

### General Description

The 5N50M uses advanced high-voltage plane technology to provide excellent  $R_{DS(ON)}$  and low gate charge. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, highly efficient DC to DC converters and bridge circuits.



Product Summary			
$V_{DS}$	$R_{DS(on)}$ ( $\Omega$ )Typ	$I_D$ (A)	$Q_g$ (Typ)
500V	1.5 @ 10V,2A	5	9.2 nc

### Features

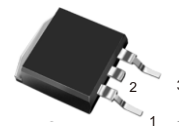
- Low on-resistance
- Low gate charge and Fast Switching
- 100% avalanche tested
- Rohs compliant

### Mechanical Data

- Case:TO-252 Package

TO-252

5N50M



### Application

- Power switch circuit of adaptor and charger

### Block Diagram

Pin Definition:

- 1.Gate
- 2.Drain
- 3.Source

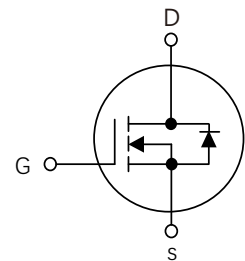


Table1 Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ , unless otherwise specified)

Parameters	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	500	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Contionous Drain Current	$I_D$	$T_c=25^\circ\text{C}$	5
		$T_c=100^\circ\text{C}$	3
Pulsed Drain Current (Note 1)	$I_{DM}$	20	A
Single Pulse Avalanche Energy(Note 2)	EAS	250	mJ
Power Dissipation $T_c=25^\circ\text{C}$	$P_D$	110	W
Operating Junction and Storage Temperature	$T_J/T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Table 2. Thermal Characteristics

Parameters	Symbol	Value	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	42	$^{\circ}\text{C}/\text{W}$
Thermal resistance Junction to Case	$R_{\theta JC}$	1.1	$^{\circ}\text{C}/\text{W}$

Table 3. Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

Parameters	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu\text{A}$	500			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=500V, V_{GS}=0V$			1	$\mu\text{A}$
Gate- Source Leakage Current	Forward	$I_{GSS}$			100	$\mu\text{A}$
	Reverse				-100	$\mu\text{A}$
On Characteristics(Note 3)						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.0	3.0	4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2A$		1.5	1.8	$\Omega$
Dynamic Characteristics(Note 4)						
Input Capacitance	$C_{ISS}$	$V_{DS}=50V, V_{GS}=0V, f=1\text{MHz}$		560		pF
Output Capacitance	$C_{OSS}$			40		pF
Reverse Transfer Capacitance	$C_{RSS}$			1.9		pF
Switching Characteristics (Note 4)						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=250V, I_D=5A,$ $V_{GS}=10V, R_G=25\Omega$		16		ns
Turn-On Rise Time	$t_r$			31		ns
Turn-Off Delay Time	$t_{d(off)}$			32		ns
Turn-Off Fall Time	$t_f$			20		ns
Total Gate Charge	$Q_G$	$V_{DS}=50V, I_D=5A,$ $V_{GS}=10V$		9.2		nC
Gate-Source Charge	$Q_{GS}$			2.8		nC
Gate-Drain Charge	$Q_{GD}$			2.5		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=5A$		0.9	1.5	V
Maximum Continuous Drain-Source Diode Forward Current(Note 3)	$I_S$				5	A
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_S=5A$		180		ns
Reverse Recovery Charge	$Q_{RR}$	$dI/dt=100A/\mu\text{s}$ (Note 4)		2.0		nC

Notes: 1 Repetitive Rating: Pulse width limited by maximum junction temperature  
 2  $L=30\text{mH}, I_D=4.1\text{A}$ , Starting  $T_J=25^{\circ}\text{C}$   
 3 Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$   
 4 Guaranteed by design, not subject to production

