

# 4 Amps, 600Volts

## N-CHANNEL MOSFET

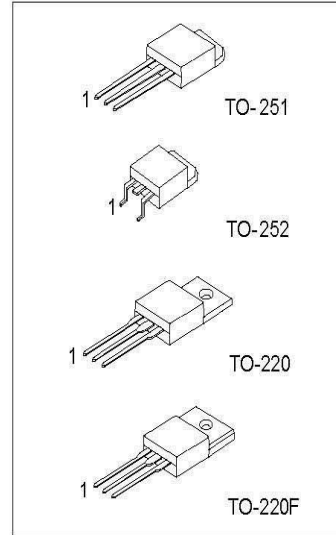
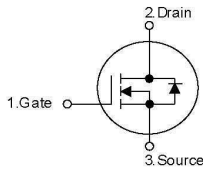
### DESCRIPTION

The SSS5N60 is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies .PWM motor controls, high efficient DC to DC converters and bridge circuits.

### FEATURES

- $R_{DS(ON)}=2.5\ \Omega @V_{GS}=10V$
- Ultra Low gate charge(typical 15.0nC)
- Low reverse transfer capacitance( $C_{RSS}$ =typical 8.0pF)
- Fast switching capability
- Avalanche energy specified
- Improved dv/dt capability,high ruggedness

### SYMBOL

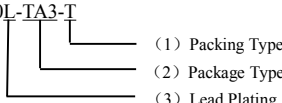


\*Pb-free plating product number: 2N60L

### ORDERING INFORMATION

Order Number		Package	Pin Assignment			Packing
Normal	Lead Free Plating		1	2	3	
5N60-TA3-T	5N60L-TA3-T	TO-220	G	D	S	Tube
5N60-TF3-T	5N60L-TF3-T	TO-220F	G	D	S	Tube
5N60-TM3-T	5N60L-TM3-T	TO-251	G	D	S	Tube
5N60-TN3-R	5N60L-TN3-R	TO-252	G	D	S	Tape Reel
5N60-TN3-T	5N60L-TN3-T	TO-252	G	D	S	Tube

Note:Pin Assignment: G:Gate D:Drain S:Source

<p>5N60L-TA3-T</p> 	<p>(1)T:Tube,R:Tape Reel                  (2)TA3:TO220,TF3:TO-220F,TM3:TO-251,TN3:TO-252                  (3)L:Lead Free Plating Blank: Pb/Sn</p>
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### ABSOLUTE MAXIMUM RATINGS( $T_c=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	PATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	600	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
Avalanche Current(Note 2)	$I_{AP}$	4.4	A
Drain Current	$I_D$	$T_c=25^\circ C$	4.0
		$T_c=100^\circ C$	2.5
Drain Current Pulsed(Note 2)	$I_{DP}$	16	A



Avalanche Energy	Repetitive(Note 2)	$E_{AR}$	260	mJ
	Single Pulse(Note 3)	$E_{AS}$	10.6	mJ
Peak Diode Recovery dv/dt(Note 4)		dv/dt	4.5	v/ns
Total Power Dissipation	$T_c=25^\circ\text{C}$	$P_D$	75	W
	Derate above 25°C		0.59	w/°C
Junction Temperature		$T_J$	+150	°C
Storage Temperature		$T_{STG}$	-55~+150	°C

Note:1.Absolute maximum ratings are those values beyond which the device could be permanently damaged

Absolute maximum ratings are stress ratings only and functional device operation is not implied

2.Repetitive Rating:Pulse width limited bu maximum junction temperature

## ■ THERMAL DATA

PARAMETER	PACKAGE	SYMBOL	RATINGS	UNIT
Thermal Resistance Junction-Ambient	TO-251	$\theta_{JA}$	83	°C/W
	TO-252		83	
	TO-220		62.5	
	TO-220F		62.5	
Thermal Resistance Junction-Case	TO-251	$\theta_{JC}$	2.5	
	TO-252		2.5	
	TO-220		1.18	
	TO-220F		3.47	

