

PSM20065HM

650V 20A 190mΩ Si Super junction MOSFET with Normal Diode

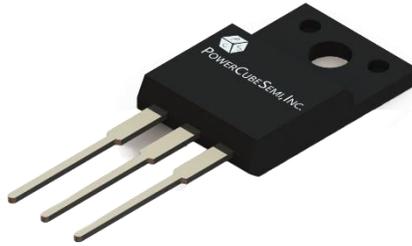
Features

Si Super junction MOSFET

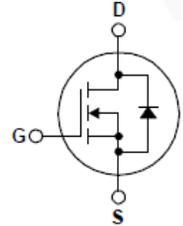
- Rated to 650V at 20Amps @ $T_J = 25^\circ\text{C}$
- Max $R_{DS(on)} = 190\text{ m}\Omega$
- Typ $R_{DS(on)} = 170\text{ m}\Omega$
- Gate Charge(Typ. $Q_g=53\text{ nC}$)
- Low power loss by high speed switching and low on-resistance
- 100% Avalanche Tested

Application

- PFC power supply stages
- Switching Applications
- Adapter
- Motor Control
- DC-DC Converter



PKG type : TO-220F



Description

PSM20065HM is Power MOSFET using PowerCubeSemi's advanced Super Junction Technology that can realize very low on-resistance and gate charge. It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of low EMI to designers as well as low switching loss.

Absolute Maximum Ratings

Symbol	Parameter	Test Condition	Value	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	650	V
I_D	Drain Current	$T_c=25^\circ\text{C}$	20	A
I_{DM}	Pulsed Drain Current		60	A
V_{GS}	Gate-Source Voltage		± 30	V
E_{AS}	Single Pulsed Avalanche Energy		485	mJ
P_d	Power Dissipation	$T_c=25^\circ\text{C}$	34	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
PSM20065HM	PSM20065	TO-220F	Tube	-	50 unit

Electrical Characteristics of Si MOSFET

Symbol	Parameter	Test Condition	Numerical			Unit
			Min	Typ.	Max.	
BV_{DSS}	Drain-source breakdown voltage	$V_{GS} = 0V, I_D = 250\mu A$	650	-	-	V
I_{DSS}	Zero gate voltage drain current	$V_{DS} = 700V, V_{GS} = 0V$	-	-	1	μA
I_{GSS}	Gate-source leakage current	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	3	4	V
$R_{DS(ON)}$	Static drain-source on state resistance	$V_{GS} = 10V, I_D = 3.2A$	-	170	190	m Ω
$t_{d(on)}$	Turn-on Delay time	$V_{DS} = 350V, I_D = 20A,$ $V_{GS} = 10V, R_G = 25\Omega$	-	40	-	ns
T_r	Turn-on Rise time		-	75	-	
$t_{d(off)}$	Turn-off Delay time		-	172	-	
T_f	Turn-off Fall time		-	54	-	



Electrical Characteristics of Si MOSFET

Symbol	Parameter	Test Condition	Numerical		Unit
			Typ.	Max.	
$R_{\theta JC}$	Thermal resistance, Junction to case		3.7	-	$^{\circ}\text{C}/\text{W}$
R_g	Gate resistance	$V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$	3.0	-	Ω
C_{iss}	Input capacitance	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$	1860	-	pF
C_{oss}	Output capacitance		1425	-	
C_{rss}	Reverse transfer capacitance		76	-	
$Q_{g(tot)}$	Total gate charge at 10V	$V_{DS} = 560\text{V}$, $I_D = 20\text{A}$ $V_{GS} = 10\text{V}$	53	-	nC
Q_{gs}	Gate to source gate charge		13	-	
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		-	60	A
V_{SD}	Drain to source diode forward voltage	$I_{SD} = 20\text{A}$, $V_{GS} = 0\text{V}$	-	1.4	V
T_{rr}	Reverse recovery time	$I_{SD} = 20\text{A}$, $V_{DD} = 100\text{V}$, $dI_F/dt = 100\text{A}/\mu\text{s}$	524	-	ns
Q_{rr}	Reverse recovery charge		9.4	-	μC
I_{rrm}	Reverse recovery current		35.7	-	A