Typical Characteristics Diagrams

Figure 1. Output Characteristics

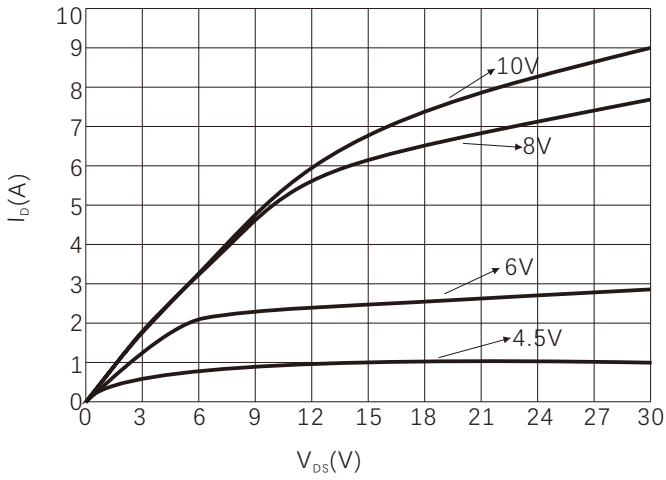


Figure 2. Transfer Characteristics

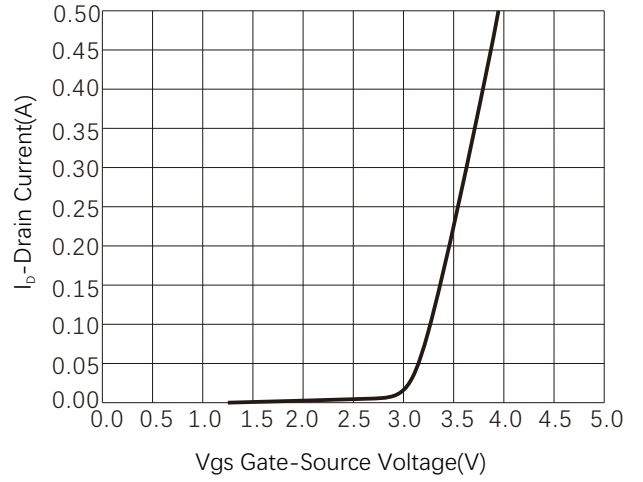


Figure 3.  $R_{DS(on)}$  Drain Current

