

PSF027R065B

650V 80A 27mΩ Si Super junction MOSFET with Fast Recovery Diode

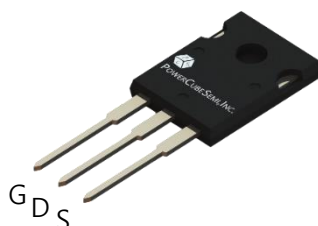
Features

Si Super Junction MOSFET

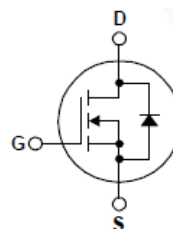
- Rated to 650V at 80Amps @ $T_c=25^{\circ}\text{C}$
- Max $R_{DS(on)} = 27\text{m}\Omega$
- Typ $R_{DS(on)} = 24\text{m}\Omega$
- Gate Charge(Typ. $Q_g=220\text{nC}$)
- Improved dv/dt Capability
- 100% Avalanche Tested

Application

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



PKG type : TO-247-3L



Description

PSF027R065B is PowerCubeSemi's third 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

$T_c=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Condition	Value	Unit
V_{DS}	Drain-Source Voltage	$V_{GS}=0\text{V}$, $I_D=1\text{mA}$	650	V
I_D	Continuous Drain Current	$T_c=25^{\circ}\text{C}$	80	A
I_{DM}	Pulsed Drain Current		320	A
V_{GS}	Gate-Source Voltage		± 30	V
E_{AS}	Single Pulsed Avalanche Energy	$I_{AS}=10\text{A}$, $V_{DD}=80\text{V}$, $L=80\text{mH}$	3900	mJ
P_d	Power Dissipation	$T_c=25^{\circ}\text{C}$	625	W
T_j	Operating Junction		150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature		-55 to 150	$^{\circ}\text{C}$

Package Marking and Ordering Information

Device Marking	Device	Package	Packing Method	Quantity
PSF027R065B	PSF027R065	TO-247	TUBE	30

Electrical Characteristics of Si MOSFET $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Condition	Numerical			Unit
			Min	Typ.	Max.	
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=1mA$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	-	-	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=1mA$	3	-	5	V
$R_{DS(ON)}$	Drain-Source On Resistance	$V_{GS}=10V, I_D=40A$	-	24	27	m Ω
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=400V, I_D=40A,$ $V_{GS}=15V, R_G=4.7\Omega$	-	60	-	ns
t_r	Turn-On Rise Time		-	285	-	
$t_{d(off)}$	Turn-Off Delay Time		-	200	-	
t_f	Turn-Off Fall Time		-	15	-	



Electrical Characteristics of Si MOSFET

Symbol	Parameter	Test Condition	Numerical			Unit
			Min.	Typ.	Max.	
$R_{\theta JC}$	Thermal Resistance, Junction to Case	Sensing Current=100mA Heating Current=70A	-	0.17	-	°C/W
R_g	Gate Resistance	$V_{GS}=0V$, $f=1.0MHz$	-	4.0	-	Ω
g_{FS}	Forward Transconductance	$V_{DS}=20V$, $I_D=40A$	-	72	-	S
C_{iss}	Input Capacitance	$V_{DS}=400V$, $V_{GS}=0V$, $f=200kHz$	-	9500	-	pF
C_{oss}	Output Capacitance		-	140	-	
C_{rss}	Reverse Transfer Capacitance		-	22	-	
$Q_{g(tot)}$	Total Gate Charge	$V_{DS}=400V$, $I_D=40A$ $V_{GS(on)}=10V$	-	220	-	nC
Q_{gs}	Gate-Source Charge		-	50	-	
Q_{gd}	Gate-Drain Charge		-	90	-	

Electrical Characteristics of Si Diode

Symbol	Parameter	Test Condition	Numerical			Unit
			Min.	Typ.	Max.	
I_S	Diode Forward Current		-	-	80	A
I_{SM}	Pulsed Diode Forward Current		-	-	320	A
V_{SD}	Diode Forward Voltage	$I_{SD}=40A$, $V_{GS}=0V$	-	-	1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=40A$, $V_{DD}=400V$, $di_F/dt=100A/\mu s$	-	298	-	ns
Q_{rr}	Reverse Recovery Charge		-	2.36	-	μC