Typical Characteristics

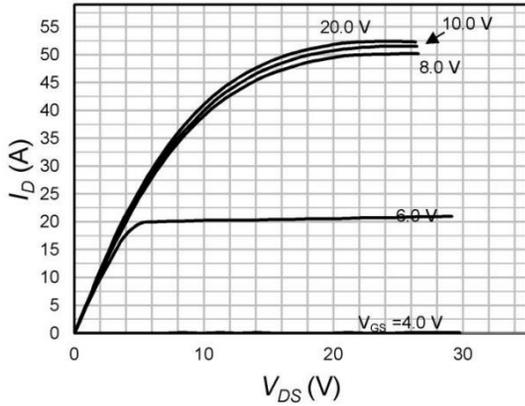


Figure 1. Output characteristics

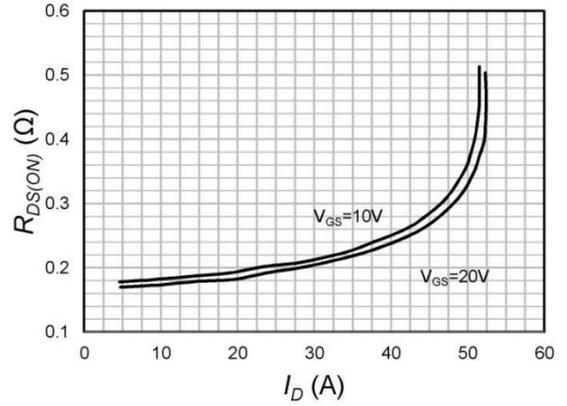


Figure 2. On-Resistance with Drain Current and Gate Voltage

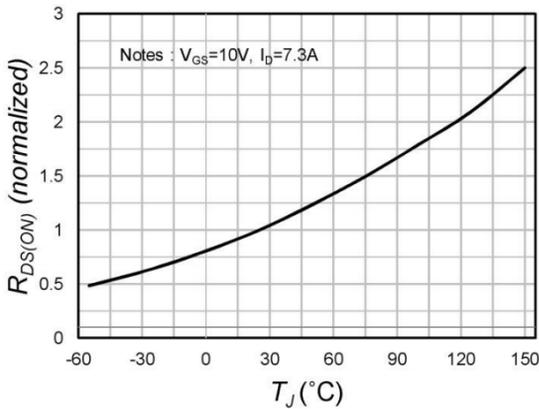


Figure 3. Drain-Source On-State Resistance (Normalized)

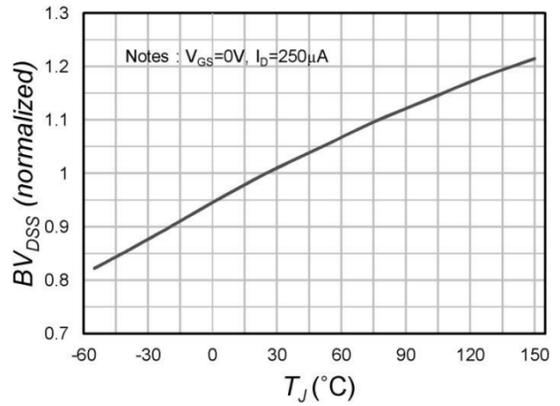


Figure 4. Drain-Source Breakdown Voltage (Normalized)

