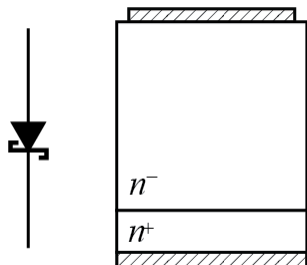




## Junction Capacitance



## Schottky Capacitance Comparison

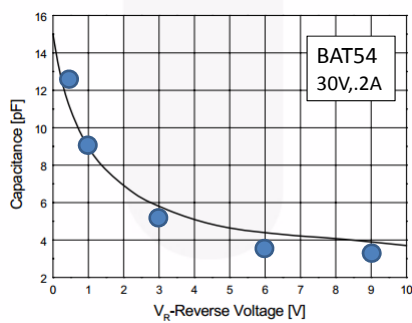


Figure 3. Total Capacitance vs. Reverse Voltage

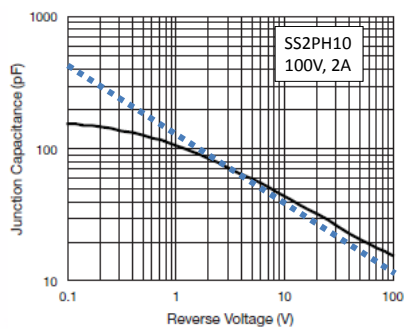
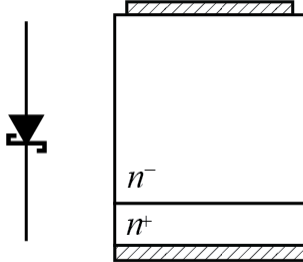


Fig. 5 - Typical Junction Capacitance



## Drift Region Resistance

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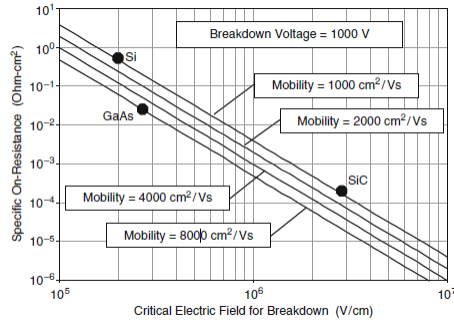
## Baliga's FOM

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Baliga, B J, "Advanced Power MOSFET Concepts"



# Ideal Specific On-Resistance



Baliga, B J, "Advanced Power MOSFET Concepts"

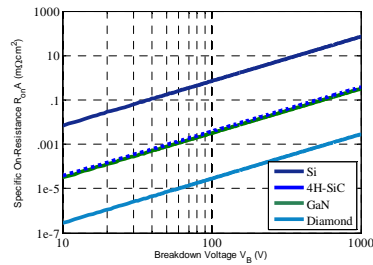


# WBG Materials

Table 2.1. Physical characteristics of Si and the major WBG semiconductors

Property	Si	GaAs	6H-SiC	4H-SiC	GaN	Diamond
Bandgap, $E_g$ (eV)	1.12	1.43	3.03	3.26	3.45	5.45
Dielectric constant, $\epsilon^a$	11.9	13.1	9.66	10.1	9	5.5
Electric breakdown field, $E_b$ (kV/cm)	300	400	2,500	2,200	2,000	10,000
Electron mobility, $\mu_n$ (cm <sup>2</sup> /V·s)	1,500	8,500	500	1,000	1,250	2,200
Hole mobility, $\mu_p$ (cm <sup>2</sup> /V·s)	600	400	101	115	850	850
Thermal conductivity, $\lambda$ (W/cm·K)	1.5	0.46	4.9	4.9	1.3	22
Saturated electron drift velocity, $v_{sat}$ ( $\times 10^7$ cm/s)	1	1	2	2	2.2	2.7

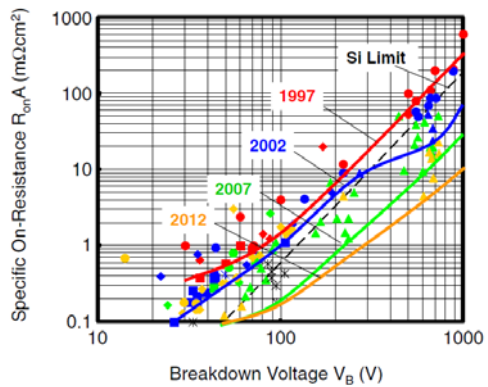
<sup>a</sup>  $\epsilon = \epsilon_r \cdot \epsilon_0$  where  $\epsilon_0 = 8.85 \times 10^{-14}$  F/cm.



B Ozpineci, L M Tolbert, "Comparison of Wide-Bandgap Semiconductors for Power Electronics Applications"



## Si Limits



W. Saito, "Power device trends for high-power density operation of power electronics system"