

Silicon N-Channel Super-Junction Power MOSFET

General Description:

HMP60J50 the silicon N-channel Enhanced VDMOSFETS, is obtained by the self-aligned Super-junction Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-247, which accords with the RoHS standard.

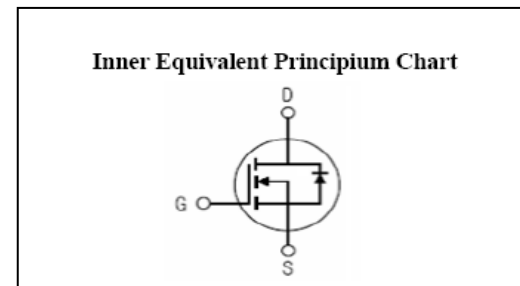
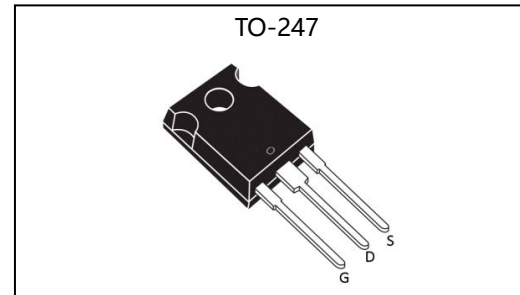
Features:

- Fast Switching
- Low Gate Charge and R_{dson}
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications:

- Switch Mode Power Supply(SMPS)
- Uninterruptible Power Supply(UPS)
- Power Factor Correction(PFC)

V_{DSS}	500	V
I_D	60	A
$P_D(T_C=25^\circ C)$	390	W
$R_{DS(ON)TYP}$	42	$m\Omega$



Absolute (Tc=25°C unless otherwise specified):

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	500	V
I_D	Continuous Drain Current	60	A
I_{DM}^{a1}	Pulsed Drain Current	180	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	1120	mJ
P_D	Power Dissipation	390	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ C$
T_L	Maximum Temperature for Soldering	300	$^\circ C$

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	0.32	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient	62	$^\circ C/W$

Electrical Characteristics (T_c=25°C unless otherwise specified):

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V _{DSS}	Drain to Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	500	--	--	V
I _{DSS}	Drain to Source Leakage Current	V _{DS} =500V, V _{GS} =0V, T _a = 25°C	--	--	1.0	μA
		V _{DS} =400V, V _{GS} =0V, T _a =150°C	--	--	100	
I _{GSS(F)}	Gate to Source Forward Leakage	V _{GS} = +30V	--	--	100	nA
I _{GSS(R)}	Gate to Source Reverse Leakage	V _{GS} = -30V	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R _{DS(ON)} ^{a3}	Drain-to-Source On-Resistance	V _{GS} =10V, I _D =20A	--	43	55	mΩ
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2.5	--	4.5	V

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g _{fs} ^{a3}	Forward Transconductance	V _{DS} =10V, I _D =20A	--	40	--	S
C _{iss}	Input Capacitance	V _{GS} =0V, V _D =50V f=1.0MHz	--	5100	--	pF
C _{oss}	Output Capacitance		--	225	--	
C _{rss}	Reverse Transfer Capacitance		--	6.2	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =400V, I _D =26A, V _{GS} =10V R _g =1.7Ω	--	16	--	ns
t _r	Rise Time		--	12	--	
t _{d(OFF)}	Turn-Off Delay Time		--	83	--	
t _f	Fall Time		--	5	--	
Q _g	Total Gate Charge	I _D =47A, V _{DD} =400V V _{GS} =0 to 10V	--	90	--	nC
Q _{gs}	Gate to Source Charge		--	24	--	
Q _{gd}	Gate to Drain ("Miller")Charge		--	30	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	60	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	180	A
V_{SD}	Diode Forward Voltage	$I_S=60A, V_{GS}=0V$	--	--	1.2	V
t_{rr}	Reverse Recovery Time	$V_R=400V, V_{GS}=0V$	--	720	--	ns
Q_{rr}	Reverse Recovery Charge	$I_S=I_F, di/dt=100A/us$	--	19	--	uC
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

