PSF30065E

PowerCubeSemi, Inc.
Potential · Convergence · Smart

650V 30A 100mΩ Si Super junction MOSFET with Fast Recovery diode

Features

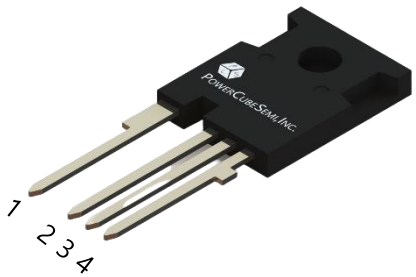
Si Super junction MOSFET

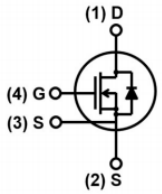
- Rated to 650V at 30Amps @T_C=25℃
- Max $R_{DS(on)}$ = 100mΩ
- Gate Charge(Typ. Q_g=70nC)
- Improved dv/dt Capability
- 100% Avalanche Tested

Application

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

(1) D (Drain)
(2) S (Source)
(3) S (Driver Source)
(4) G (Gate)





Halogen-Free

RoHS

Description

PSF30065E is PowerCubeSemi's second generation of high voltage Super Junction MOSFET with FRD 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 with FRD 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=1㎃	650	V
I_D	Drain Current	T_c=25℃	30	A
I_{DM}	Pulsed Drain Current	Pulse width limited by junction temperature	110	A
V_{GS}	Gate-Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	I_D=6.2A, V_{DD}=50V	1250	mJ
P_d	Power Dissipation	T_C=25℃	568	W
dv/dt	MOSFET dv/dt ruggedness	V_{DS}=0....400V	120	V/ns
	Peak diode dv/dt ruggedness	V_{DS}=0....400V, I_{SD}=15A, T_J=25℃	50	
T_J	Operating Junction Temperature		150	℃
T_{stg}	Storage Temperature		-55 to 150	℃

Package Marking and Ordering Information

Device Marking	Device	Package	Packing Method	Quantity
PSF30065E	PSF30065	TO-247-4L	TUBE	30

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=1mA, T_C=25°C	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V	-	-	10	μA
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=1mA	3	-	5	V
$R_{DS(ON)}$	Static Drain-Source On State Resistance	V_{GS}=10V, I_D=15A	-	80	100	mΩ
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=380V, I_D=15A, V_{GS}=10V, R_G=4.7Ω	-	83	-	ns
T_r	Turn-On Rise Time		-	11	-	
$t_{d(off)}$	Turn-Off Delay Time		-	39	-	
T_f	Turn-Off Fall Time		-	16	-	

Electrical Characteristics of Si MOSFET

Symbol	Parameter	Test Condition	Numerical		Unit
			Typ.	Max.	
$R_{\theta JC}$	Thermal Resistance, Junction to Case		0.22	-	℃/W
R_g	Gate Resistance	V_{GS}=0V, f=1.0㎒	1.3	-	Ω
C_{iss}	Input Capacitance	V_{DS}=380V, V_{GS}=0V, f=200㎑	3200	-	pF
C_{oss}	Output Capacitance		77	-	
C_{rss}	Reverse Transfer Capacitance		3.5	-	
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS}=380V, I_D=15A V_{GS}=10V	70	-	nC
Q_{gs}	Gate to Source Gate Charge		21	-	
Q_{gd}	Gate to Drain “Miller” Charge		42	-	

Electrical Characteristics of Si Diode

Symbol	Parameter	Test Condition	Numerical		Unit
			Typ.	Max.	
I_S	Diode Forward Current		-	30	A
V_{SD}	Drain to Source Diode Forward Voltage	I_S=15A, V_{GS}=0V	-	1.2	V
T_{rr}	Reverse Recovery Time	I_{SD}=15A, V_{DD}=400V, dI_F/dt=100A/㎲	119	-	ns
Q_{rr}	Reverse Recovery Charge		904.2	-	nC
I_{rrm}	Reverse Recovery Current		14.3	-	A

