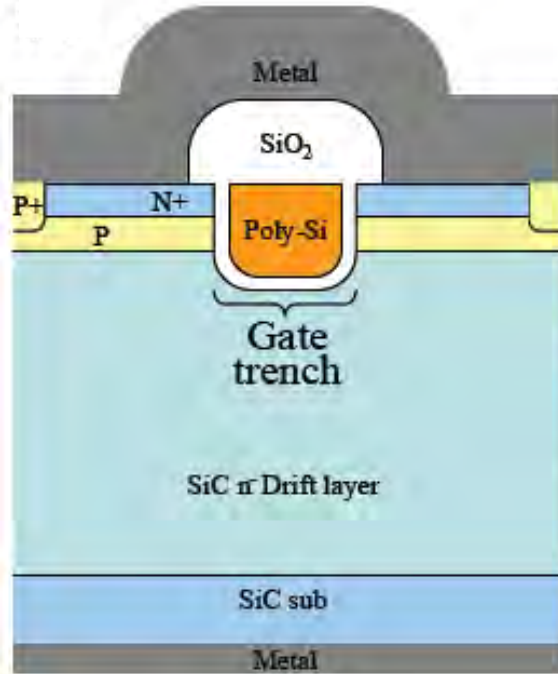
# New Products Under Development

## 3<sup>rd</sup> Gen SiC MOSFET

# Schematic Cross Section of SiC Trench MOSFET

1

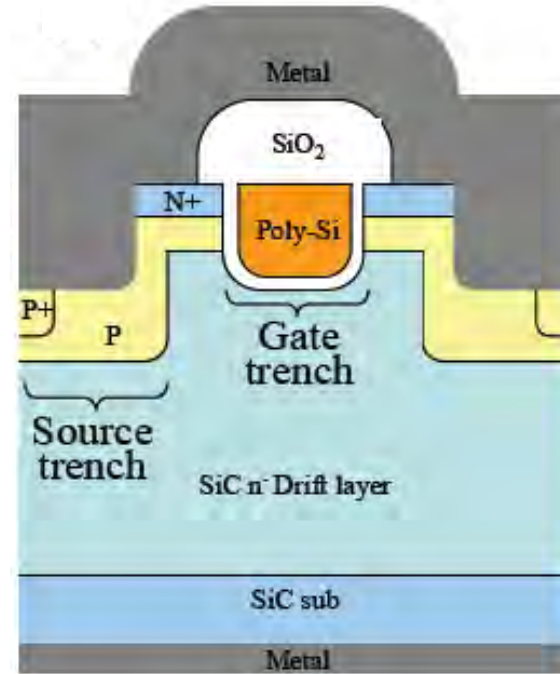
Ordinary designed trench MOSFET



Conventional single-trench  
(Gate trench only)

May lead to destruction of gate oxide  
at the bottom of the gate trench

ROHM 3G SiC MOSFET



Double-trench  
(Source trench and gate trench)

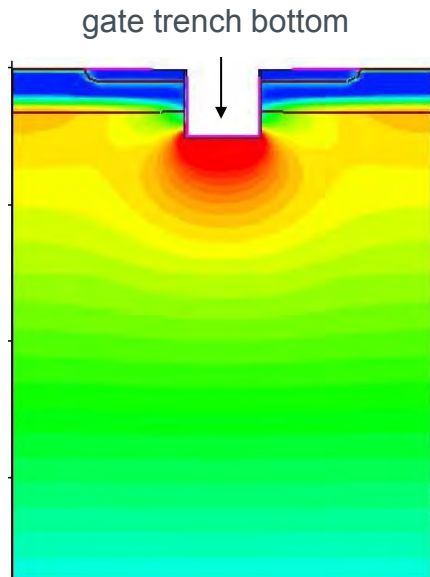
Successfully reduced the electric field  
at the bottom of the gate trench