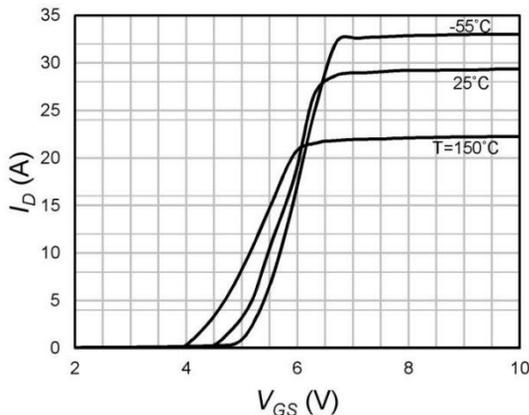


Figure 5. Transfer Characteristics

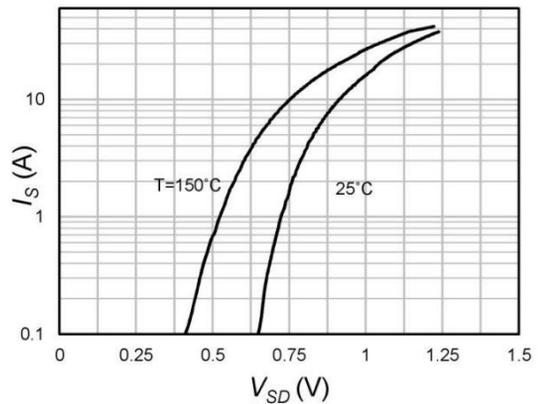


Figure 6. Forward Characteristics of Reverse Diode

Typical Characteristics

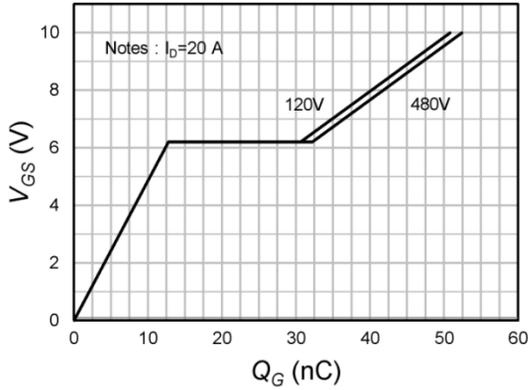


Figure 7. Gate charge

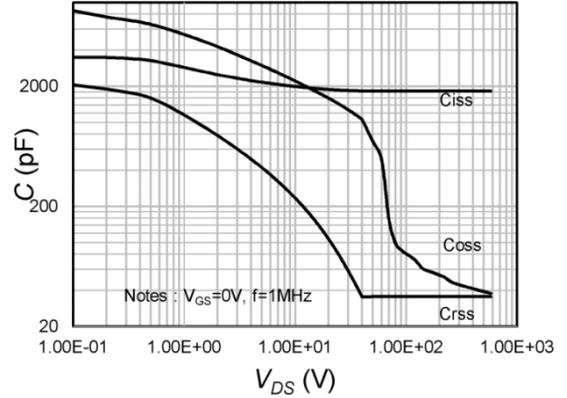


Figure 8. Capacitance

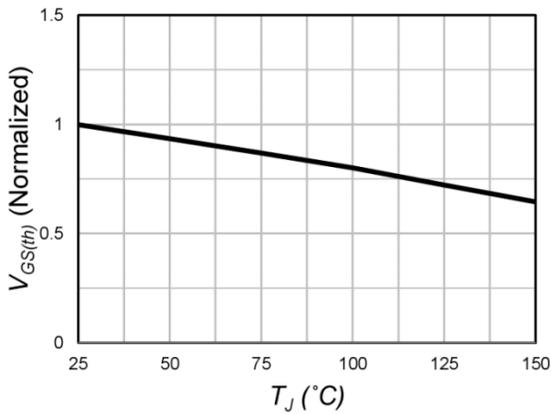


Figure 9. $V_{GS(TH)}$ Variation vs. Temperature (Normalized)