Typical Characteristics

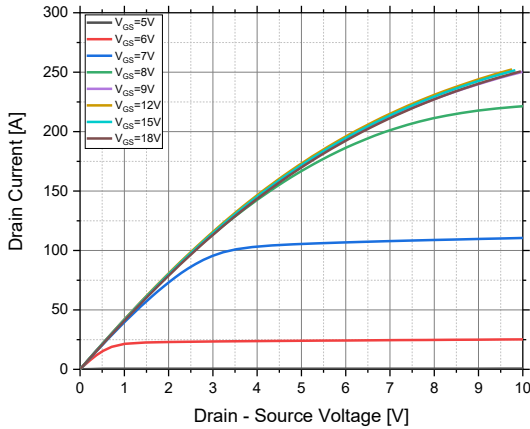


Figure 1. On-state Characteristics

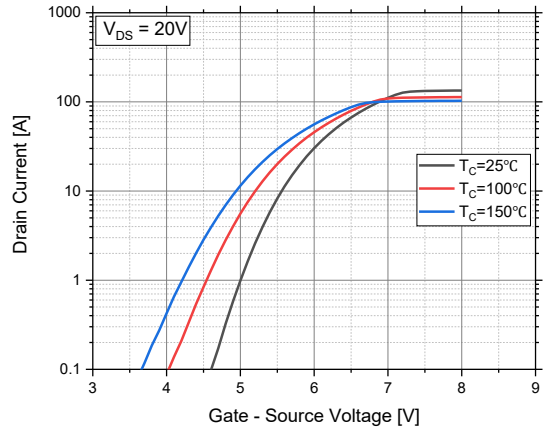


Figure 2. Transfer Characteristics

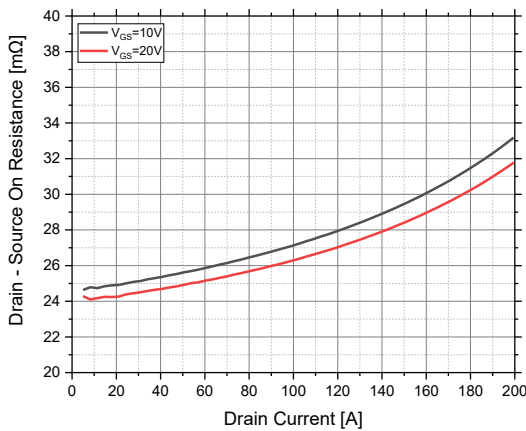


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

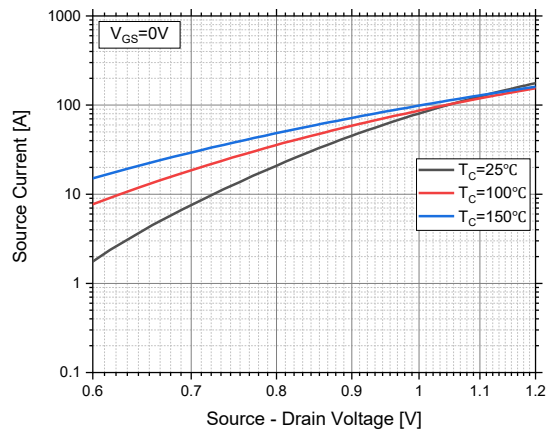


Figure 4. Body Forward Voltage Variation vs Source Current and Temperature

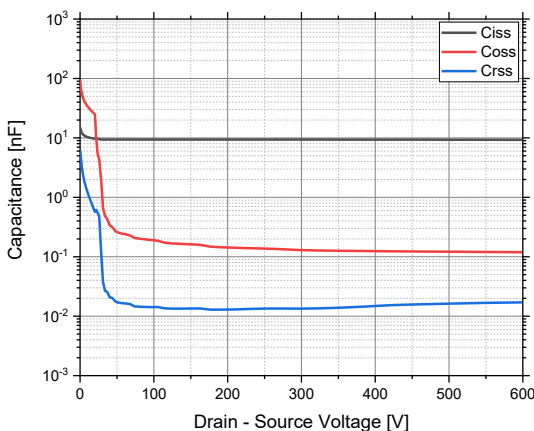


Figure 5. Capacitance Characteristics

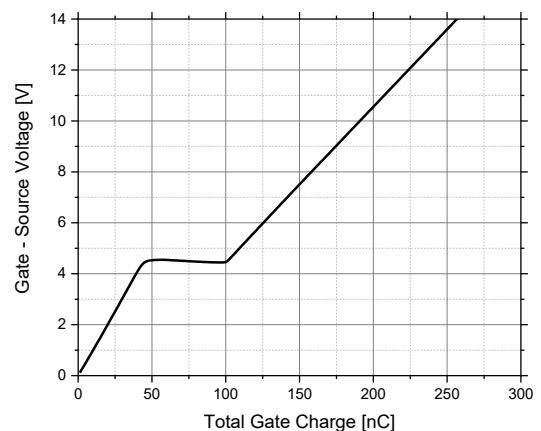


Figure 6. Gate Charge Characteristics