Typical Characteristics

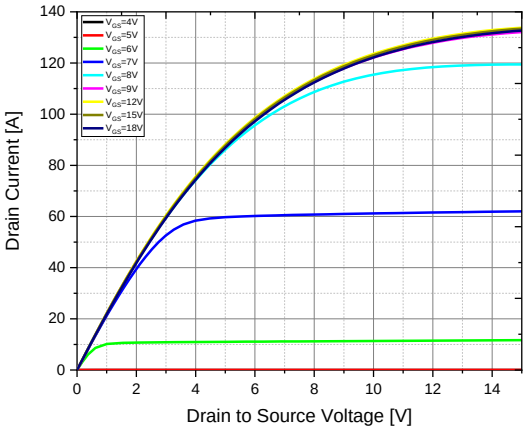


Figure 1. Output Characteristics at T_C=-50℃

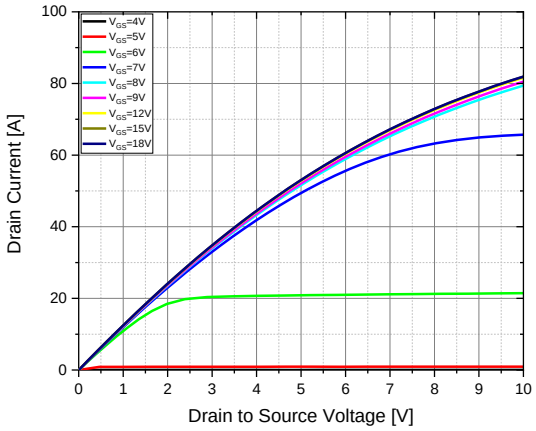


Figure 2. Output Characteristics at T_C=25℃

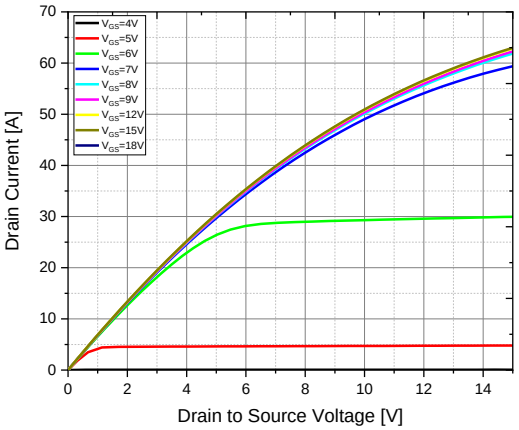


Figure 3. Output Characteristics at T_C=100℃

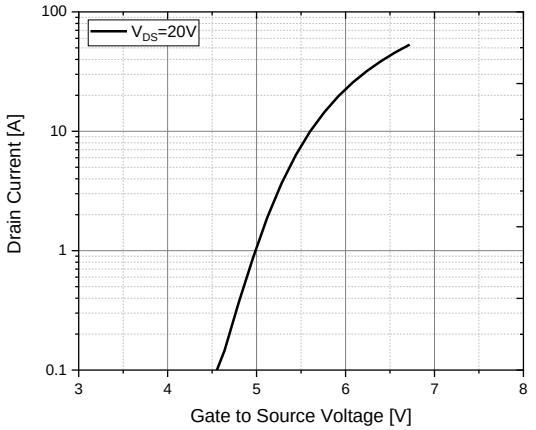


Figure 4. Transfer Characteristics

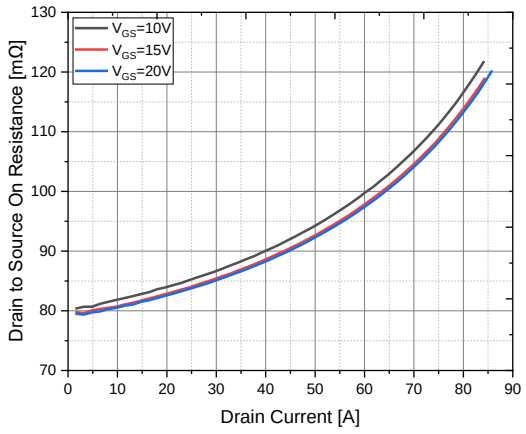


Figure 5. On Resistance Variation vs. Drain Current and Gate Voltage

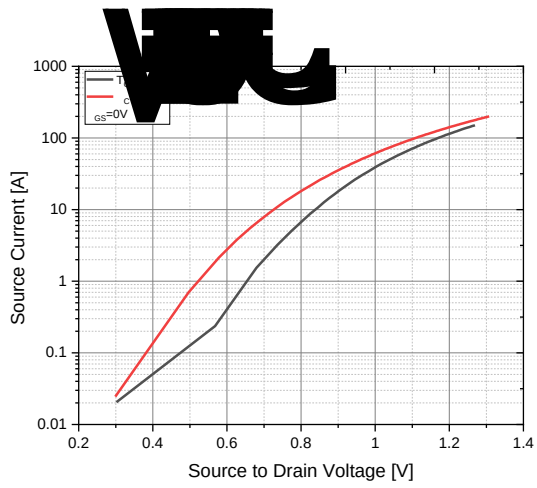


Figure 6. Body Forward Voltage Variation vs. Source Current and Temperature

