PSM20065D

650V 20A 200mΩ Si Super junction MOSFET with Normal body diode

PowerCubeSemi, Inc.
Potential · Convergence · Smart

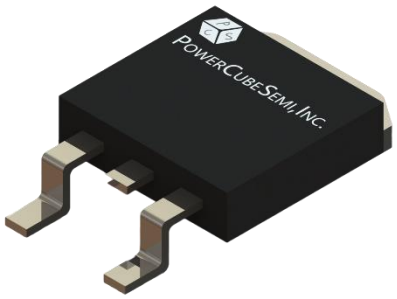
Features

Si Super junction MOSFET

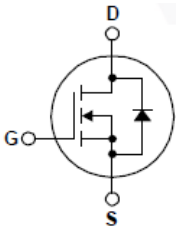
- Rated to 650V at 20Amps @T_J = 25℃
- Max $R_{DS(on)}$ = 200 mΩ
- Typ $R_{DS(on)}$ = 190 mΩ
- Gate Charge(Typ. Q_g=35 nC)
- Improved dv/dt Capability
- 100% Avalanche Tested

Application

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



PKG type : TO-263 (D2PAK)



Halogen-Free

RoHS

Description

PSM20065D 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℃	20	A
I_{DM}	Pulsed Drain Current	Pulse width limited by junction temperature	80	A
V_{GS}	Gate-Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	I_{AS}=9A, R_G=25Ω V_{DD}=50V, L=20mH	810	mJ
P_d	Power Dissipation	T_C=25℃	33	W
T_J	Operating Junction Temperature		150	℃
T_{stg}	Storage Temperature		-55 to 150	℃

Package Marking and Ordering Information

Device Marking	Device	Package	Packing Method	Tape width	Quantity
PSM20065D	PSM20065	TO-263 (D2PAK)	-	-	-

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
I_{DSS}	Zero gate voltage drain current	V_{DS} = 650V, V_{GS} = 0V	-	-	30	μA
I_{GSS}	Gate-source leakage current	V_{GS} = ±30V, V_{DS} = 0V	-	-	±70	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250μA	3	-	5	V
$R_{DS(ON)}$	Static drain-source on state resistance	V_{GS} = 10V, I_D = 10A	-	190	200	mΩ
$t_{d(on)}$	Turn-on Delay time	V_{DD} = 380 V, I_D = 10A, V_{GS} = 10 V, R_G = 4.7Ω	-	18	-	ns
T_r	Turn-on Rise time		-	20	-	
$t_{d(off)}$	Turn-off Delay time		-	64	-	
T_f	Turn-off Fall time		-	21	-	

Electrical Characteristics of Si MOSFET

Symbol	Parameter	Test Condition	Numerical		Unit
			Typ.	Max.	
$R_{\theta JC}$	Thermal resistance, Junction to case		3.77	-	℃/W
R_g	Gate resistance	V_{GS} = 0V, f = 100㎑	4	5	Ω
C_{iss}	Input capacitance	V_{DS} = 380V, V_{GS} = 0V, f = 100㎑	2000	-	pF
C_{oss}	Output capacitance		1500	-	
C_{rss}	Reverse transfer capacitance		20	-	
$Q_{g(tot)}$	Total gate charge at 10V	V_{DS} = 380V, I_D = 10A $V_{GS(on)}$ = 10V, $V_{GS(off)}$ = 0V	35	-	nC
Q_{gs}	Gate to source gate charge		10	-	
Q_{gd}	Gate to drain "Miller" charge		20	-	

Electrical Characteristics of Si Diode

Symbol	Parameter	Test Condition	Numerical		Unit
			Typ.	Max.	
I_S	Maximum continuous drain to source diode forward current		-	20	A
I_{SM}	Maximum pulsed drain to source diode forward current		-	80	A
V_{SD}	Drain to source diode forward voltage	I_{SD} = 10A, V_{GS} = 0V	-	1.1	V
T_{rr}	Reverse recovery time	I_{SD} = 10A, V_{DD} = 400V, dI_F/dt=100A/㎲	330	-	ns
Q_{rr}	Reverse recovery charge		4.8	-	μC
I_{rrm}	Reverse recovery current		29		A