## ■ ELECTRICAL CHARACTERISTICS( $T_J=25^\circ\text{C}$ , unless Otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNI
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu\text{A}$	600			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=600V, V_{GS}=0V$			10	$\mu\text{A}$
		$V_{DS}=480V, T_c=125^\circ\text{C}$			100	$\mu\text{A}$
Gate-Body Leakage Current	Forward	$I_{GSS}$	$V_{GS}=30V, V_{DS}=0V$		100	nA
	Reverse			$V_{GS}=-30V, V_{DS}=0V$		-100
Breakdown Voltage Temperature	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$		0.6		V/°C
<b>On Characteristics</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{DS}=10V, I_D=2.2A$			2.5	$\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=100V, I_D=2.4A(\text{Note 1})$	2.9			S
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$		520	670	pF
Output Capacitance	$C_{OSS}$			70	90	pF
Reverse Transfer Capacitance	$C_{RSS}$			8	11	pF

## ■ ELECTRICAL CHARACTERISTICS(Cont.)

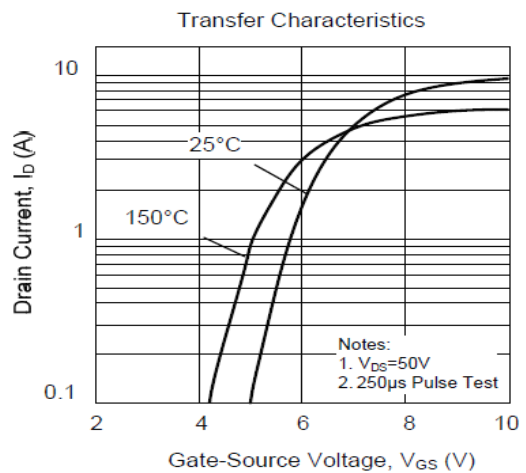
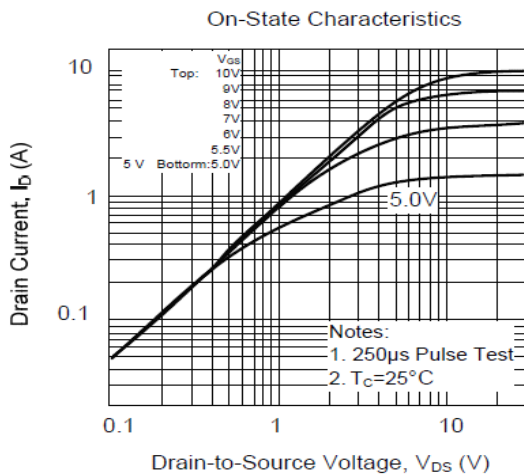
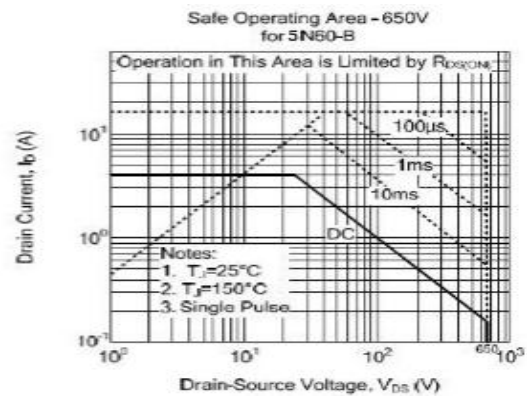
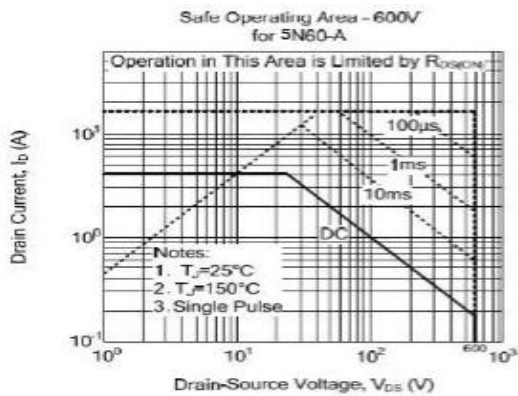
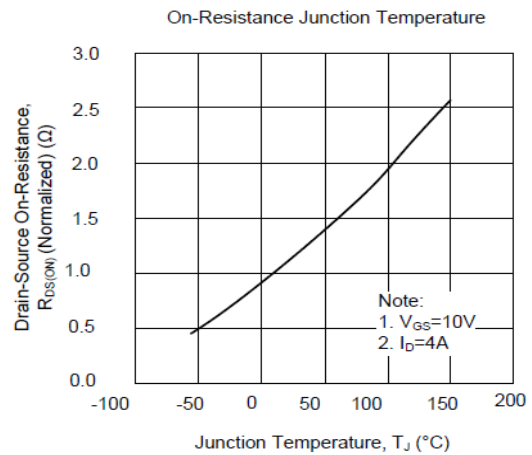
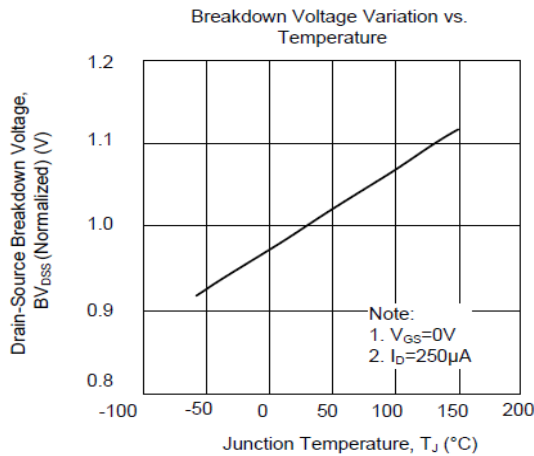
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>Switching Characteristics</b>						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=300V, I_D=4.0A, R_G=25\Omega$ (Note1, 2)		13	35	ns
Rise Time	$t_R$			45	100	ns
Turn-Off Delay Time	$t_{D(OFF)}$			25	60	ns
Fall Time	$t_F$			35	80	ns
Total Gate Charge	$Q_G$	$V_{DS}=480V, V_{GS}=10V, I_D=4.0A$		15	20	nC