Typical Characteristics

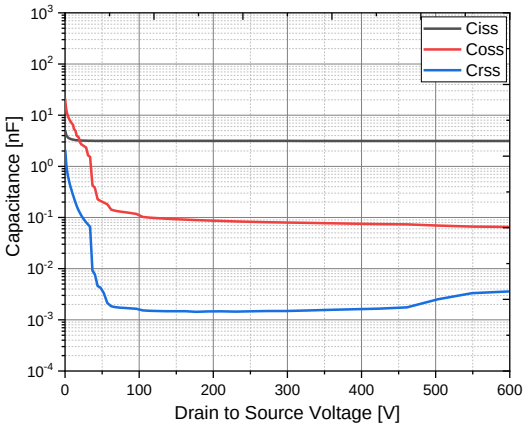


Figure 7. Capacitance Characteristics

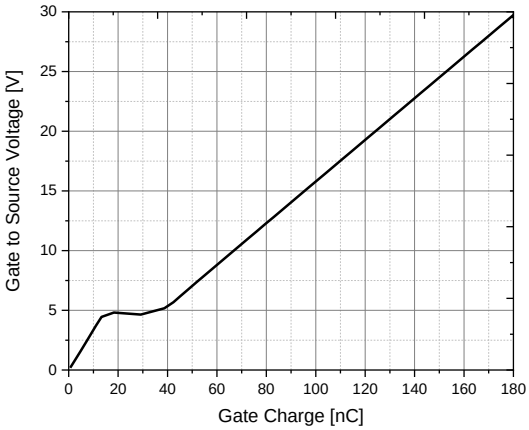


Figure 8. Gate Charge Characteristics

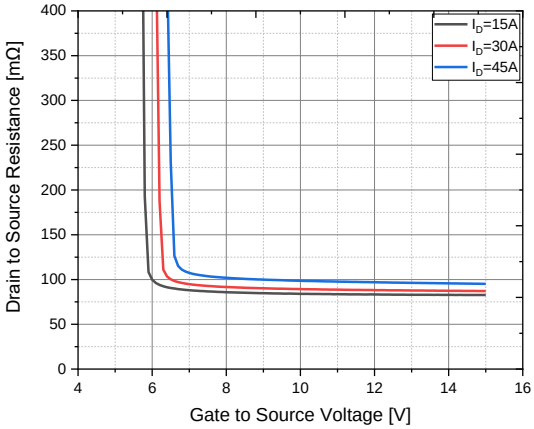


Figure 9. Drain to Source Resistance vs. Gate to Source Voltage

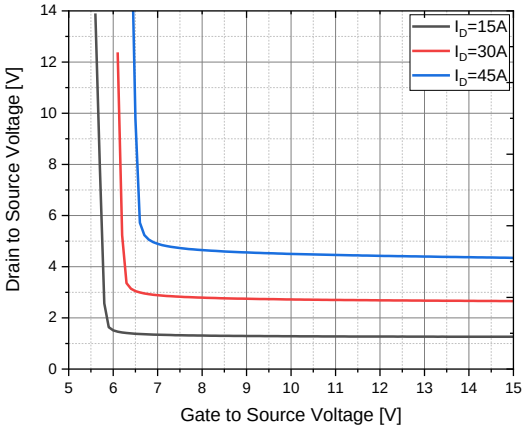


Figure 10. Drain to Source Voltage vs. Gate to Source Voltage

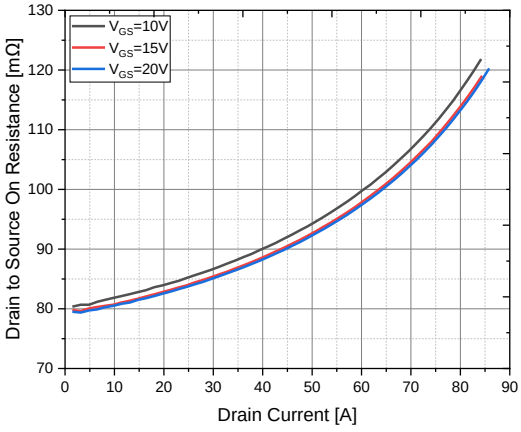


Figure 11. Drain to Source Resistance vs. Drain Current

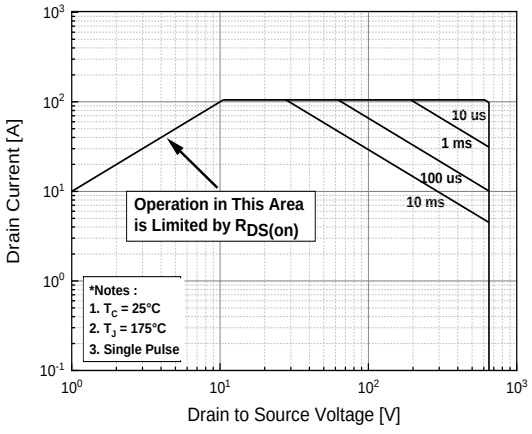


Figure 12. Safe Operating Area

