HMT25N50

Silicon N-Channel Power MOSFET

General Description :

HMT25N50, the silicon N-channel Enhanced VDMOSFET, is obtained by the self-aligned planar 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.

Features :

- Fast Switching
- Low ON Resistance(Typical Data:0.145Ω)
- Low Gate Charge Minimize Switching loss
- Fast Recovery Body Diode
- 100% Single Pulse avalanche energy Test

Applications :

- Adaptor
- Charger
- SMPS Standby Power

V_{DSS}	500	V
I_D	25	A
$P_D(T_C=25℃)$	230	W
$R_{DS(ON).type.}$	0.145	Ω

TO-3P(N)

Inner Equivalent Principium Chart
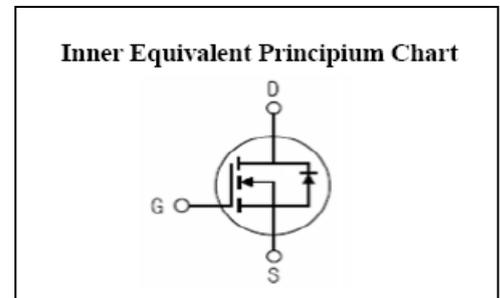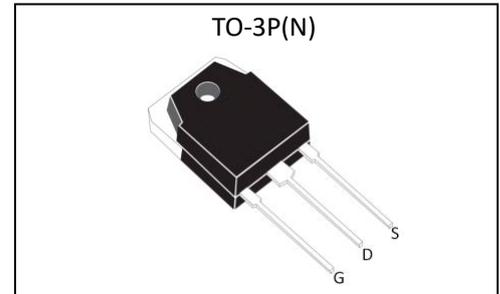
Absolute (Tc= 25℃ unless otherwise specified) :

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	500	V
I_D	Continuous Drain Current	25	A
I_{DM}	Pulsed Drain Current at V_{GS}=10V	100	A
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy	2500	mJ
dv/dt	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	230	W
	Derating Factor above 25°C	1.84	W/℃
T_J,T_{stg}	Operating Junction and Storage Temperature Range	150,−55 to 150	℃
T_L	Maximum Temperature for Soldering	300	℃
T_{PAK}	Leads at 0.63 in(1.6mm) from Case for 10 seconds, Package Body for 10 seconds	260	

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

Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.54	℃/ W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	℃/ W

Electrical Characteristics (Tc= 25℃ unless otherwise specified) :

OFF Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	500	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=500V, V_{GS}=0V, T_a=25℃$	--	--	10	μA
		$V_{DS}=400V, V_{GS}=0V, T_a=125℃$	--	--	250	
$I_{GSS(F)}$	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.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=10A$	--	0.145	0.18	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	--	4.0	V
g_{fs}	Forward Transconductance	$V_{DS}=15V, I_D=10A$	--	24	--	S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V \; V_{DS}=25V$ $f=1.0MHz$	--	4900	--	pF
C_{oss}	Output Capacitance		--	410	--	
C_{rss}	Reverse Transfer Capacitance		--	44	--	

Resistive Switching Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=20A, V_{DD}=250V$ $V_{GS}=10V, R_g=25Ω$	--	53	--	ns
tr	Rise Time		--	117	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	307	--	
t_f	Fall Time		--	138	--	
Q_g	Total Gate Charge	$I_D=20A, V_{DD}=250V$ $V_{GS}=10V$	--	96	--	nC
Q_{gs}	Gate to Source Charge		--	18	--	
Q_{gd}	Gate to Drain ("Miller")Charge		--	41	--	

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_{SD}	Continuous Source Current (Body Diode)		--	--	25	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	100	A
V_{SD}	Diode Forward Voltage	I_S=20A,V_{GS}=0V	--	--	1.5	V
trr	Reverse Recovery Time	I_S=20A,T_j=25℃	--	558	--	ns
Qrr	Reverse Recovery Charge	di/dt=100A/μs,V_{GS}=0V	--	6.1	--	uC
*Pulse width tp≤380μs,δ≤2%						

