

## Silicon N-Channel Super-Junction Power MOSFET

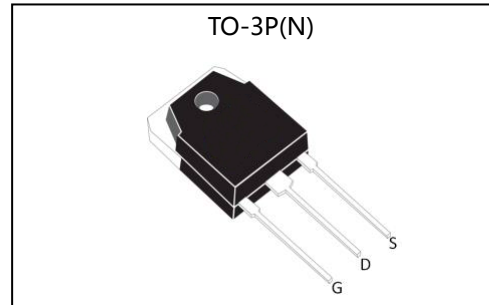
### General Description :

HMT47J60 the silicon N-channel Enhanced VDMOSFETS, is obtained by the self-aligned Superjunction 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-3P(N), which accords with the RoHS standard.

$V_{DSS}(T_c=150^\circ\text{C})$	600	V
$I_D$	47	A
$P_D(T_c=25^\circ\text{C})$	400	W
$R_{DS(ON)}$	80	m $\Omega$

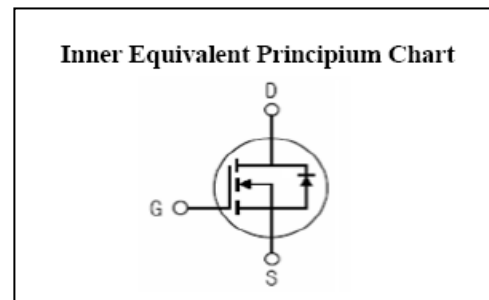
### Features :

- Proprietary New Super-Junction Technology
- $R_{DS(ON),typ.}=0.08\Omega$
- Low Gate Charge Minimize Switching Loss
- 100% Single Pulse avalanche energy Test



### Applications :

- Adaptor
- Charger
- SMPS Standby Power
- Switching Voltage Regulators



### Absolute ( $T_c=25^\circ\text{C}$ unless otherwise specified ) :

Symbol	Parameter	Rating	Units
$V_{DSS}$	Drain-to-Source Voltage	600	V
$I_D$	Continuous Drain Current	47	A
$I_{DM}$	Pulsed Drain Current	140	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulse Avalanche Energy	1100	mJ
$P_D$	Power Dissipation	400	W
	Derating Factor above $25^\circ\text{C}$	3.23	W/ $^\circ\text{C}$
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ\text{C}$
$T_L$	Maximum Temperature for Soldering	300	$^\circ\text{C}$

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

**Electrical Characteristics** (  $T_c = 25^\circ\text{C}$  unless otherwise specified ) :

<b>OFF Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$V_{DSS}$	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	600	--	--	V
$I_{DSS}$	Drain to Source Leakage Current	$V_{DS}=600V, V_{GS}=0V, T_a=25^\circ\text{C}$	--	--	1	$\mu A$
		$V_{DS}=480V, V_{GS}=0V, T_a=125^\circ\text{C}$	--	--	100	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+30V$	--	--	10	$\mu A$
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-30V$	--	--	-10	$\mu A$

<b>ON Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=20A$	--	80	95	m $\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	--	4.0	V
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=47A$	--	40	--	S
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

<b>Dynamic Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=50V$ $f=1.0\text{MHz}$	--	4300	--	pF
$C_{oss}$	Output Capacitance		--	30	--	
$C_{rss}$	Reverse Transfer Capacitance		--	400	--	
$Q_g$	Total Gate Charge	$I_D=47A, V_{DD}=480V$ $V_{GS}=0 \text{ to } 10V$	--	115	--	nc
$Q_{gs}$	Gate to Source Charge		--	19	--	nc
$Q_{gd}$	Gate to Drain ( "Miller" ) Charge		--	40	--	nc

<b>Resistive Switching Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=300V, I_D=47A,$ $V_{GS}=10V, R_g=25\Omega$	--	96	--	nS
$t_r$	Rise Time		--	216	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	352	--	
$t_f$	Fall Time		--	100	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$I_S$	Continuous Source Current (Body Diode)		--	--	47	A
$I_{SM}$	Maximum Pulsed Current(Body Diode)		--	--	140	A
$V_{SD}$	Diode Forward Voltage	$I_S=47A, V_{GS}=0V$	--	--	1.5	V
$t_{rr}$	Reverse Recovery Time	$V_R=480V, I_F=I_S,$	--	520	--	ns
$Q_{rr}$	Reverse Recovery Charge	$diF/dt=100A/us, V_{GS}=0V$	--	13	--	uC
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

Symbol	Parameter	Max.	Units
$R_{\theta JC}$	Junction-to-Case	0.31	°C/W
$R_{\theta JA}$	Junction-to-Ambient	55	°C/W

$T_J = +25^\circ C$  to  $+150^\circ C$

Pulse width  $\leq 380\mu s$ ; duty cycle  $\leq 2\%$ .