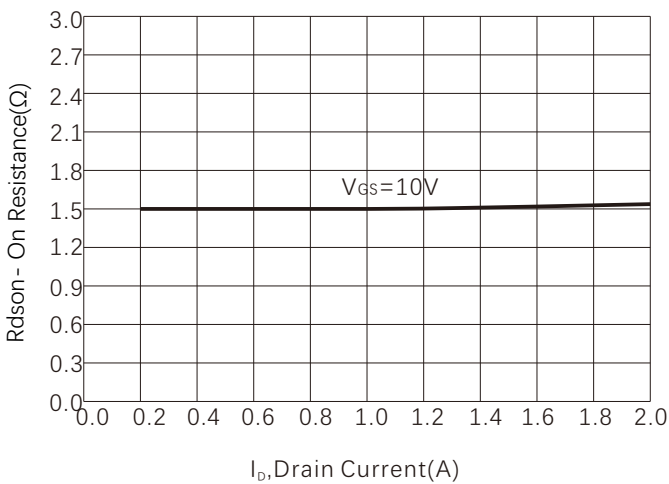


Figure 4. Capacitance

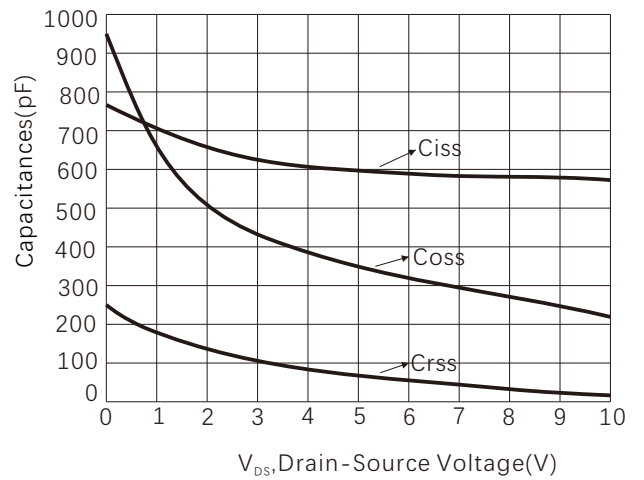


Figure 5.  $R_{ds(on)}$ -Gate Drain voltage

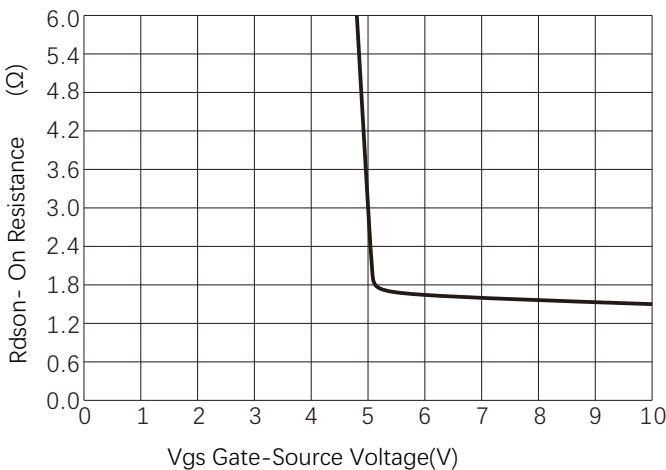


Figure 6. Gate Charge

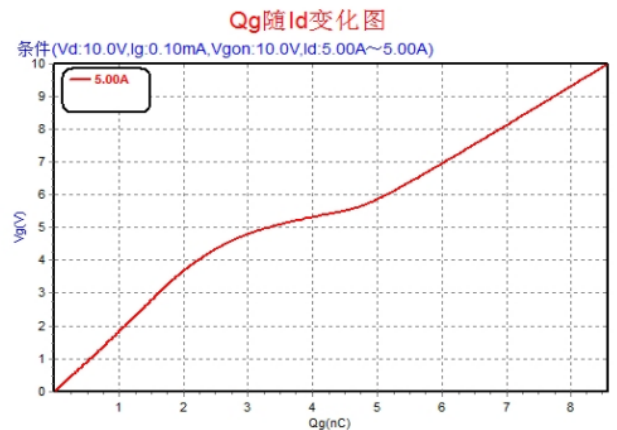