# Drain-source Bias Simulation Results

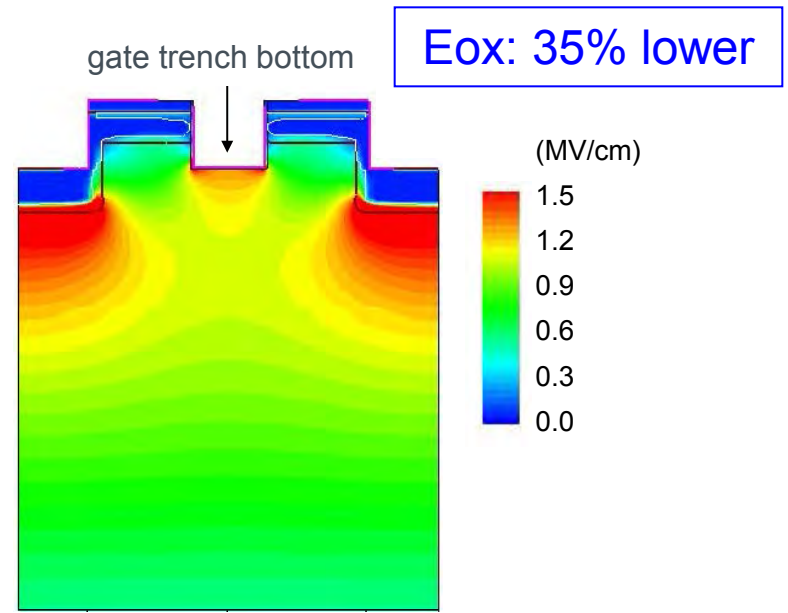
2

Condition: Same  $V_{ds}$  supplied in both cases

Standard trench MOSFET

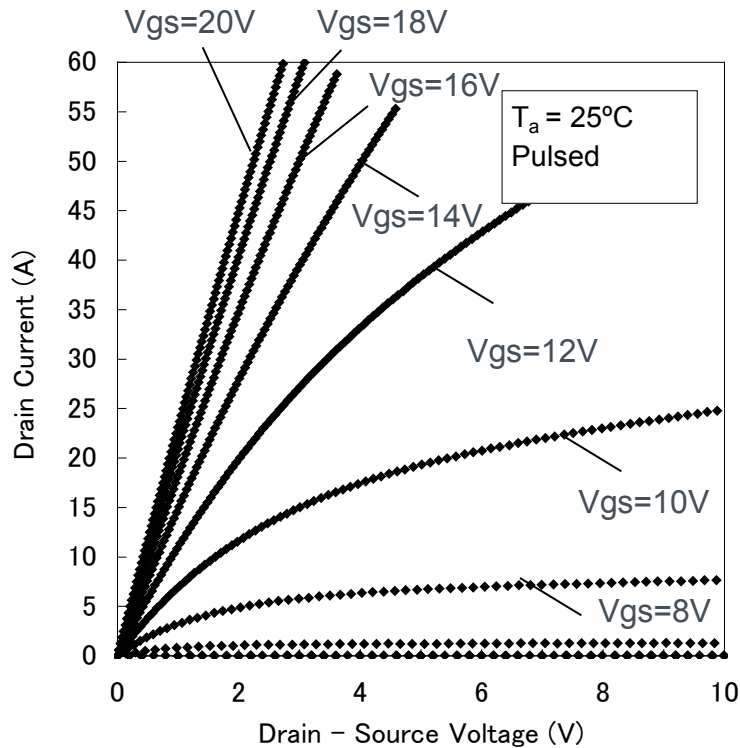


ROHM 3G SiC MOSFET

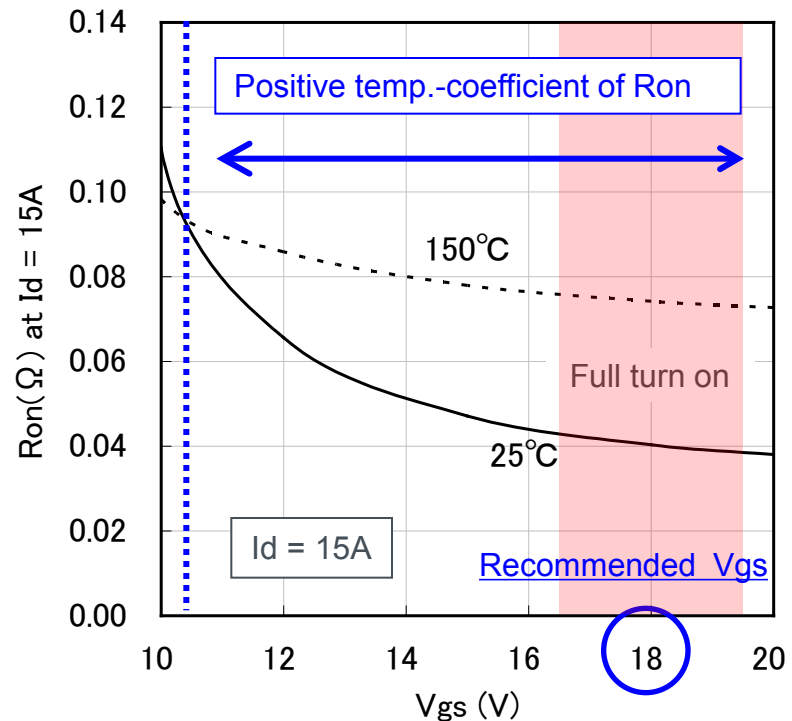


Suppression of the electric field concentration at the bottom of the gate trench is achieved by the double trench structure of ROHM 3G SiC MOSFET

