

4 Amps, 600Volts

N-CHANNEL MOSFET

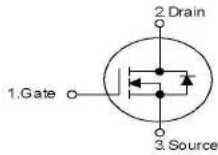
DESCRIPTION

The SI4N60 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} =typical8.0pF)
- Fast switching capability
- Avalanche energy specified
- Improved dv/dt capability,high ruggedness

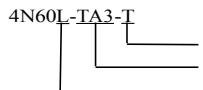
SYMBOL



ORDERING INFORMATION

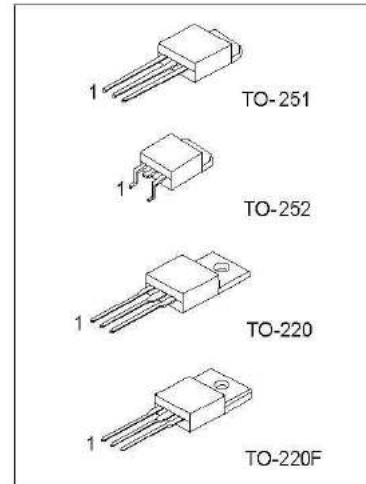
Order Number		Package	Pin Assignment			Packing
Normal	Lead Free Plating		1	2	3	
4N60-TA3-T	4N60L-TA3-T	TO-220	G	D	S	Tube
4N60-TF3-T	4N60L-TF3-T	TO-220F	G	D	S	Tube
4N60-TM3-T	4N60L-TM3-T	TO-251	G	D	S	Tube
4N60-TN3-R	4N60L-TN3-R	TO-252	G	D	S	Tape Reel
4N60-TN3-T	4N60L-TN3-T	TO-252	G	D	S	Tube

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

 <p>(1) Packing Type (2) Package Type (3) Lead Plating</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}	± 30	V
Avalanche Current(Note 2)	I_{AP}	4.4	A
Drain Currentet	I_D	$T_c=25^\circ C$	4.0
		Continuous	
Drain Current Pulsed(Note 2)	I_{DP}	16	A



*Pb-free plating product number: 4N60

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/ $^\circ\text{C}$
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55~+150	$^\circ\text{C}$

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	θ_{JA}	83	$^\circ\text{C/W}$
	TO-252		83	
	TO-220		62.5	
	TO-220F		62.5	
Thermal Resistance Junction-Case	TO-251	θ_{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
Off Characteristics						
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	μA
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/ $^\circ\text{C}$
On Characteristics						
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	$R_{DS(ON)}$	$V_{DS}=10V, I_D=2.0A$			2.5	Ω
Forward Transconductance	g_{FS}	$V_{DS}=100V, I_D=2.4A$ (Note 1)	2.9			S
Dynamic Characteristics						
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.)