Figure7.Power De-rating

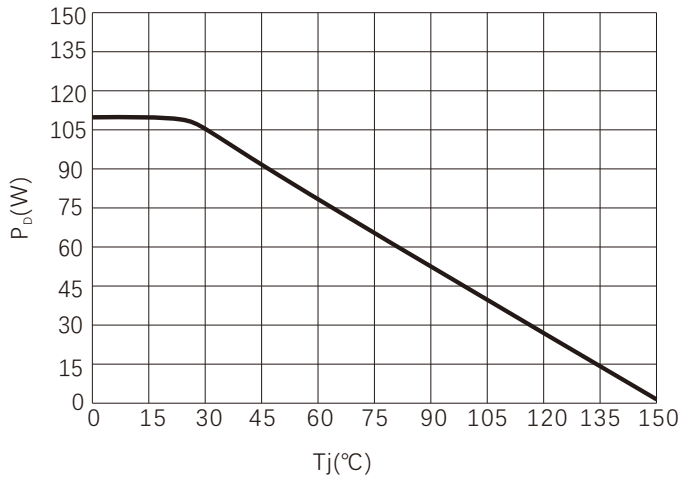


Figure 8. Safe operating area

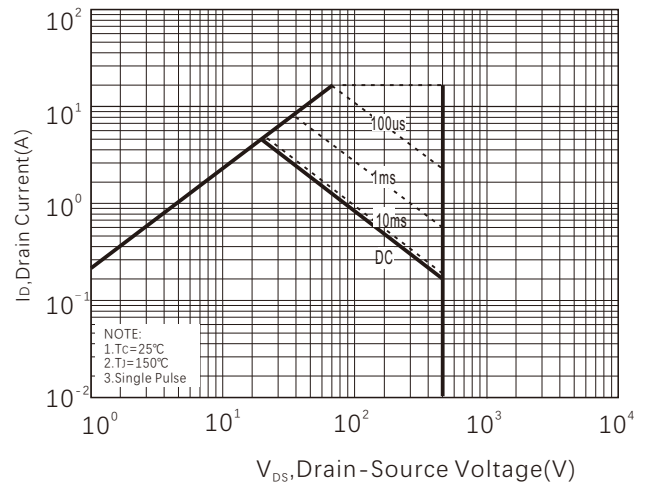
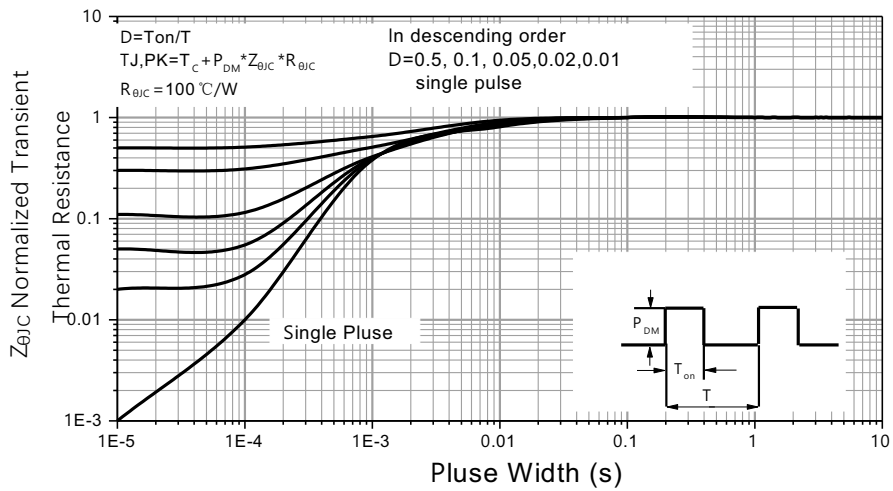
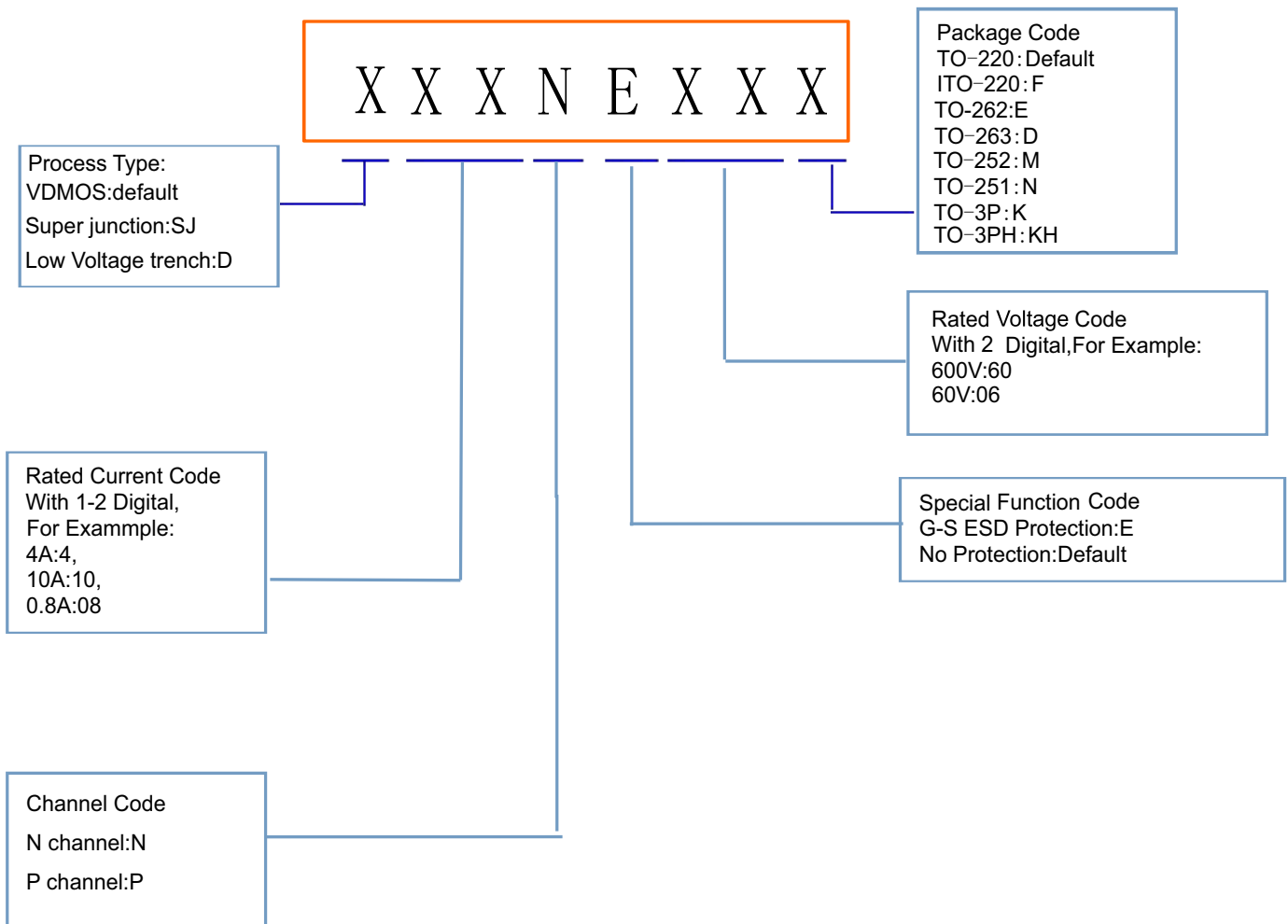