# On-state Characteristics of 3G SiC Trench MOSFET <sub>3</sub>



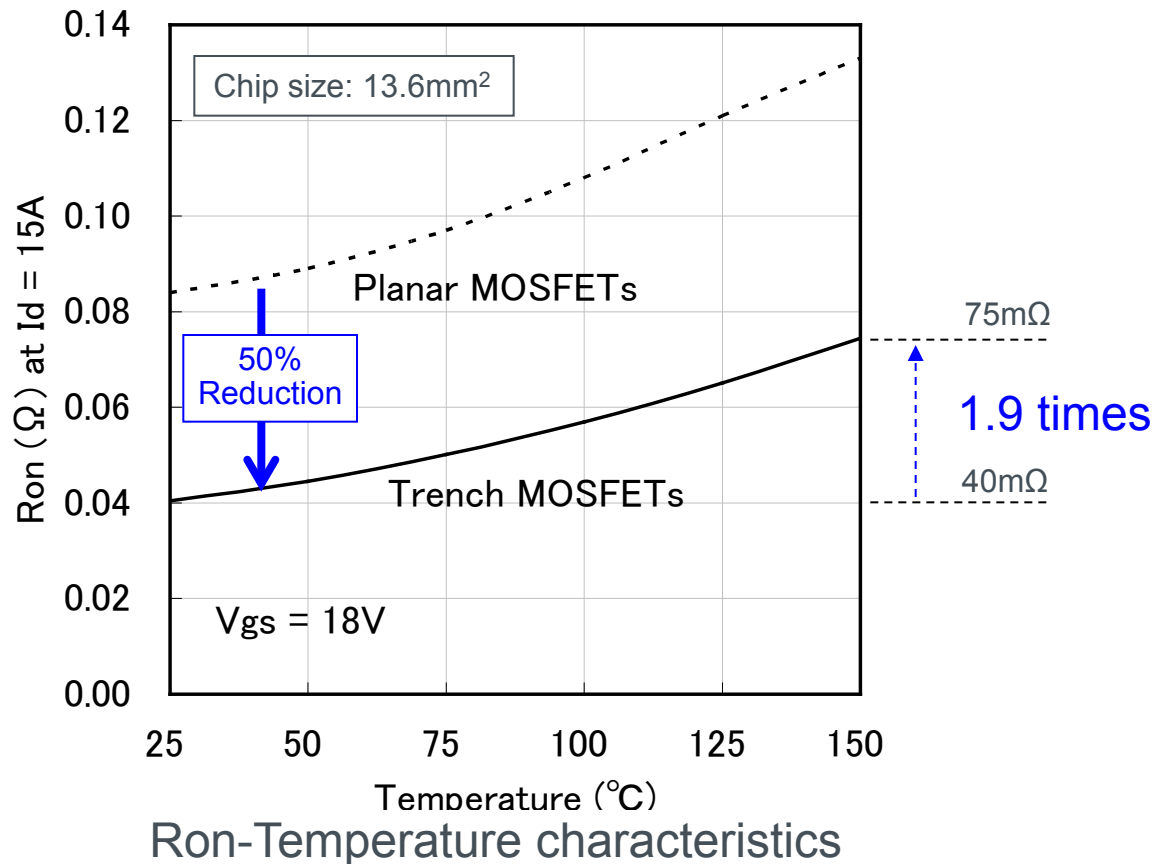
$I_d$ - $V_{ds}$  characteristics



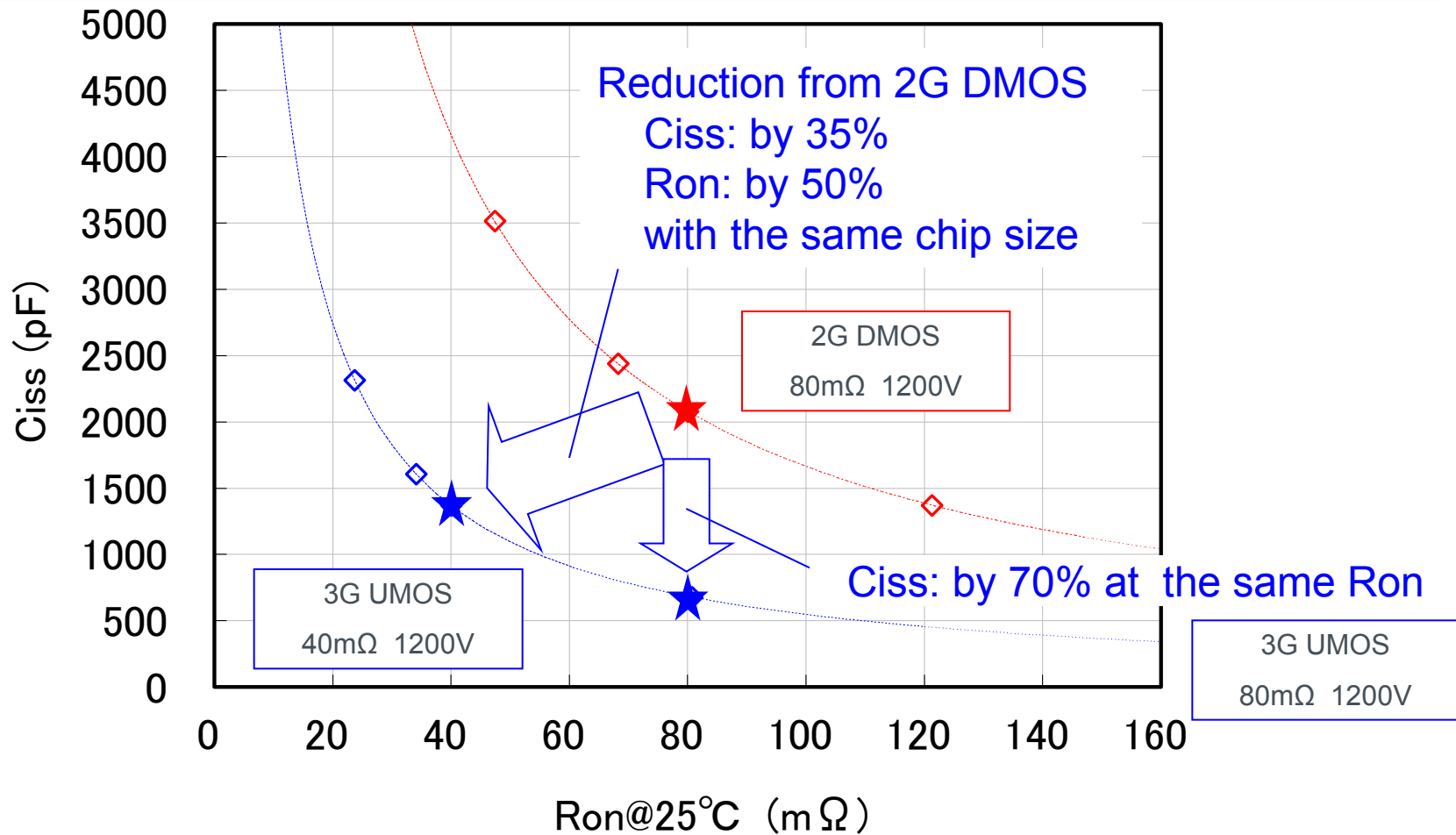
$R_{on}$ - $V_{gs}$  characteristics

- Low  $R_{on}$  at recommended  $V_{gs}$  of 18V
- A positive temperature-coefficient of on-resistance over  $V_{gs}$  of 10.5V, thus lower risk of thermal runaway