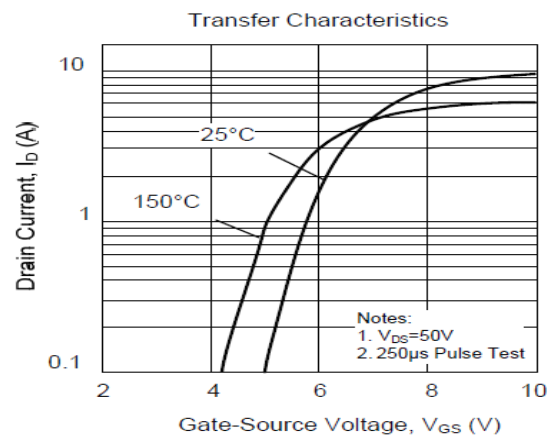
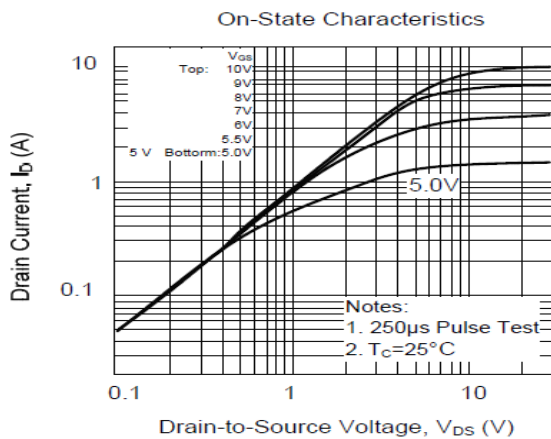
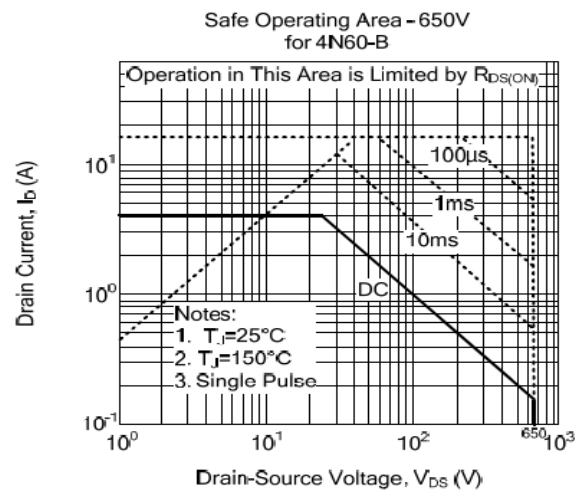
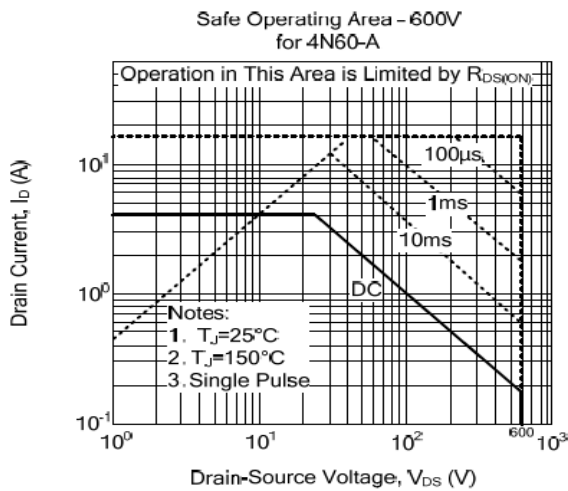
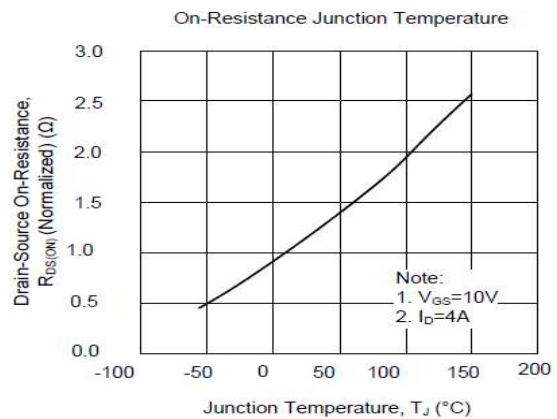
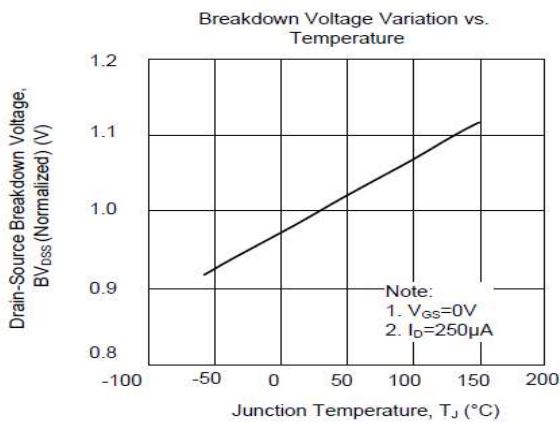
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Switching Characteristics						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=300V, I_D=4.0A, R_G=25\Omega$ (Note 1, 2)		13	35	ns
Rise Time	t_R			45	100	ns
Turn-Off Delay Time	$t_{D(OFF)}$			25	60	ns
Fall Time	t_F			35	80	ns
Total Gate Charge	Q_G	$V_{DS}=480V, V_{GS}=10V, I_D=4.0A$		15	20	nC