Fig9 Transient Thermal Response Curve

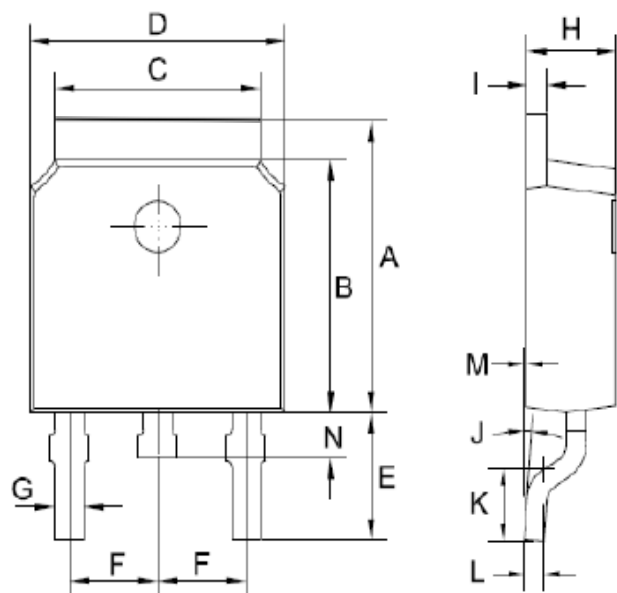


Product Names Rules



Dimensions

TO-252 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	6.85	7.25	0.270	0.285
B	5.8	6.3	0.228	0.248
C	5	5.53	0.197	0.218
D	6.3	6.8	0.248	0.268
E	2.6	3.3	0.102	0.130
F	2.19	2.39	0.086	0.094
G	0.45	0.85	0.018	0.033
H	2.2	2.4	0.087	0.094
I	0.41	0.61	0.016	0.024
J	0°	8°	0°	8°
K	1.45	1.85	0.057	0.073
L	0.41	0.61	0.016	0.024
M	0	0.12	0.000	0.005
P	0.6	1	0.024	0.039

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