

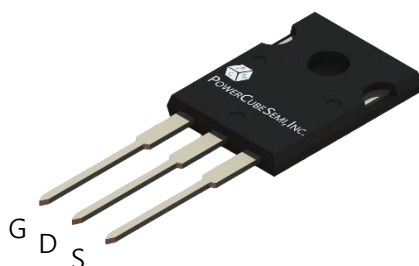
PSFQ70065B

650V 70A 40mΩ Si Super junction MOSFET with Fast Recovery Diode

Features

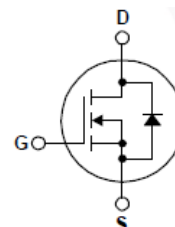
Si Super junction MOSFET

- Rated to 650V at 70Amps @ $T_J = 25^{\circ}\text{C}$
- Max $R_{DS(on)} = 40\text{ m}\Omega$
- Typ $R_{DS(on)} = 37\text{ m}\Omega$
- Gate Charge(Typ. $Q_g=180\text{ nC}$)
- Improved dv/dt Capability
- 100% Avalanche Tested
- **AEC-Q101 Qualified**



Application

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



PKG type : TO-247-3L

Description

PSFQ70065B 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	$V_{GS}=0V, I_D=1mA$	650	V
I_D	Drain Current	$T_C=25^{\circ}\text{C}$	70	A
I_{DM}	Pulsed Drain Current	Pulse width limited by junction temperature	280	A
V_{GS}	Gate-Source Voltage		± 30	V
E_{AS}	Single Pulsed Avalanche Energy	$I_{AS}=15A, R_G=25\Omega$ $V_{DD}=100V, L=20mH$	4550	mJ
P_d	Power Dissipation	$T_C=25^{\circ}\text{C}$	357	W
T_J	Operating Junction Temperature		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	Tape width	Quantity
PSFQ70065B	PSFQ70065	TO-247	Tube	-	30 unit

Electrical Characteristics of Si MOSFET

Symbol	Parameter	Test Condition	Numerical			Unit
			Min	Typ.	Max.	
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 1mA, T_J = 25^{\circ}C$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V$	-	-	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 1mA$	3	-	5	V
$R_{DS(ON)}$	Static Drain-Source on State Resistance	$V_{GS} = 10V, I_D = 38A$ Pulse width = 200 μs	-	37	40	m Ω
$t_{d(on)}$	Turn-on Delay time	$V_{DD} = 380V, I_D = 38A,$ $V_{GS} = 15V, R_G = 4.7\Omega$	-	50	-	ns
T_r	Turn-on Rise time		-	10	-	
$t_{d(off)}$	Turn-off Delay time		-	193	-	
T_f	Turn-off Fall time		-	12	-	



Electrical Characteristics of Si MOSFET

Symbol	Parameter	Test Condition	Numerical		Unit
			Typ.	Max.	
$R_{\theta JC}$	Thermal Resistance, Junction to Case	Sensing Current = 1mA Heating Current = 100A	0.35	-	$^{\circ}\text{C}/\text{W}$
R_g	Gate Resistance	$V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$	2	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 380\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$	8500	-	pF
C_{oss}	Output Capacitance		180	-	
C_{rss}	Reverse Transfer Capacitance	$V_{DS} = 380\text{V}$, $V_{GS} = 0\text{V}$, $f = 200\text{kHz}$	10	-	
$Q_{g(\text{tot})}$	Total Gate Charge at 10V	$V_{DS} = 380\text{V}$, $I_D = 38\text{A}$ $V_{GS(\text{on})} = 10\text{V}$, $V_{GS(\text{off})} = 0\text{V}$	180	-	nC
Q_{gs}	Gate to Source Gate Charge		50	-	
Q_{gd}	Gate to Drain "Miller" Charge		70	-	