Typical Characteristics

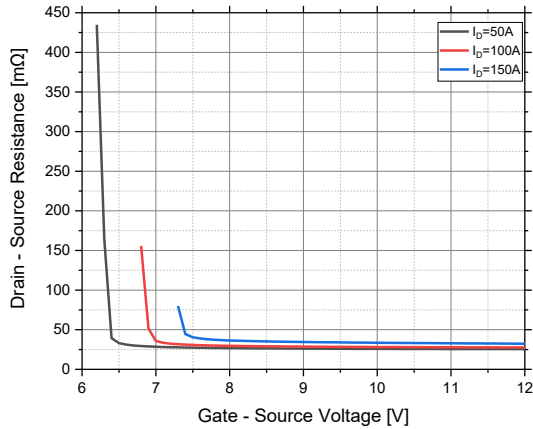


Figure 7. Drain to Source Resistance vs Gate to Source Voltage

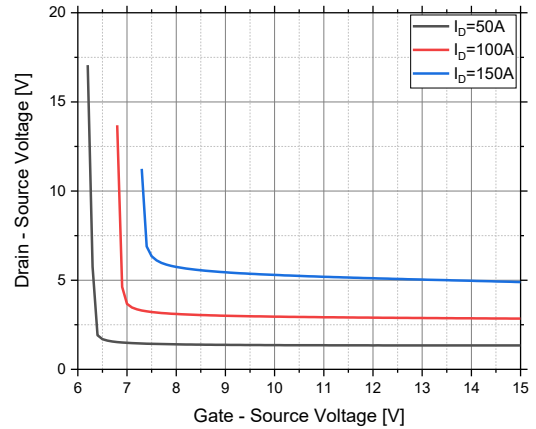


Figure 8. Drain to Source Voltage vs Gate to Source Voltage

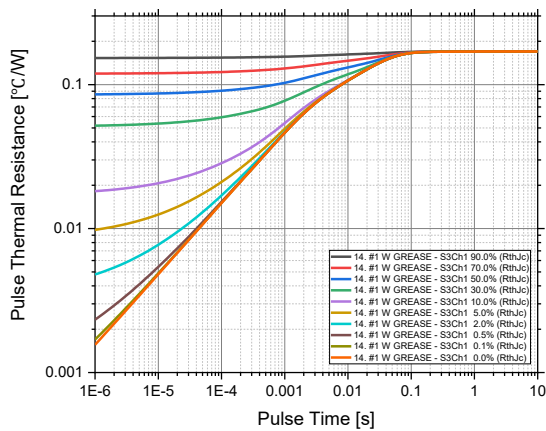
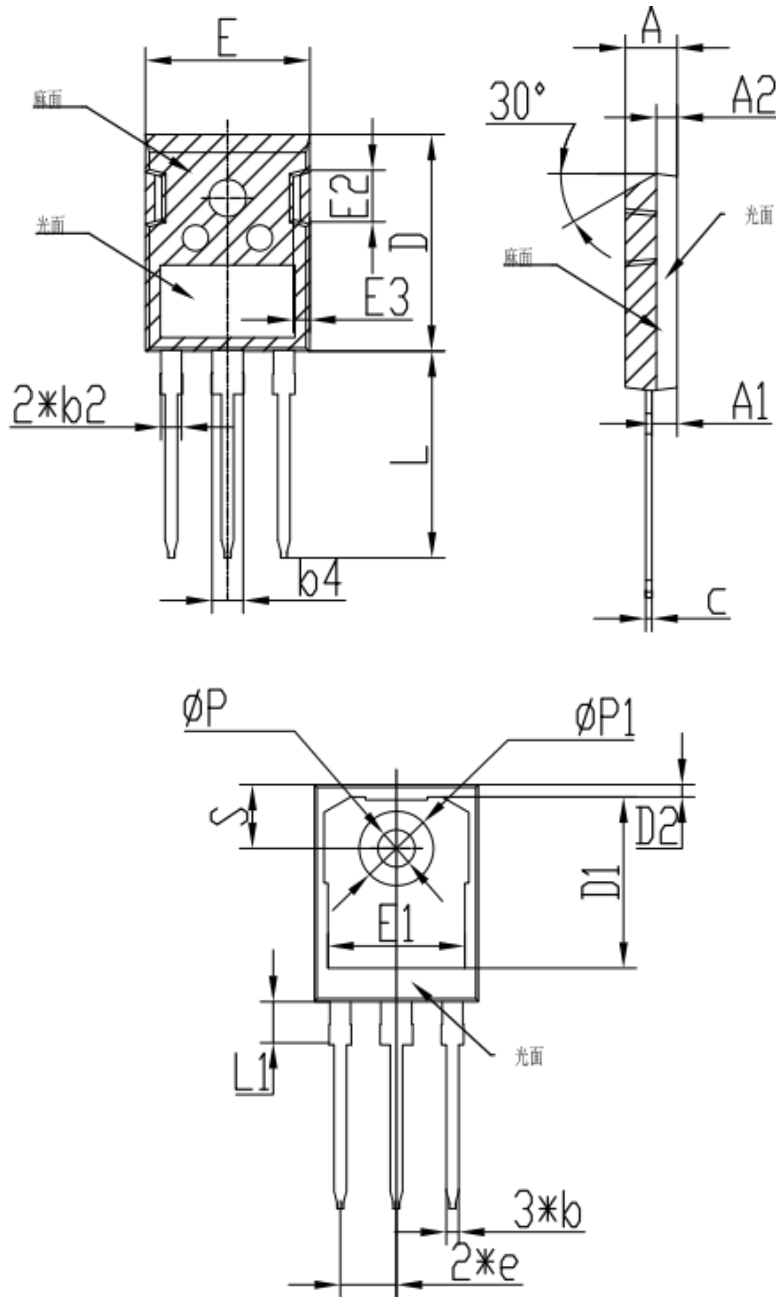


Figure 9. Transient Thermal Response Curve

Package Outline



SYMB	DIMENSIONS [mm]		
	MIN	NOM	MAX
A	4.70	5.00	5.20
A1	2.30	-	2.50
A2	1.90	2.00	2.10
b	1.10	1.20	1.30
b2	-	2.00	-
b4	-	3.00	-
c	0.50	0.60	0.70
D	20.80	20.95	21.10
D1	-	16.55	-
D2	0.95	1.17	1.35
E	15.48	15.88	16.28
E1	13.06	13.26	13.56
E2	4.90	5.00	5.10
E3	1.50	1.60	1.70
e	5.34	5.44	5.54
L	19.80	20.00	20.32
L1	-	4.17	4.50
P	3.50	3.60	3.70
P1	7.00	7.19	7.40
S	6.04	6.15	6.30

Revision History

Version	Data of release	Description of changes
Pre	2023-03-02	Preliminary Datasheet
1.0	2023-05-11	Update R_{thjc} Value & Graph Update P_D , I_{DM} , I_{SM} Value
1.1	2023-06-23	Product Name Change (PSF80065B → PSF027R065B)
1.2	2024-12-31	Re-measurement and modification of results due to increase in samples due to mass production
1.3	2025-04-18	Update Package Dimension