PSM50065B

650V 50A Si Super junction MOSFET

PowerCubeSemi, Inc.
Potential · Convergence · Smart

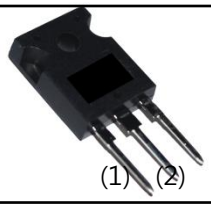
Features

Si Super junction MOSFET

- Rated to 650V at 50Amps @T_J = 100℃
- Max $R_{DS(on)}$ = 0.07Ω
- Gate Charge(Typ.Q_g=165 nC)
- Improved dv/dt Capability
- 100% Avalanche Tested

Key Characteristics		
V_{DSS}	650	V
$R_{DS(ON)}$ Max.	0.07	Ω
I_D	50	A

Outline

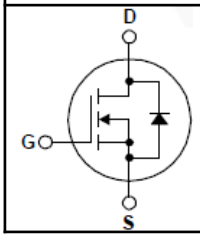


(1) (2) (3)

Application

- Solar inverters
- LCD/LED/PDP TV
- Telecom/Server Power supplies
- AC-DC Power Supply

Inner circuit



(1) Gate
(2) Drain
(3) Source

Description

PSM50060 is PowerCubeSemi's second generation of high voltage Super Junction MOSFET that is utilizing charge balance technology for outstanding low on-resistance and lower gate charge performance. This advanced technology is tailored to minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate and higher avalanche energy. Consequently, the combination of Super Junction MOSFET is suitable for various AC/DC power conversion for system miniaturization and higher efficiency

Absolute Maximum Ratings

Symbol	Parameter	Test Condition	Value	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	650	V
I_D	Drain current	T_c=25℃	50	A
I_{DM}	Drain current	Pulse width limited by junction temperature	188	A
V_{GS}	Gate-Source Voltage		±30	V
P_d	Power Dissipation	T_C=25℃	328.9	W
T_j	Operating Junction		-55 to 155	℃
T_{stg}	Storage Temperature		-55 to 155	℃

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape width	Quantity
PSM50065B	PSM50065	TO-247	-	-	-

Electrical Characteristics of Si MOSFET

Symbol	Parameter	Test Condition	Numerical			Unit
			Min	Typ.	Max.	
BV_{DSS}	Drain-Source Breakdown voltage	V_{GS} = 0V, I_D = 250μA, T_J = 25°C	650	-	-	V
$BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	-	0.62	-	V/°C
I_{DSS}	Zero Gate Voltage Drain current	V_{DS} = 650V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 520V, T_c=125°C	-	50	-	
I_{GSS}	Gate-Source Leakage Current	V_{GS} = 30V, V_{DS} = 0V	-	-	±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} =V_{GS}, I_D = 7.6mA	-	2	5	V
$R_{DS(ON)}$	Static Drain-Source on state Resistance	V_{GS} = 10V, I_D = 38A	-	60	72	mΩ
g_{FS}	Forward Transconductance	V_{DS} =20V, I_D = 38A	-	32	-	S
$t_{d(on)}$	Turn-on Delay time	V_{DD} = 380V, I_D = 38A, V_{GS} = 10V, R_G = 4.7Ω	-	70	-	ns
t_r	Turn-on Rise time		-	99	-	
$t_{d(off)}$	Turn-off Delay time		-	302	-	
t_f	Turn-off Fall time		-	84	-	

Electrical Characteristics of Si MOSFET

Symbol	Parameter	Test Condition	Numerical		Unit
			Typ.	Max.	
$R_{\theta JC}$	Thermal Resistance, Junction to case		-	0.21	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		-	40	℃/W
C_{iss}	Input capacitance	V_{DS} = 25V, V_{GS} = 0V, F = 1.0㎒	5700	-	pF
C_{oss}	Output capacitance		3990	-	
C_{rss}	Reverse Transfer Capacitance		30	-	
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 520V, I_D = 50A V_{GS} = 10V	165	-	nC
Q_{gs}	Gate to Source Gate Charge		52	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		70	-	nC

Electrical Characteristics of Si Diode

Symbol	Parameter	Test Condition	Numerical		Unit
			Typ.	Max.	
I_S	Maximum continuous Drain to Source Diode Forward Current		-	50	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	188	A
V_{SD}	Drain to Source Diode Forward Voltage	I_S = 50A, V_{GS} = 0V	-	1.26	V
t_{rr}	Reverse Recovery Time	I_S = 20A, V_{GS} = 0V, dI_F/dt=100A/us	1584	-	ns
Q_{rr}	Reverse Recovery Charge		31	-	μC