Typical Characteristics

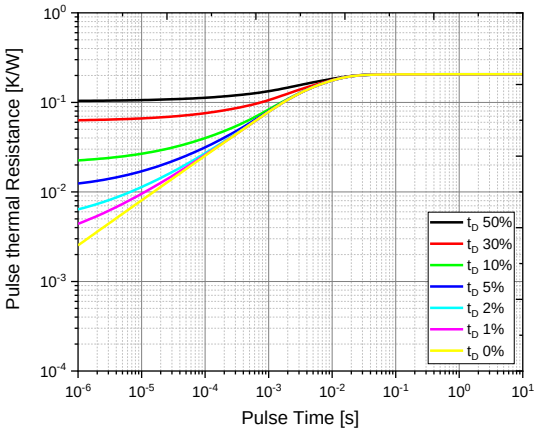
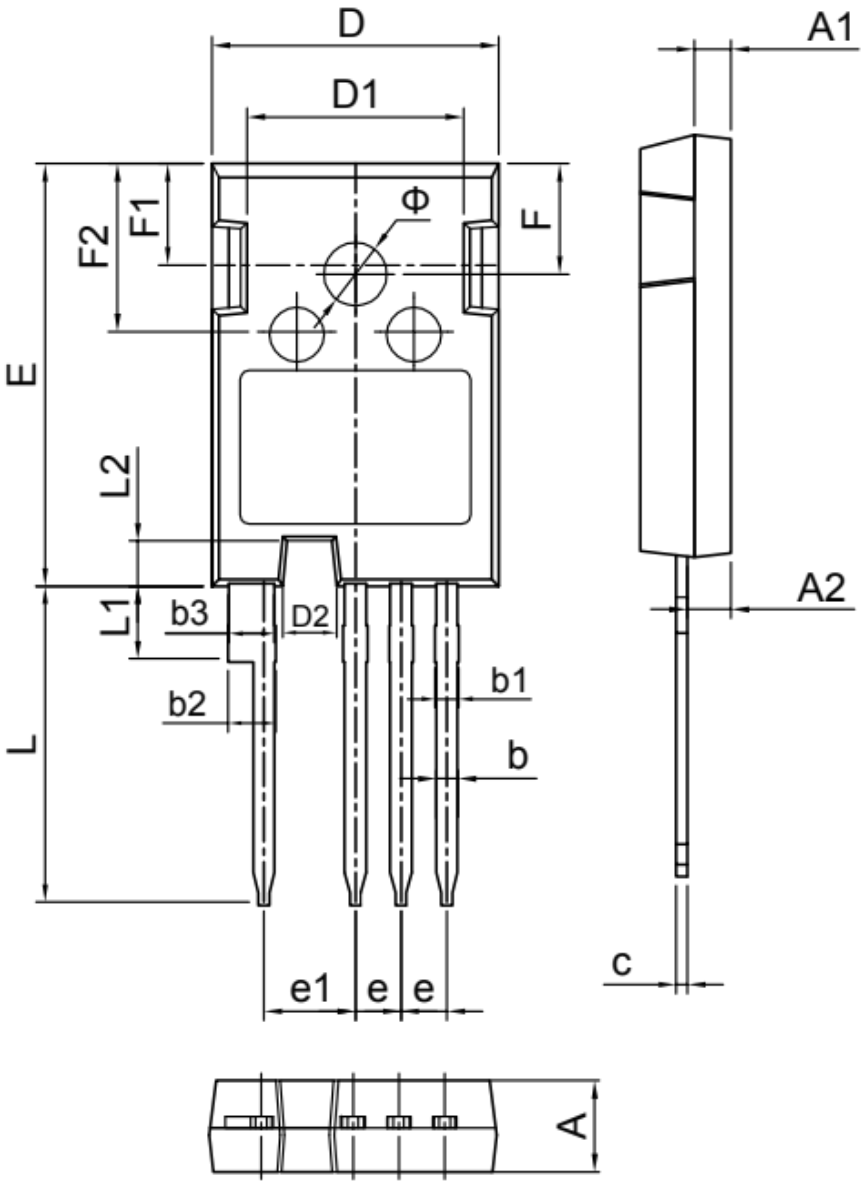


Figure 13. Thermal Transient Impedance

Package Outline

[Unit : mm]



SYMBOL	DIMENSIONS	
	MIN	MAX
A	4.90	5.10
A1	1.90	2.10
A2	2.29	2.54
b	1.07	1.33
b1	1.20	1.50
b2	2.40	2.80
b3	2.40	2.69
c	0.55	0.68
D	15.77	16.03
D1	11.60	12.00
D2	2.40	2.70
E	23.30	23.70
e	2.54 BSC	
e1	5.08 BSC	
F	6.05	6.25
F1	5.50	5.90
F2	9.30	9.70
L	17.20	17.60
L1	4.05	4.35
L2	2.35	2.65
Φ	3.50	3.70

Revision History

Version	Data of release	Description of changes
1.0	2024-12-05	Release Datasheet