Gate-Source Charge	$Q_{GS}$	(Note1,2)	3.4	nC
Gate-Drain Charge	$Q_{GD}$		7.1	nC
<b>Drain-Source Diode Characteristics</b>				
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_{SD}=4.4A$	1.4	V
Continuous Drain-Source Current	$I_{SD}$		4.4	A
Pulsed Drain-Source Current	$I_{SM}$		17.6	A
Reverse Recovery Time	$t_{RR}$	$V_{GS}=0V, I_{SD}=4.4A,$	250	ns
Reverse Recovery Charge	$Q_{RR}$	$di/dt=100A/\mu A$	1.5	$\mu C$

Note:1. Pulse Test: Pulse Width  $\leq 300 \mu s$ , Duty Cycle  $\leq 2\%$

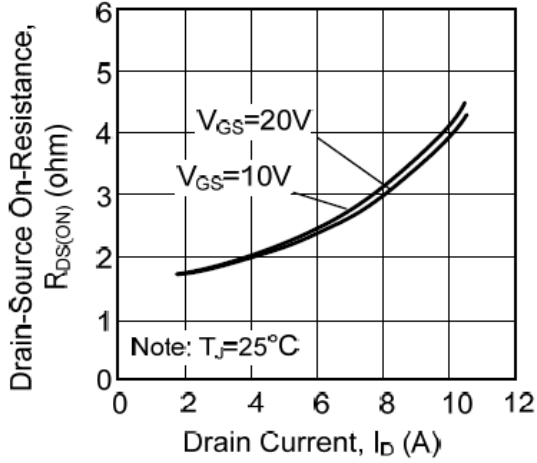
2. Essentially Independent of Operating Temperature