Electrical Characteristics of Si Diode

Symbol	Parameter	Test Condition	Numerical		Unit
			Typ.	Max.	
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	70	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	280	A
V_{SD}	Drain to Source Diode Forward Voltage	$I_{SD} = 38\text{A}$, $V_{GS} = 0\text{V}$	-	1.2	V
T_{rr}	Reverse Recovery Time	$I_{SD} = 38\text{A}$, $V_{DD} = 400\text{V}$, $di_f/dt = 100\text{A}/\mu\text{s}$	206	-	ns
Q_{rr}	Reverse Recovery Charge		2.0	-	μC

Typical Characteristics

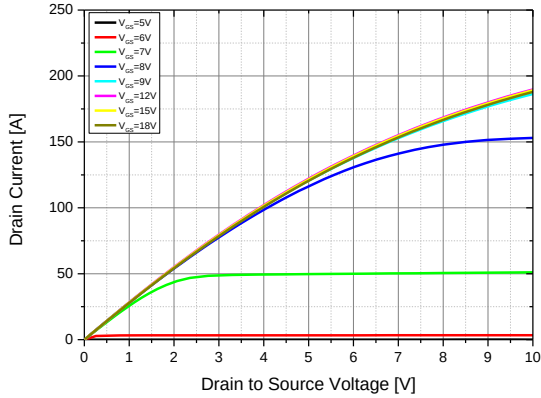


Figure 1. On-state Characteristics

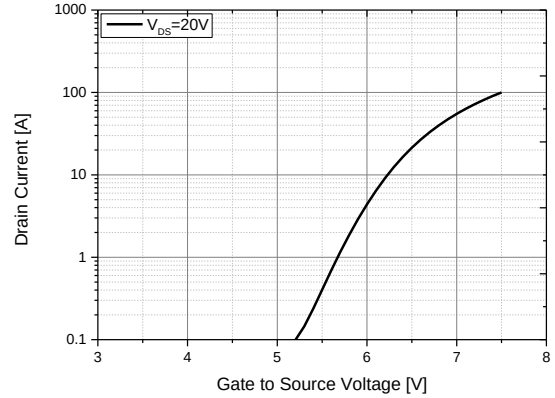


Figure 2. Transfer Characteristics

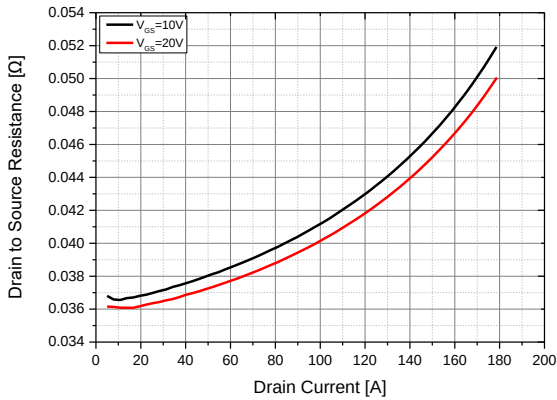


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