## Characteristics Curve

Figure 1. Output Characteristics

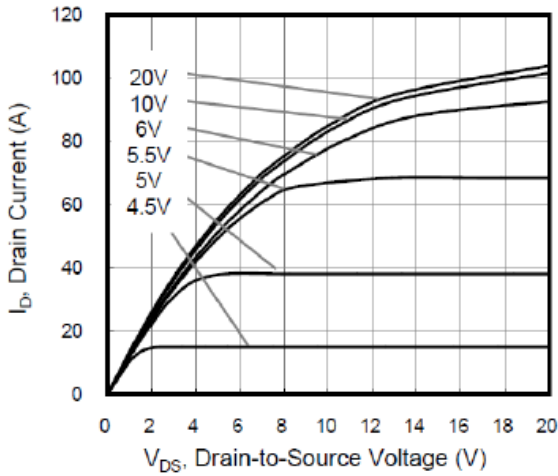


Figure 2. Transfer Characteristics

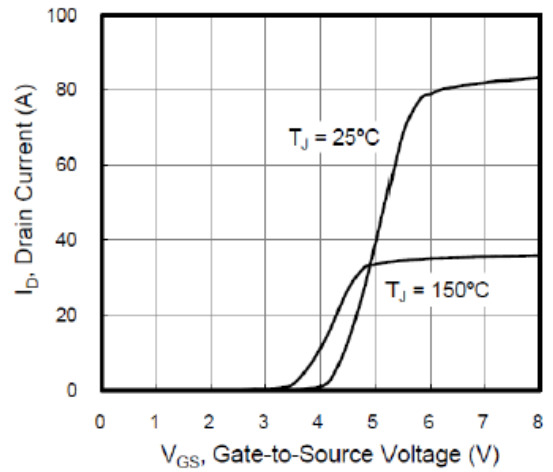


Figure 3. On-Resistance vs. Drain Current

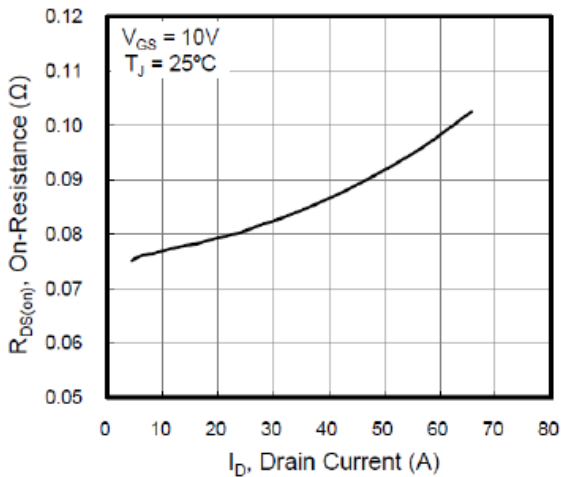


Figure 4. Capacitance

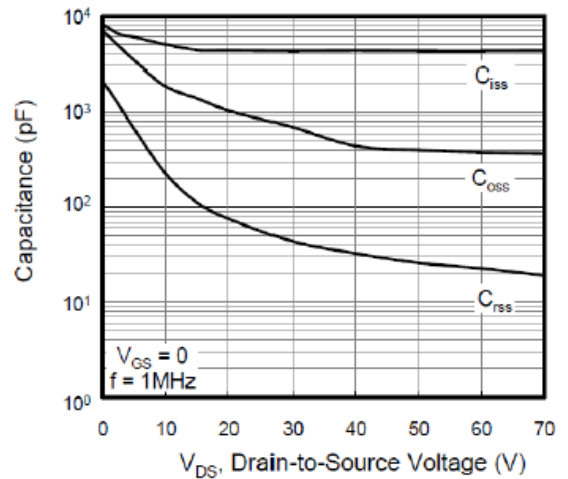


Figure 5. Gate Charge

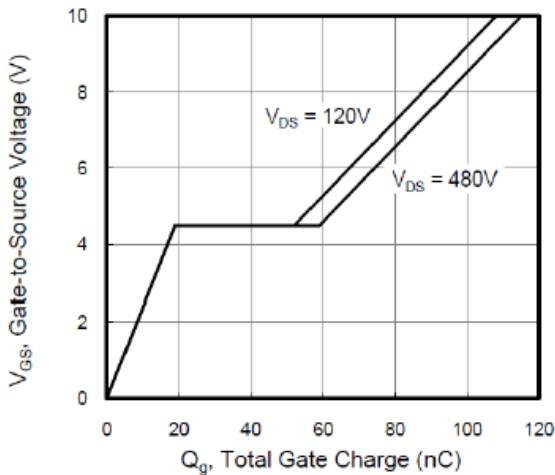