Characteristics Curve :

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case
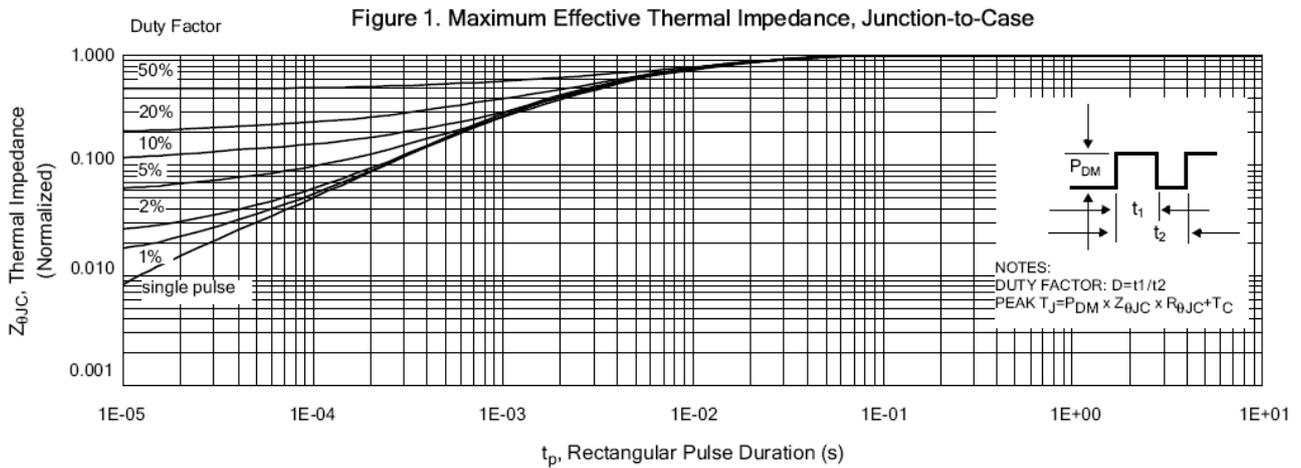
Figure 2. Maximum Power Dissipation vs Case Temperature
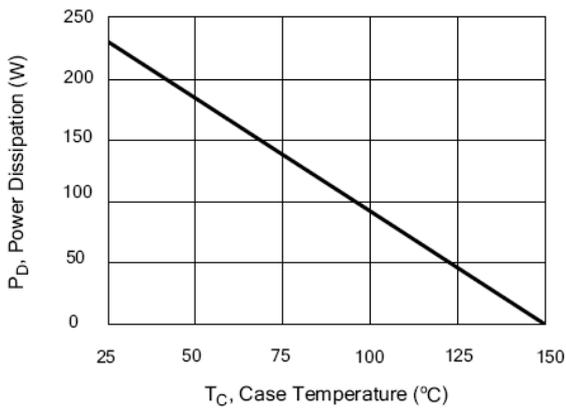
Figure3. Maximum Continuous Drain Current vs Case Temperature
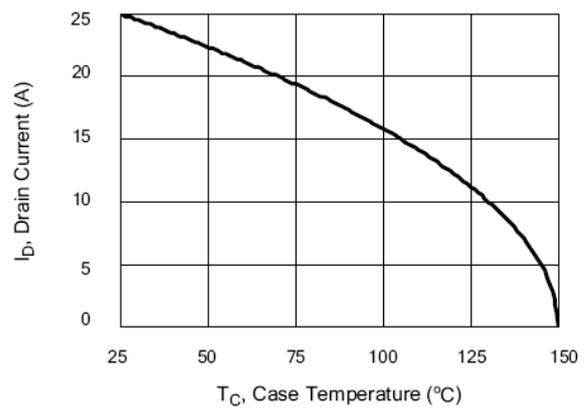
Figure 4. Typical Output Characteristics
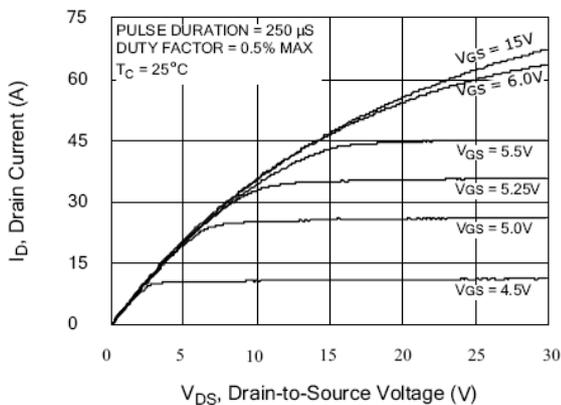
Figure5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current