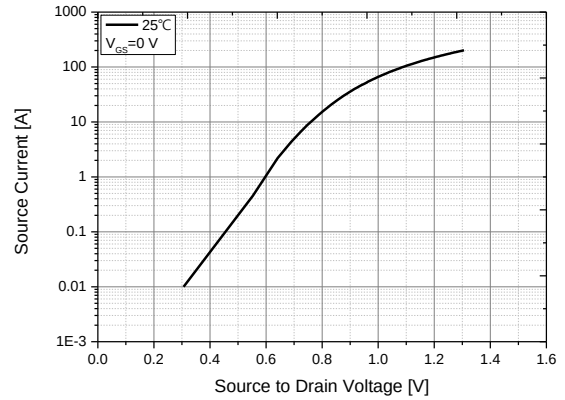


Figure 4. Body Forward Voltage Variation vs Source Current and Temperature

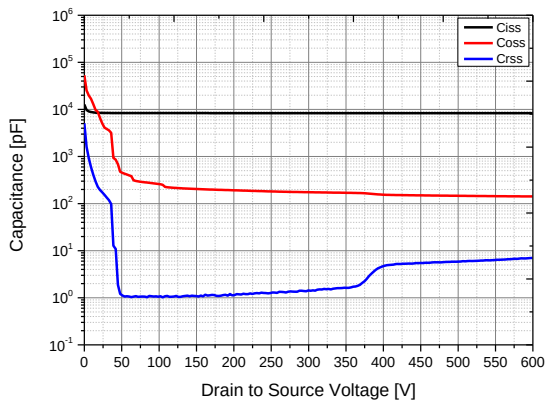


Figure 5. Capacitance Characteristics

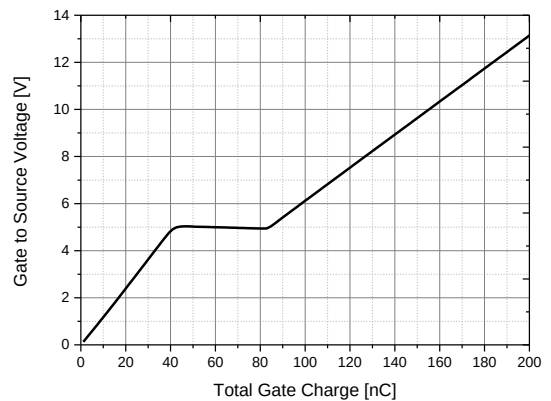


Figure 6. Gate Charge Characteristics

Typical Characteristics

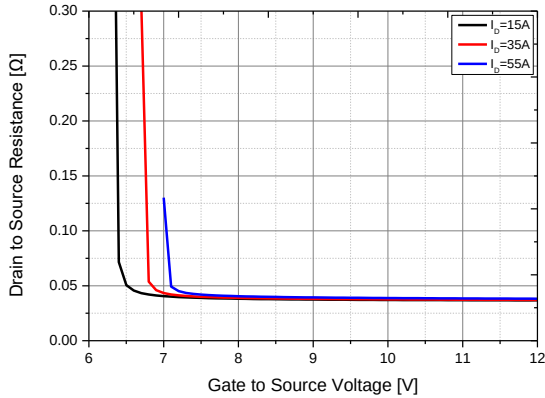


Figure 7. Drain to Source Resistance vs Gate to Source Voltage

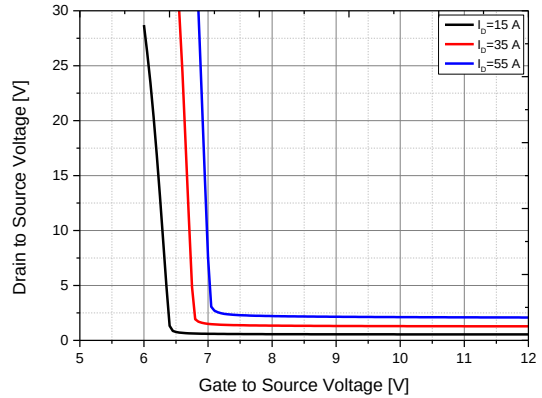


Figure 8. Drain to Source Voltage vs Gate to Source Voltage

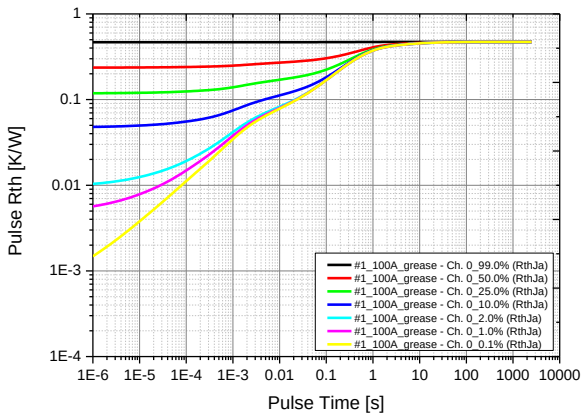


Figure 9. Transient Thermal Response Curve

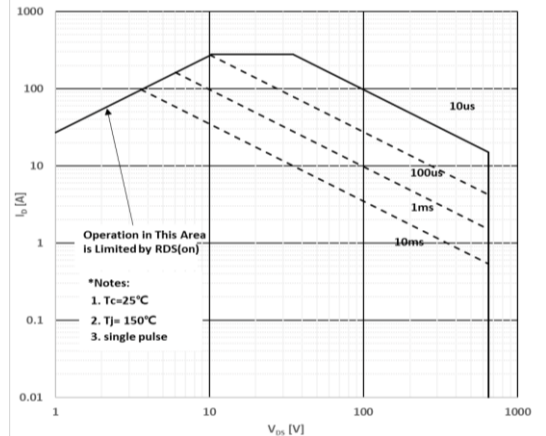
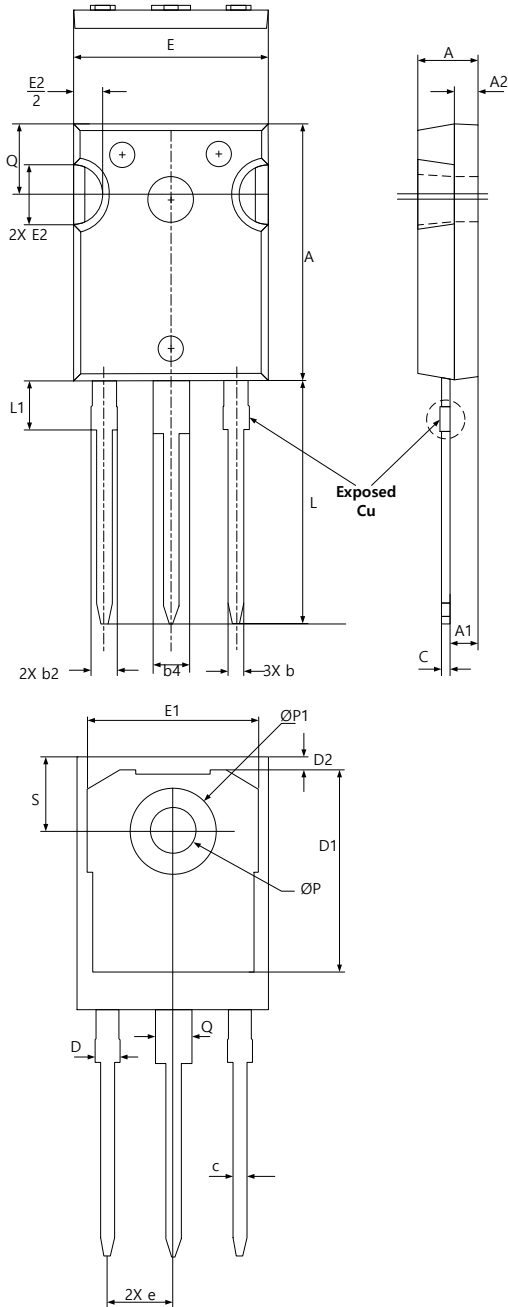


Figure 10. Safe Operating Area