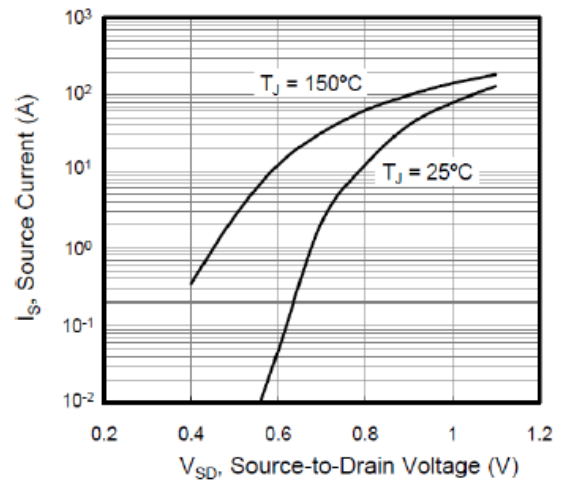
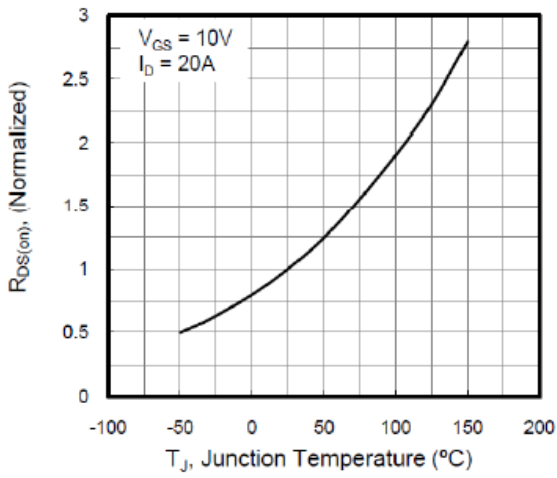


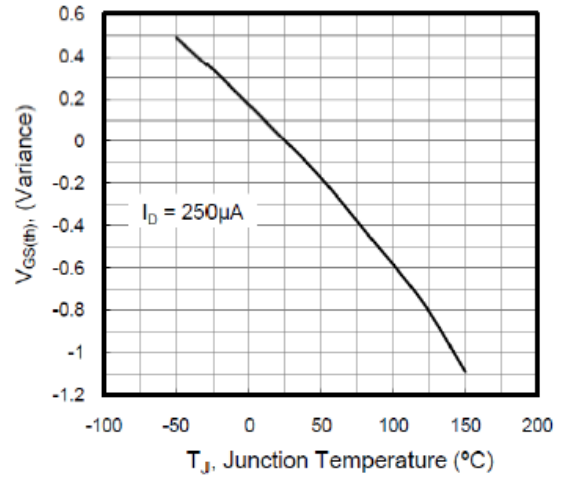
Figure 6. Body Diode Forward Voltage



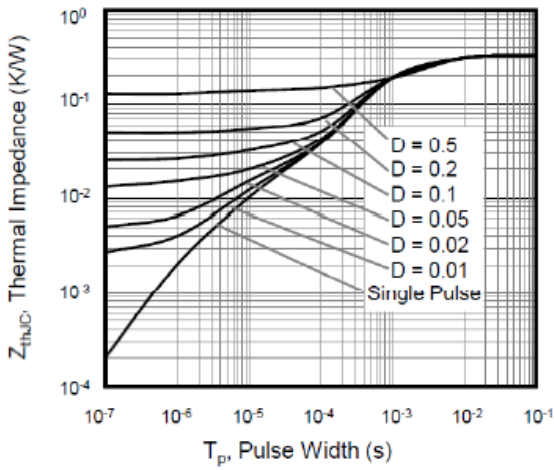
**Figure 7. On-Resistance vs. Temperature**



**Figure 8. Threshold Voltage vs. Temperature**



**Figure 9. Transient Thermal Impedance**



**Figure 10. Safe Operating Area**