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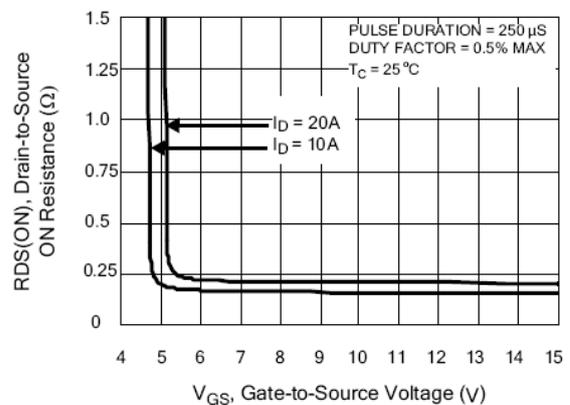
Figure 6. Maximum Peak Current Capability

$$I = I_{25} \left[\sqrt{\frac{150 - T_C}{125}} \right]$$

FOR TEMPERATURES ABOVE 25ºC DERATE PEAK CURRENT AS FOLLOWS:
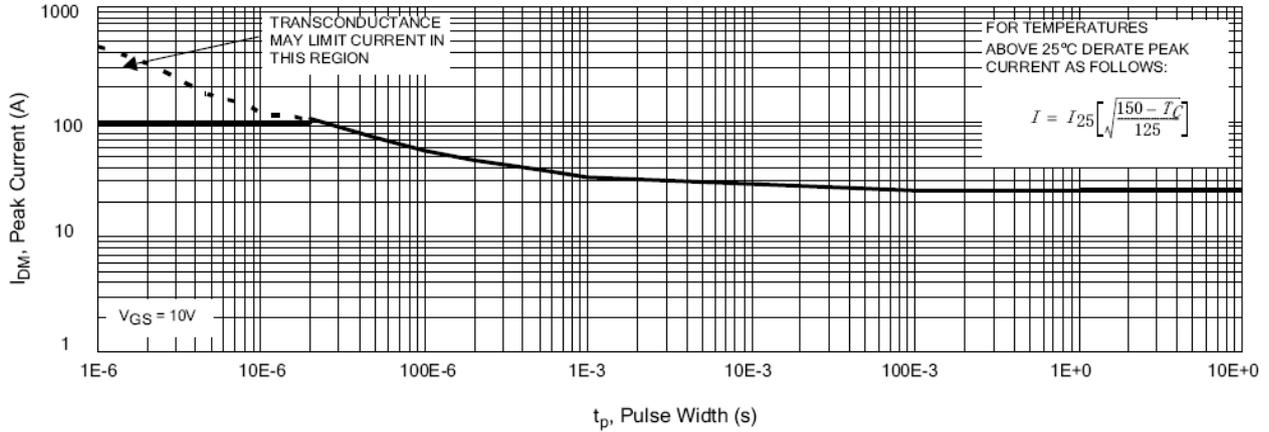