Package Outline



SYMBOL	DIMENSIONS			NOTES
	MIN	NOM	MAX	
A	4.83	5.02	5.21	
A1	2.29	2.41	2.55	
A2	1.50	2.00	2.49	
b	1.12	1.20	1.33	
b1	1.12	1.20	1.28	
b2	1.91	2.00	2.39	6
b3	1.91	2.00	2.34	
b4	2.87	3.00	3.22	6, 8
b5	2.87	3.00	3.18	
c	0.55	0.60	0.69	6
c1	0.55	6.00	0.65	
D	20.80	20.95	21.10	4
D1	16.25	16.55	17.65	5
D2	0.51	1.19	1.35	
E	15.75	15.94	16.13	4
E1	13.46	14.02	14.16	5
E2	4.32	4.91	5.49	3
e	5.44 BSC			
L	19.81	20.07	20.32	
L1	4.10	4.19	4.40	6
ϕP	3.56	3.61	3.65	7
$\phi P1$	7.19 REF			
Q	5.39	5.79	6.20	
S	6.04	6.17	6.30	

Revision History

Version	Data of release	Description of changes
Pre	2022-12-29	Pre-Version Datasheet
1.0	2023-06-09	Update R_{thjc} Value & Graph Update P_D , I_{DM} , I_{SM} Value
1.1	2024-05-07	Update SOA graph