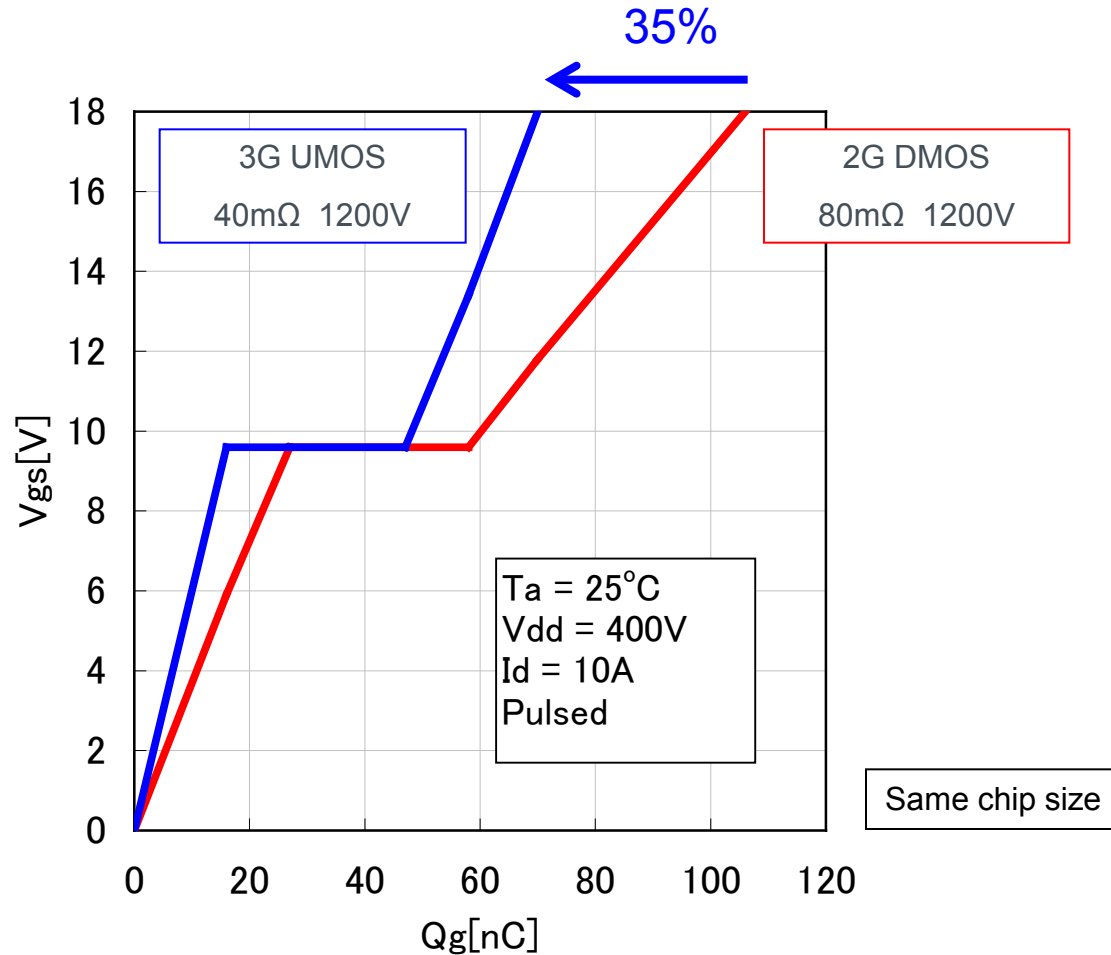
# Comparison of Temperature Dependency of Ron



- Compared to 2G planar MOSFET, Ron reduced by half throughout the entire temperature range