### TYPICAL CHARACTERISTICS

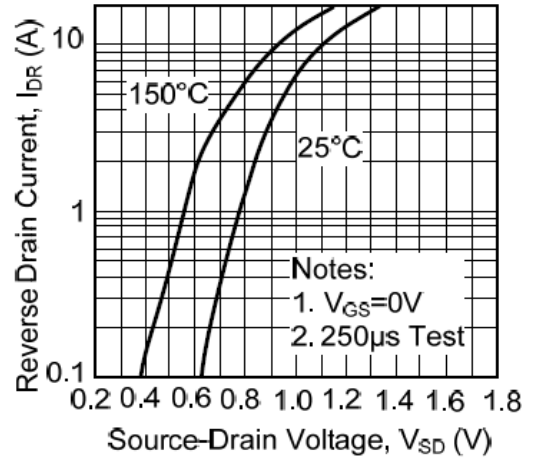


**TYPICAL PERFORMANCE CHARACTERISTICS(cont)**

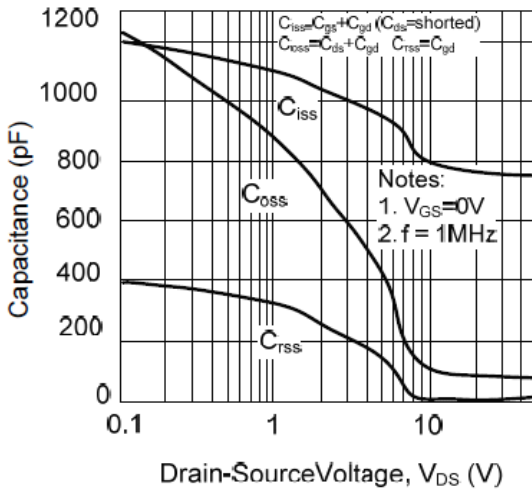
On-Resistance Variation vs. Drain Current and Gate Voltage



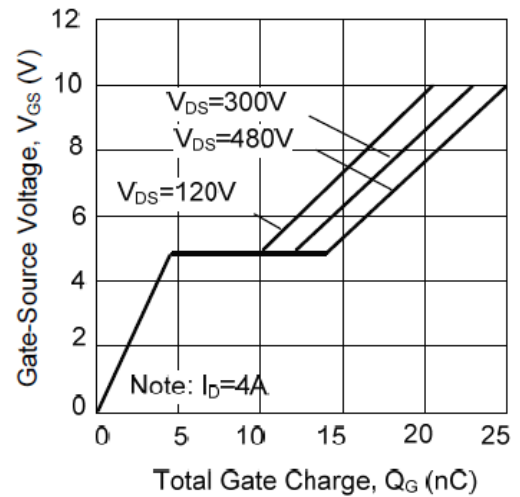
On State Current vs. Allowable Case Temperature



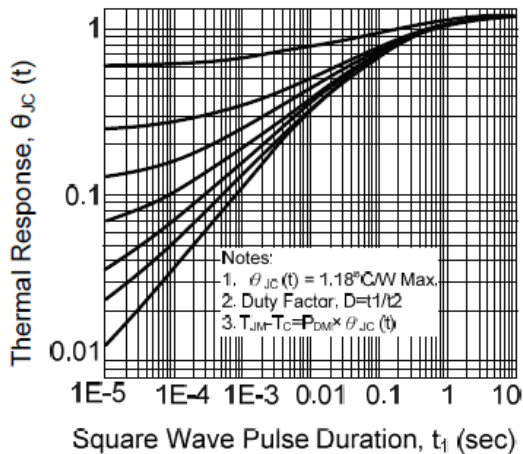
Capacitance Characteristics (Non-Repetitive)



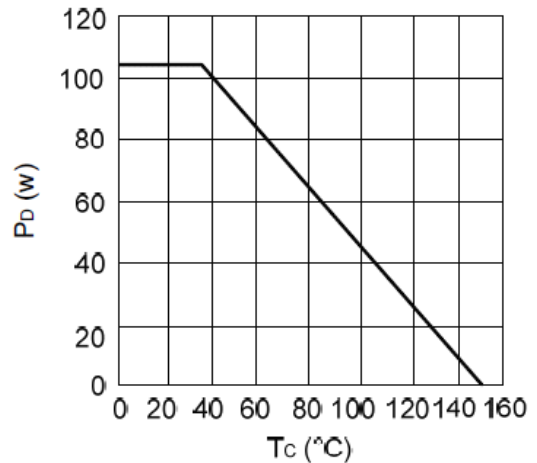
Gate Charge Characteristics



Transient Thermal Response Curve



Power Dissipation



■ **TYPICAL CHARACTERISTICS(cont)**

Maximum Drain Current vs. Case Temperature