^{a2}: $I_{AS}=15A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^\circ C$

^{a3}: Pulse Test: Pulse width $\leq 380us$, Duty Cycle $\leq 2\%$

Typical Characteristics

Figure 1. Output Characteristics

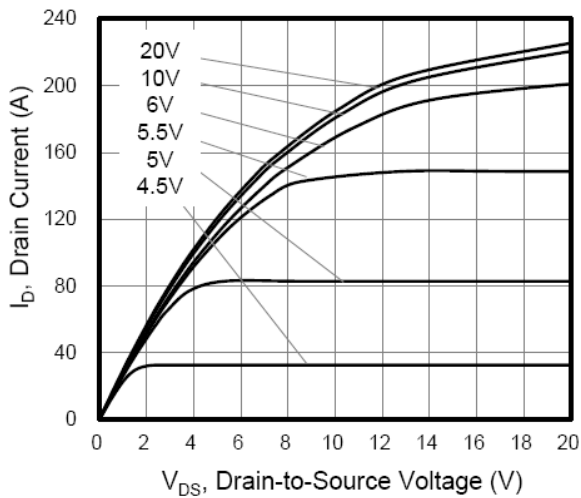


Figure 2. Transfer Characteristics

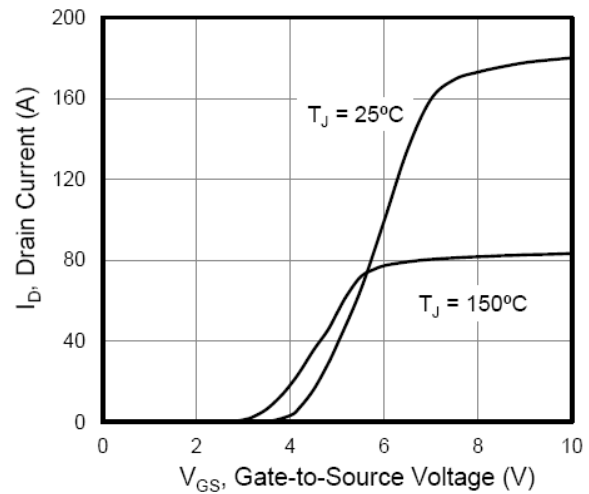


Figure 3. On-Resistance vs. Drain Current

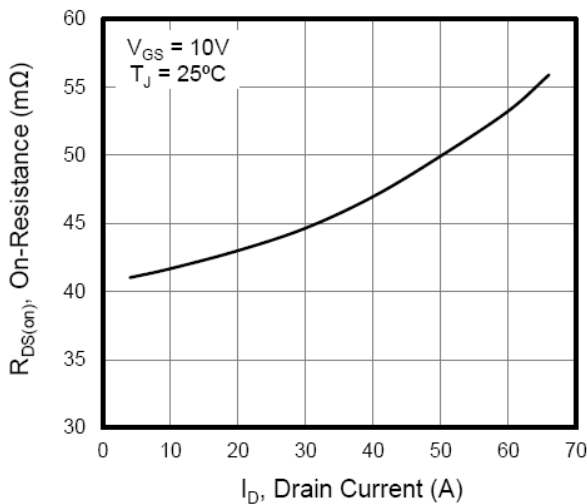