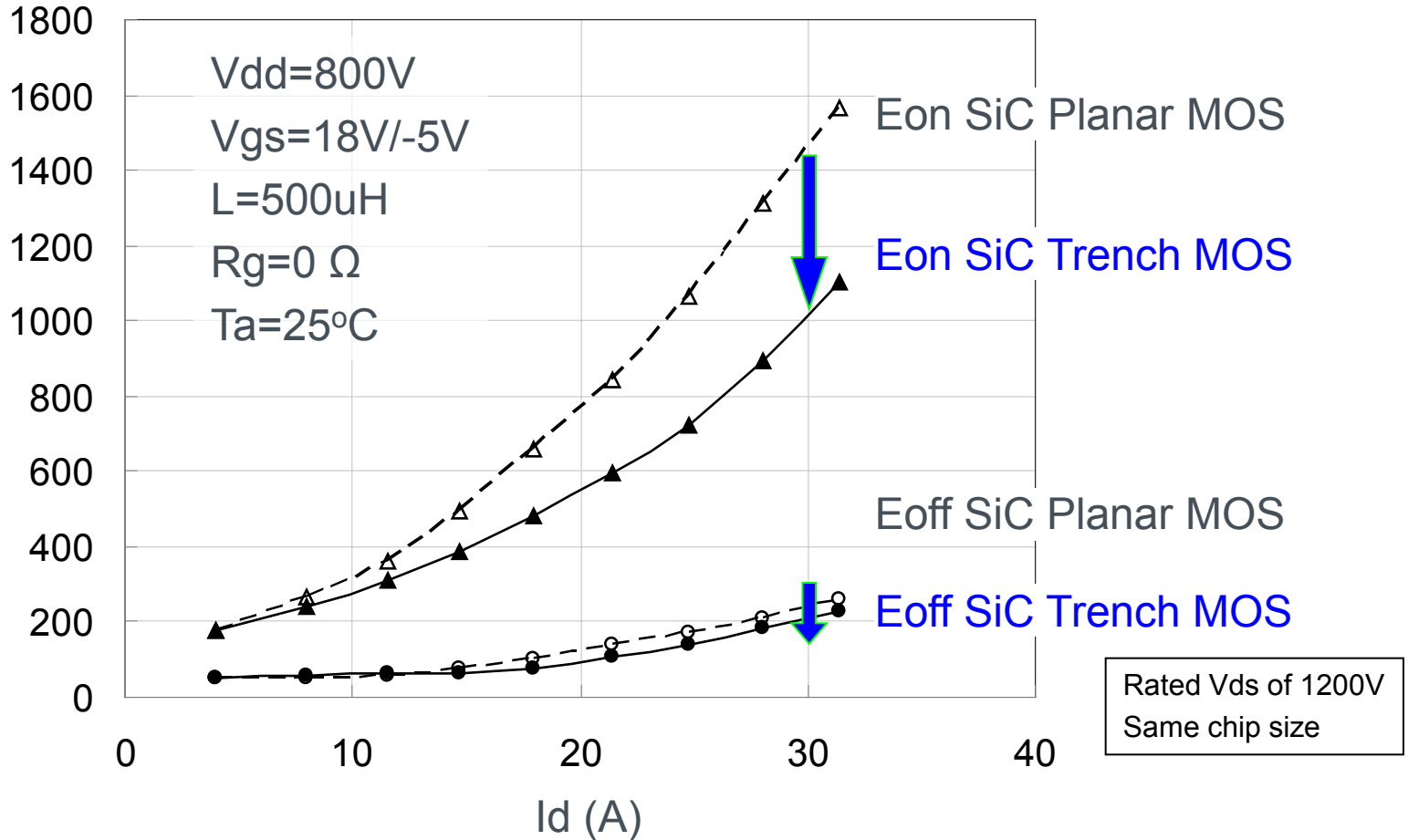


The combination of Lower Ron & Ciss reduced both conduction and switching losses



35% Lower Qg compared to ROHM 2G SiC DMOS

# Switching Loss Reduction

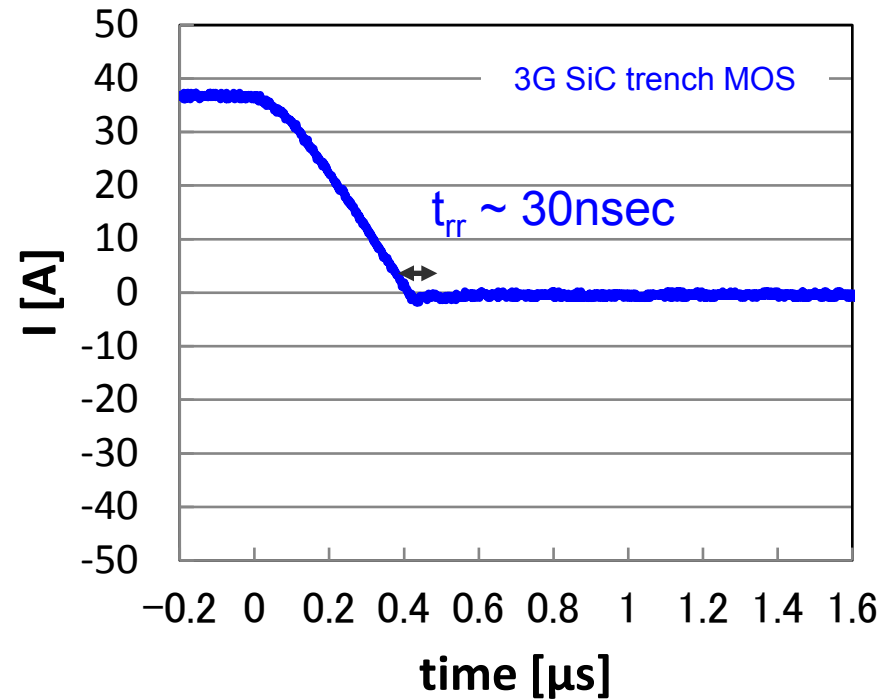
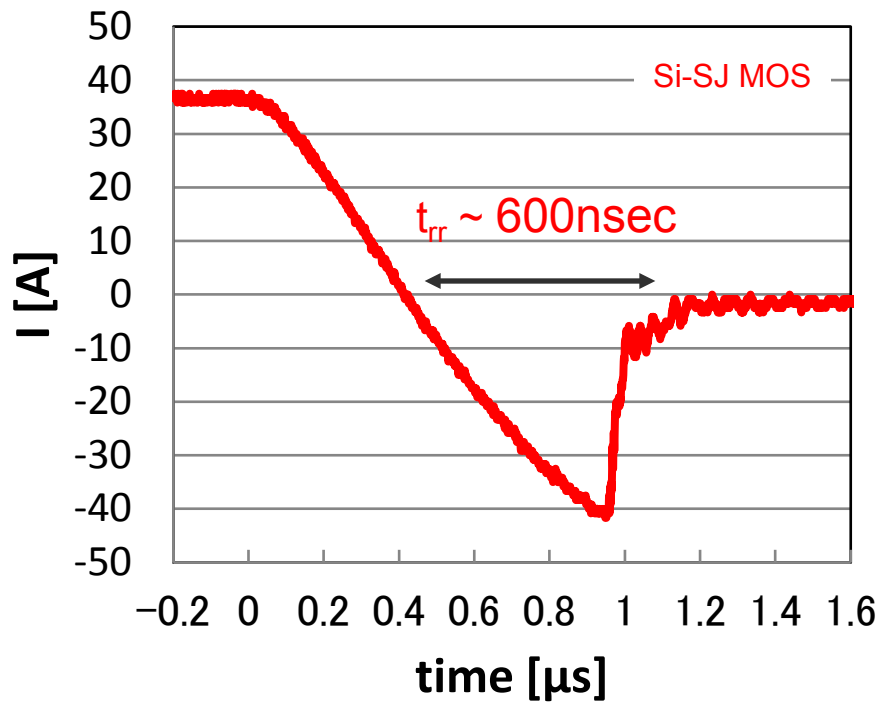


Total switching loss reduced by 30% compared to ROHM 2G SiC MOSFET



# Reverse Recovery Characteristics of Body-diode

measurement  
condition  
E = 300V  
R<sub>g</sub> = 100Ω  
I<sub>d</sub> = 36A