Typical Characteristics

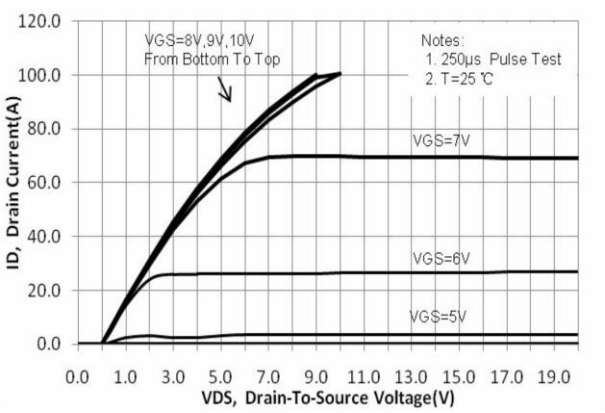


Figure 1. On-state Characteristics

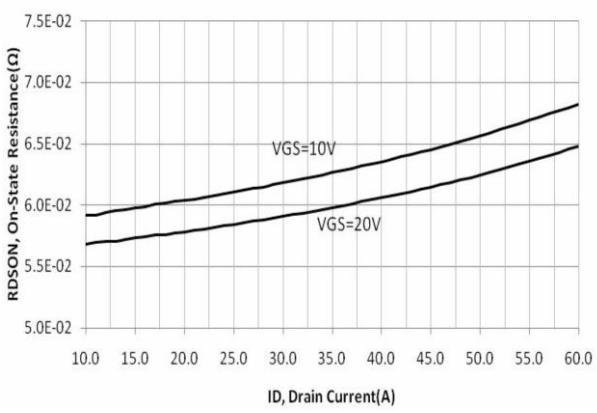


Figure 2. On Resistance Variation vs Drain Current and Gate Voltage

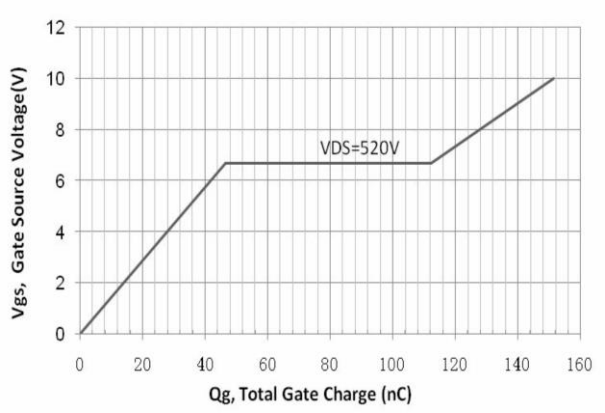


Figure 3. Gate Charge Characteristics

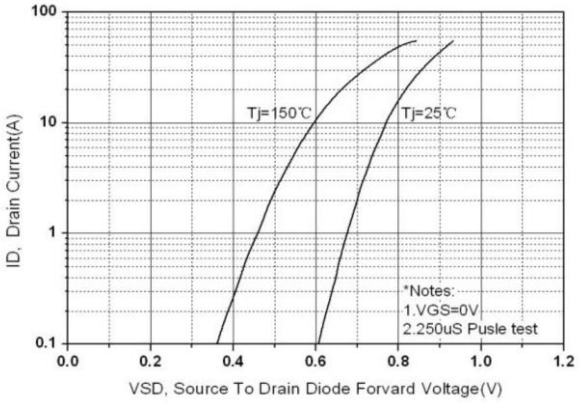


Figure 4. On-state current vs Diode forward voltage

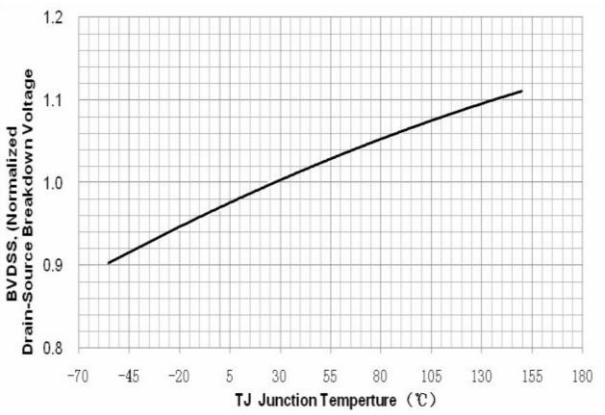