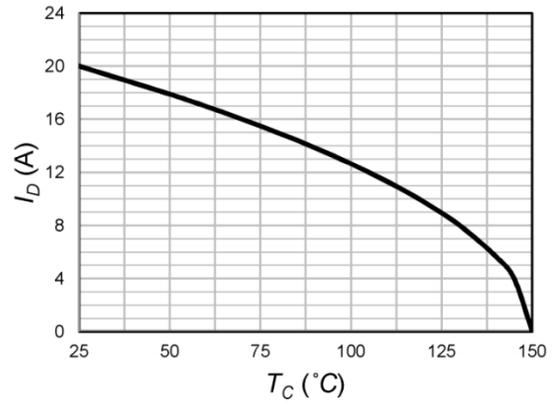


Figure 10. Maximum Drain current vs. Case temperature

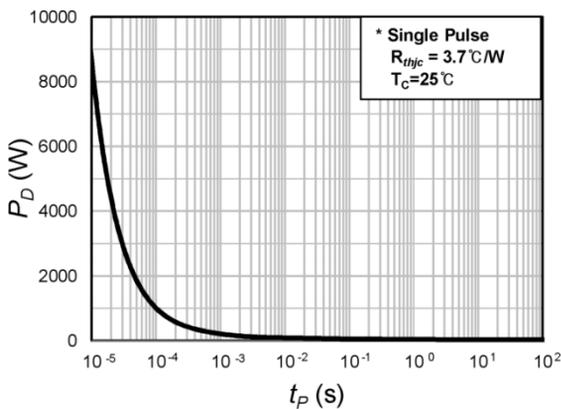


Figure 11. Power Dissipation

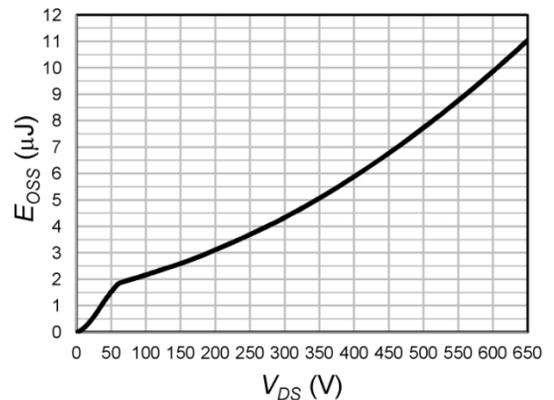


Figure 12. Output Capacitance stored energy

Typical Characteristics

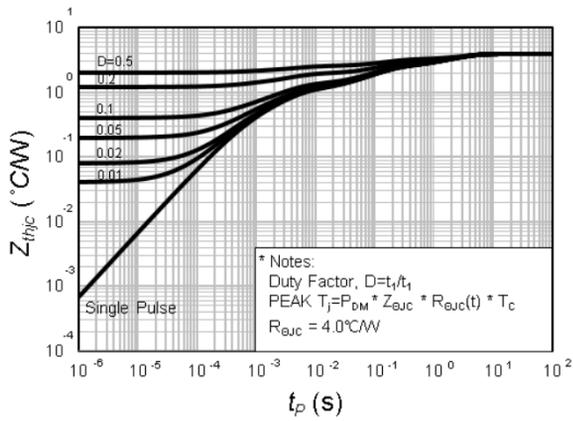


Figure 13. Transient thermal impedance

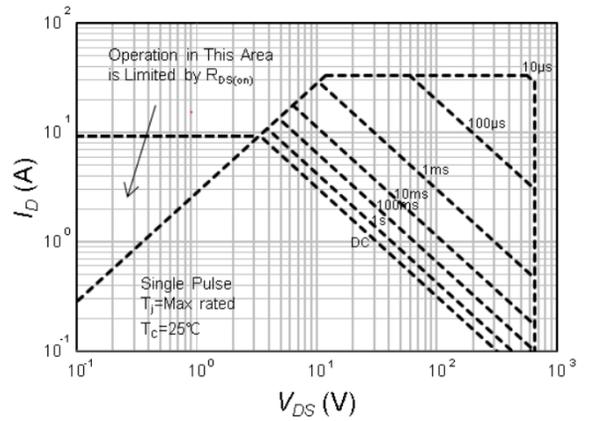
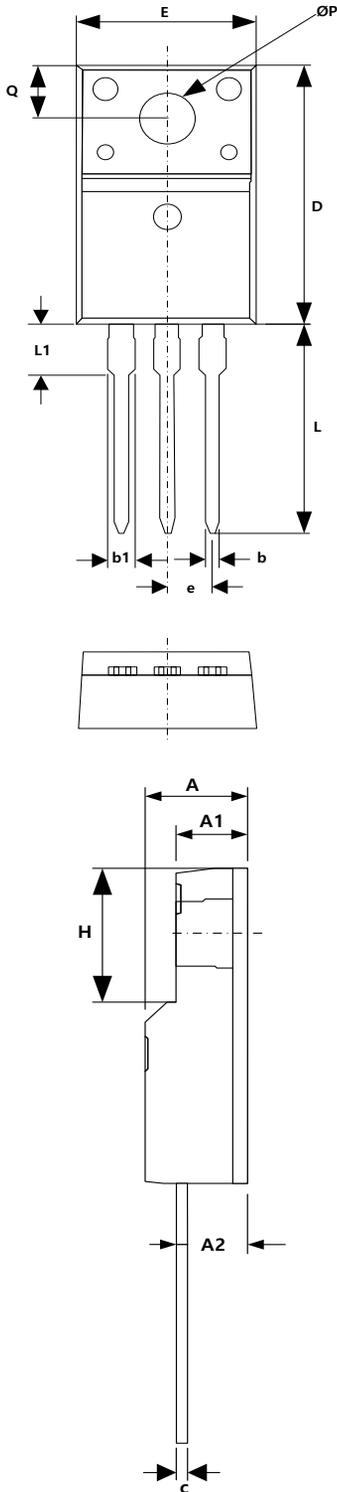


Figure 14. Safe operating area

Package Outline

Unit : mm



SYMBOL	DIMENSIONS			NOTES
	MIN	NOM	MAX	
A	4.60	4.70	4.80	
A1	2.44	2.54	2.64	
A2	2.15	2.45	2.75	
b	0.70	0.80	0.90	
b1	1.15	1.35	1.55	
c	0.50	0.60	0.70	
D	15.30	15.80	16.30	
E	9.90	10.10	10.30	
e	4.98	5.08	5.18	
H	6.40	6.60	6.80	
L	13.05	13.55	14.05	
L1	3.00	3.30	3.60	
$\varnothing P$	3.00	3.20	3.40	
Q	3.10	3.30	3.50	