Typical Characteristics

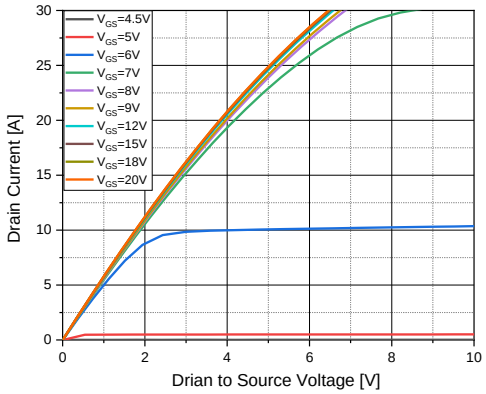


Figure 1. On-state characteristics

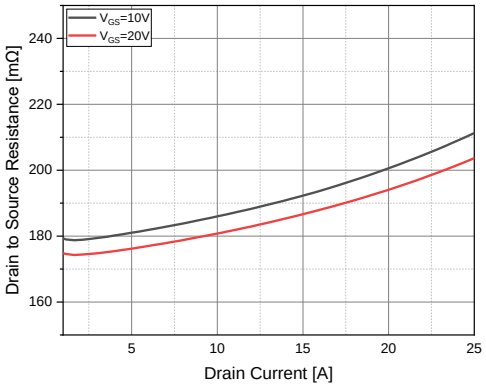


Figure 2. On resistance variation vs Drain current and gate voltage

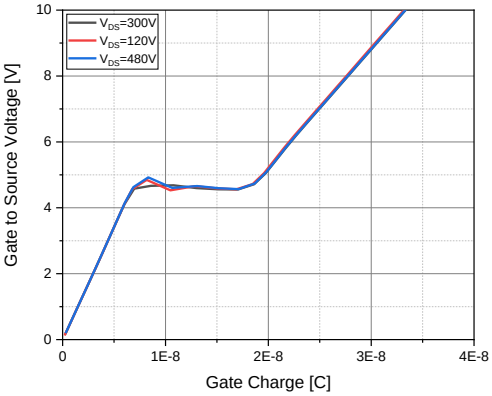


Figure 3. Gate charge characteristics

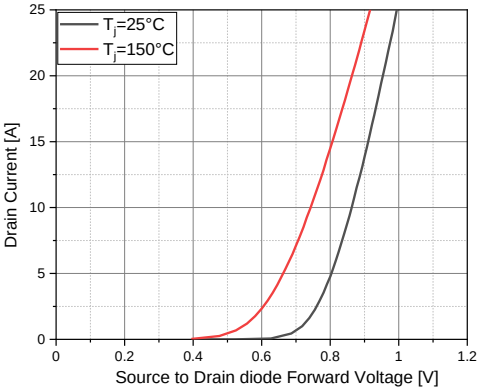


Figure 4. On-state current vs Diode forward voltage

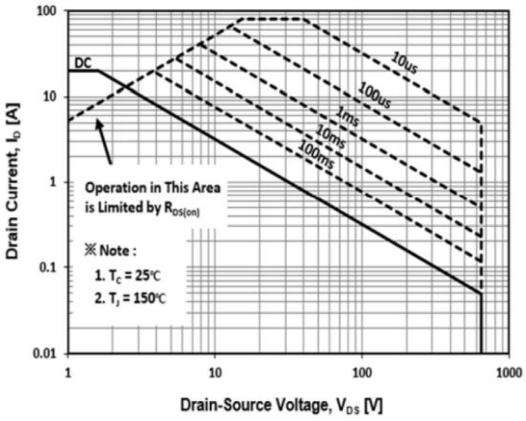


Figure 5. Maximum safe operating area

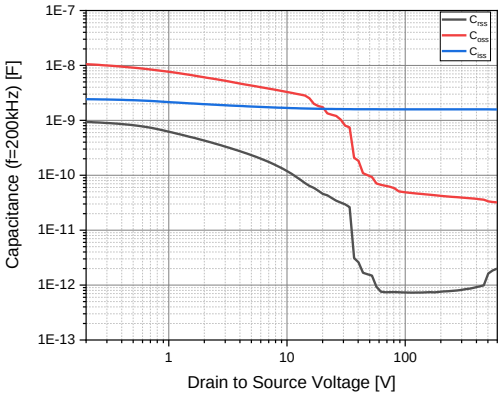


Figure 6. Capacitance characteristics

Typical Characteristics

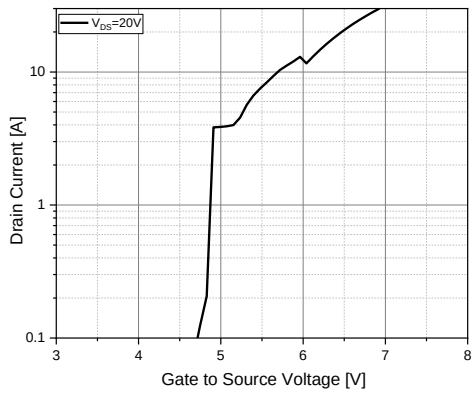


Figure 7. Transfer characteristics

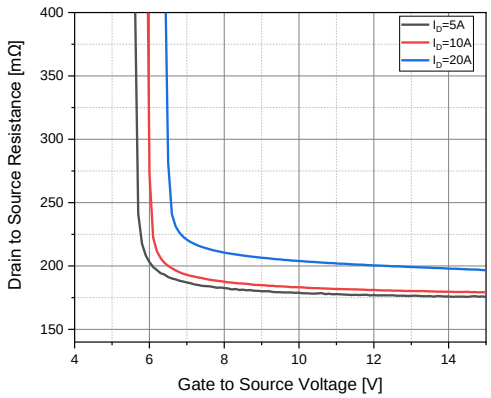