Figure 4. Capacitance

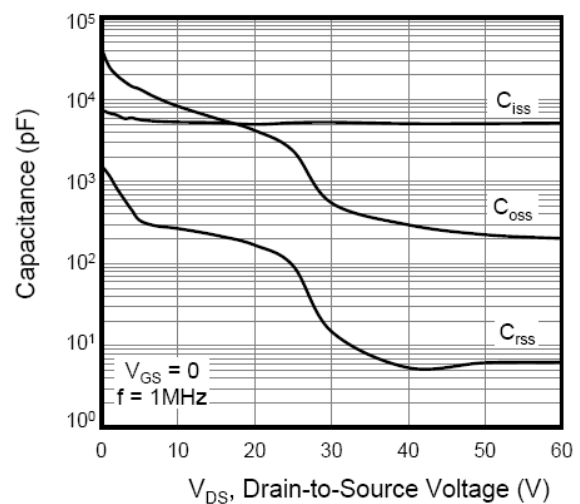


Figure 5. Gate Charge

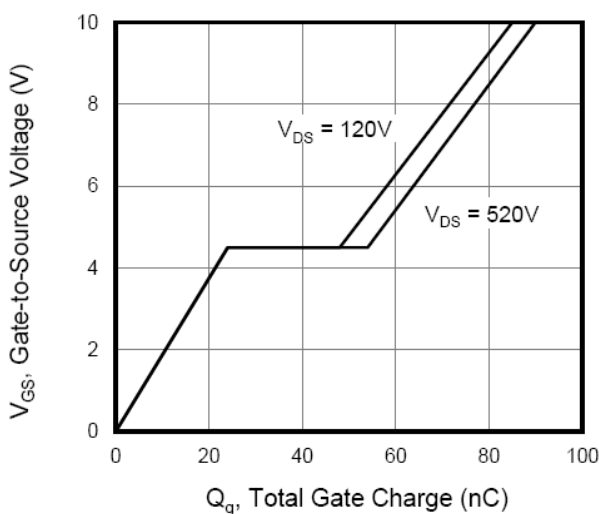


Figure 6. Body Diode Forward Voltage

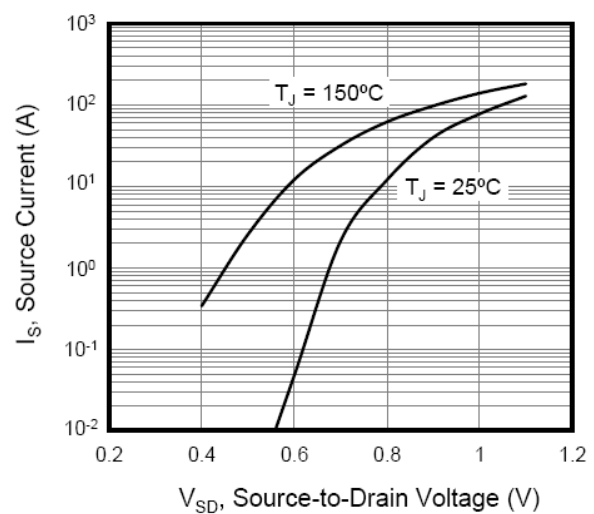


Figure 7. On-Resistance vs. Temperature

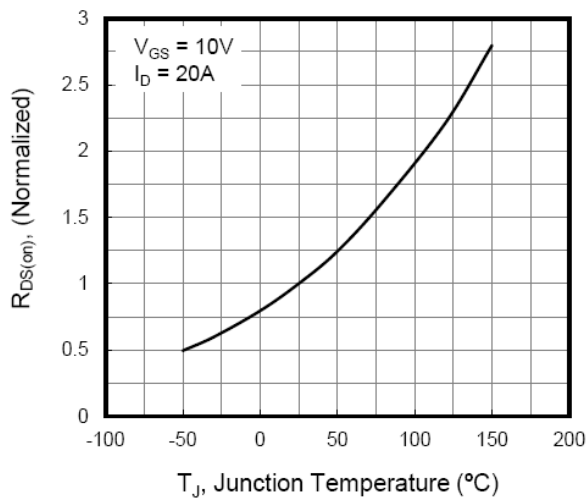


Figure 8. Threshold Voltage vs. Temperature

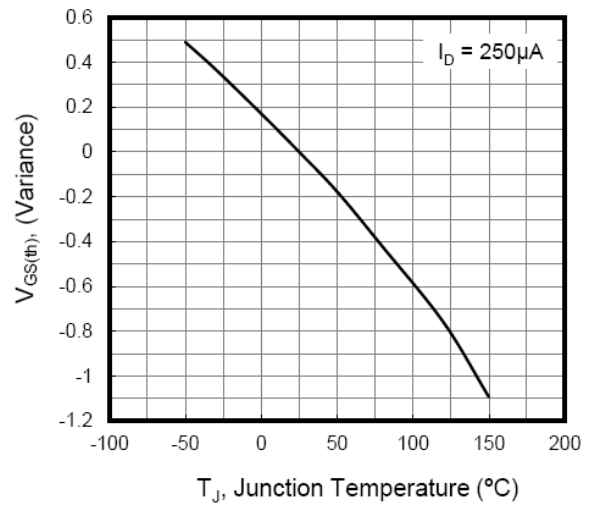


Figure 9. Transient Thermal Impedance