Figure 5. Breakdown Voltage Variation vs Junction Temperature

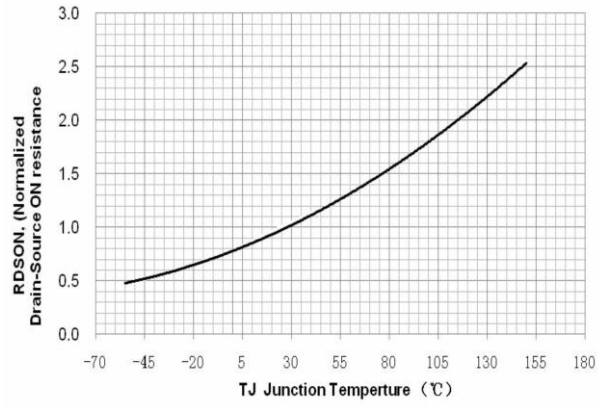


Figure 6. On resistance variation vs Junction Temperature

Typical Characteristics

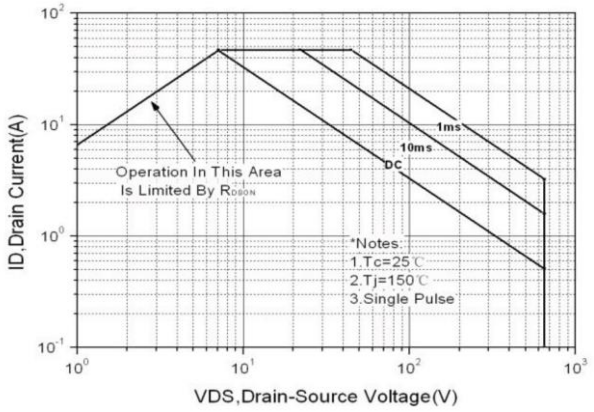


Figure 7. Maximum Safe Operating Area

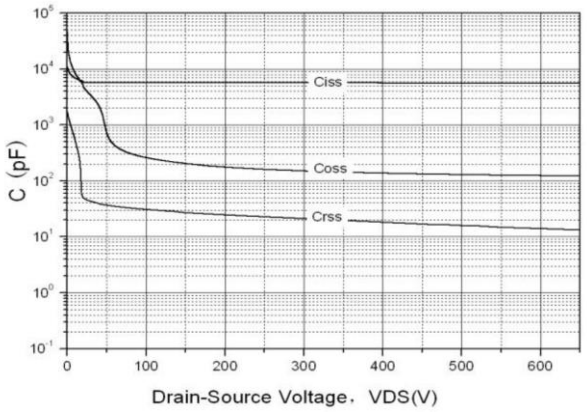


Figure 8. Capacitance Characteristics

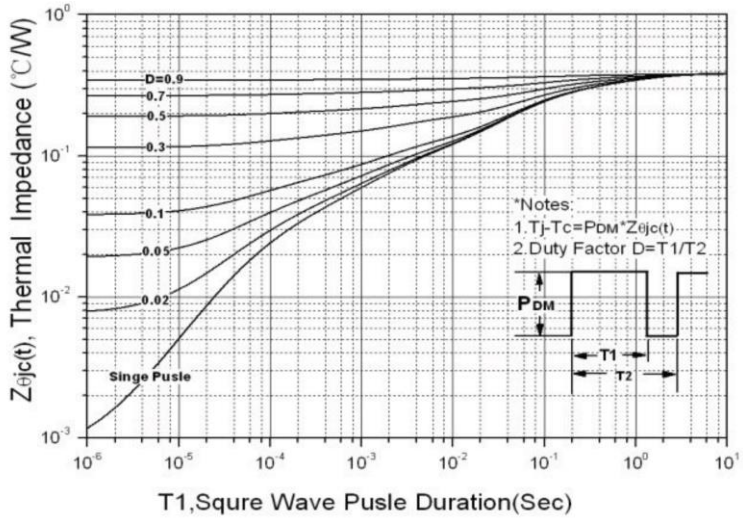


Figure 11. Transient Thermal Response Curve