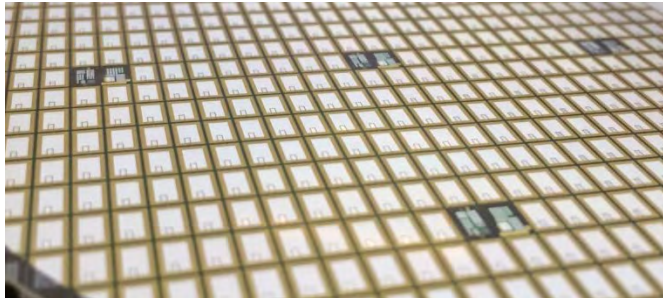


Reverse recovery current of body-diode is extremely smaller than Si-MOSFETs

# Lineup of 3G SiC MOSFET

P/N	Package	BV <sub>DSS</sub>	V <sub>gs</sub>	R <sub>Dson</sub>	Status
SCT30XXKL	TO247, Bare die	1200V	22V / -10V	22mΩ	<b>Under development</b>
	TO247, Bare die	1200V	22V / -10V	30mΩ	
	TO247, Bare die	1200V	22V / -10V	40mΩ	
SCT30XXAL	TO247, Bare die	650V	22V / -10V	17mΩ	
	TO247, Bare die	650V	22V / -10V	22mΩ	
	TO247, Bare die	650V	22V / -10V	30mΩ	

Bare die



Package

TO247