Figure 8. Drain to source resistance vs Gate to source voltage

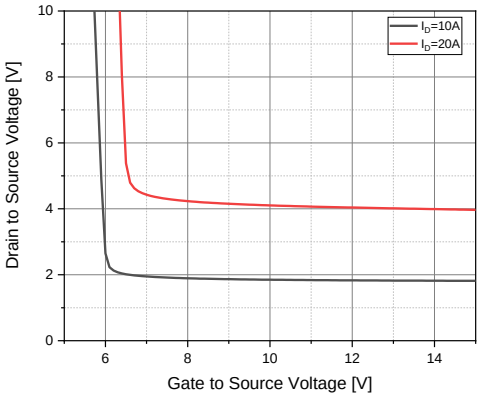


Figure 9. Drain to source voltage vs Gate to Source voltage

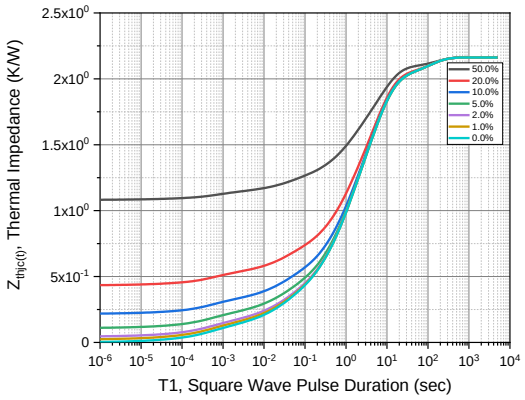
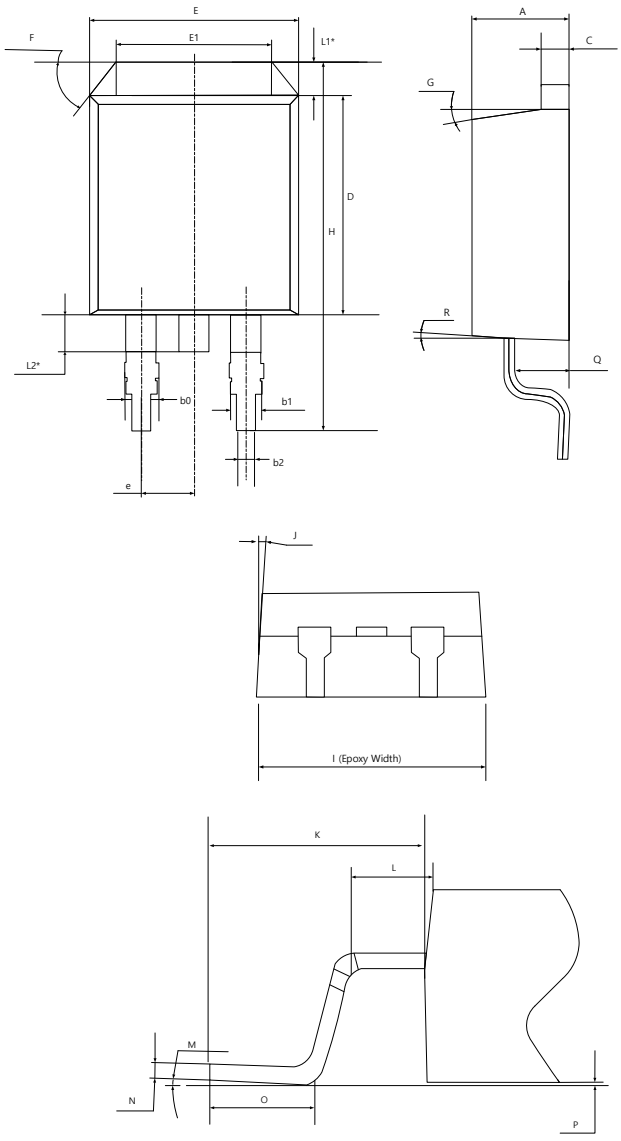


Figure 10. Transient thermal response curve

Package Outline

Unit : mm



SYMBOL	DIMENSIONS			NOTES
	MIN	NOM	MAX	
A	4.4	4.6	4.8	
b0	1.17	1.37	1.57	
b1	1.17	1.27	1.37	
b2	0.70	0.80	0.90	
C	1.17	1.27	1.37	
D	8.50	8.70	8.90	
E	9.8	10.0	10.2	
E1	6.5	-	-	
e	2.44	2.54	2.64	
F	-	30° (Ref)	-	
G	-	7.0°	-	
H	15.00	15.30	15.60	
I	9.80	10.0	10.20	
J	-	3.0°	-	
K	5.00	5.30	5.60	
L	1.8	2.0	2.2	
L1*	1.07	1.27	1.47	
L2*	1.2	1.5	1.8	
M	0°	-	8°	
N	0.30	0.45	0.60	
O	2.34	2.54	2.74	
P	0	-	0.25	
Q	2.37	2.67	2.97	
R	-	7.0°	-	