Figure 7. Typical Transfer Characteristics
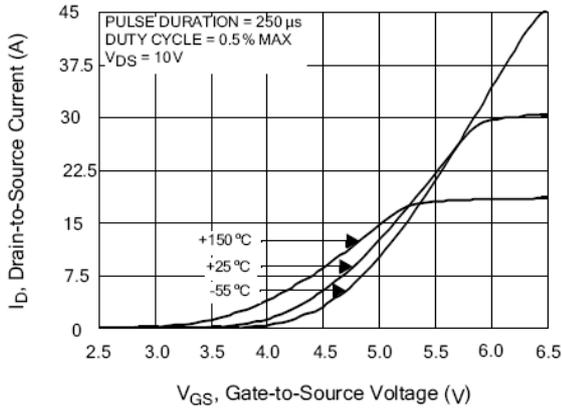
Figure 8. Unclamped Inductive Switching Capability
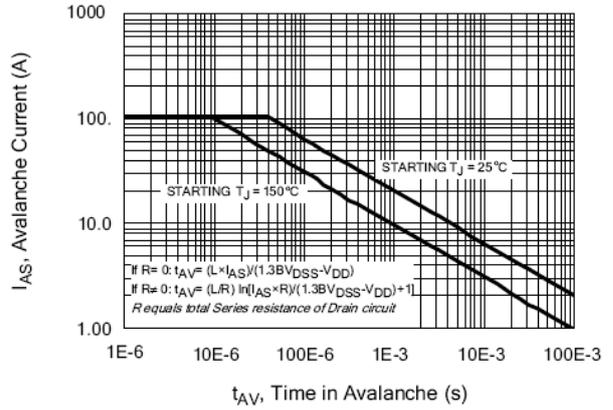
Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current
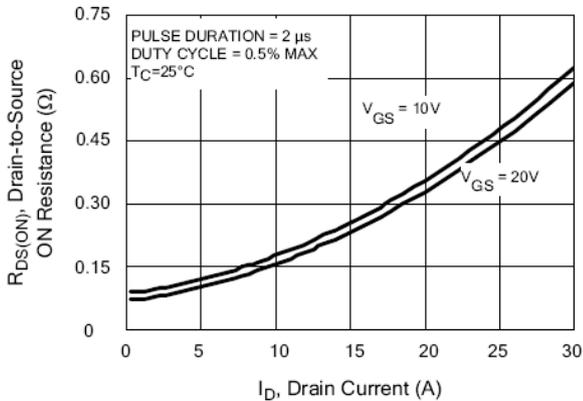
## Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature

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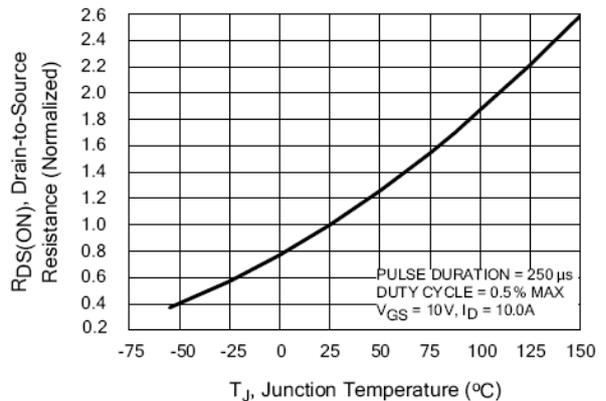
Figure 11.   Typical Breakdown Voltage vs Junction Temperature
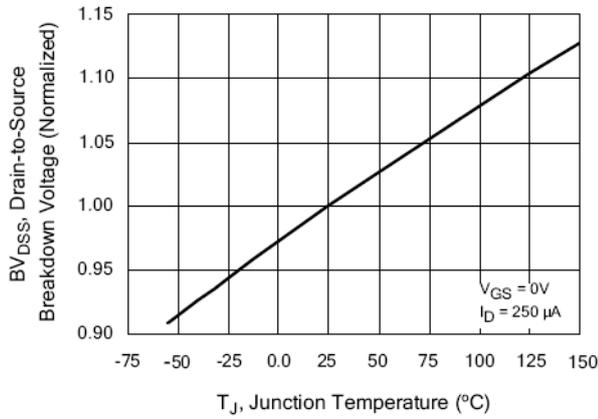
Figure 12.   Typical Threshold Voltage vs Junction Temperature
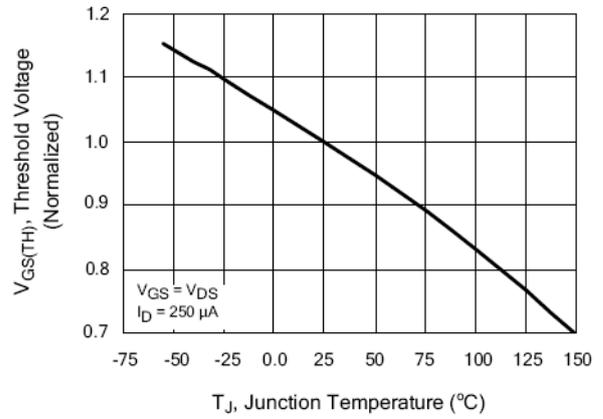
Figure 13.   Maximum Forward Bias Safe Operating Area
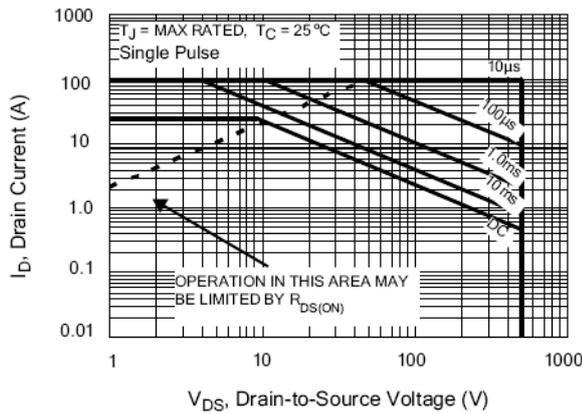

Figure 14.   Typical Capacitance vs
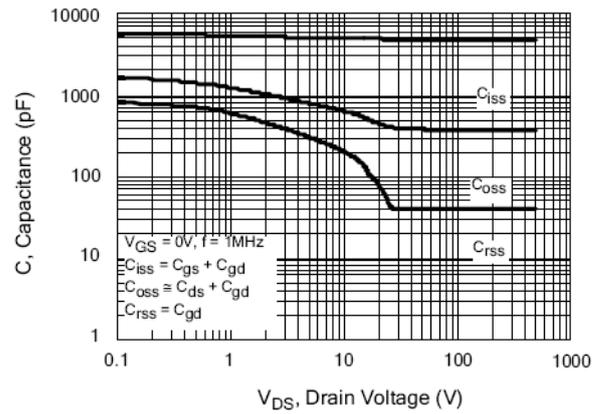
Figure 15.   Typical Gate Charge vs Gate-to-Source Voltage
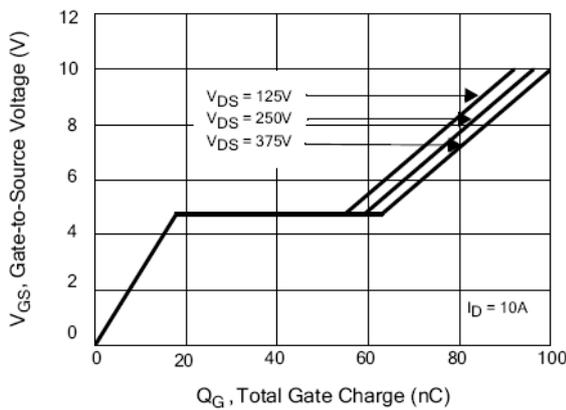
Figure 16.   Typical Body Diode Transfer Characteristics