Gate-Source Charge	Q_{GS}	(Note1,2)	3.4	nC
Gate-Drain Charge	Q_{GD}		7.1	nC
Drain-Source Diode Characteristics				
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	μC

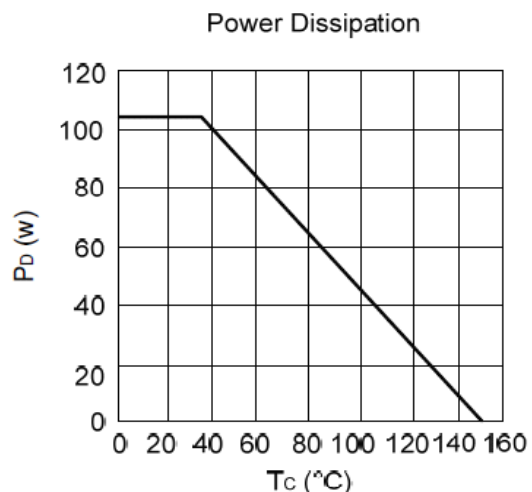
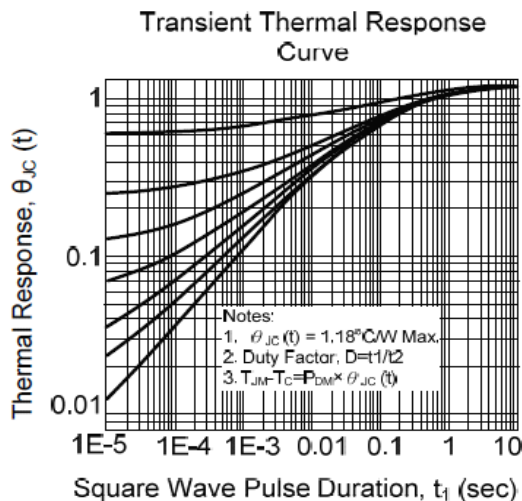
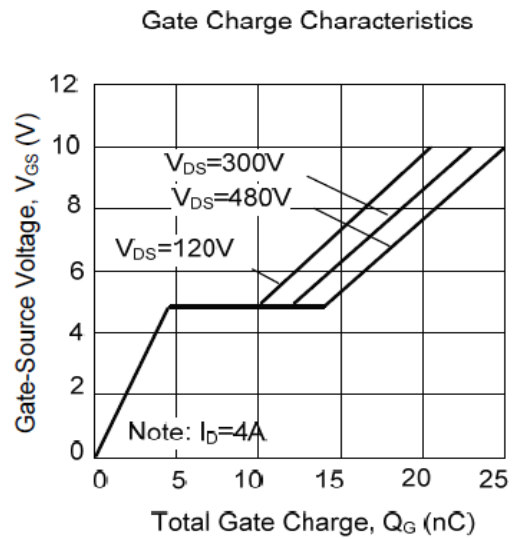
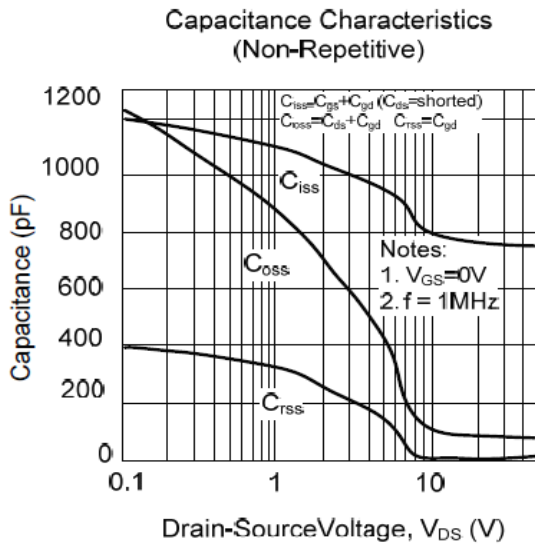
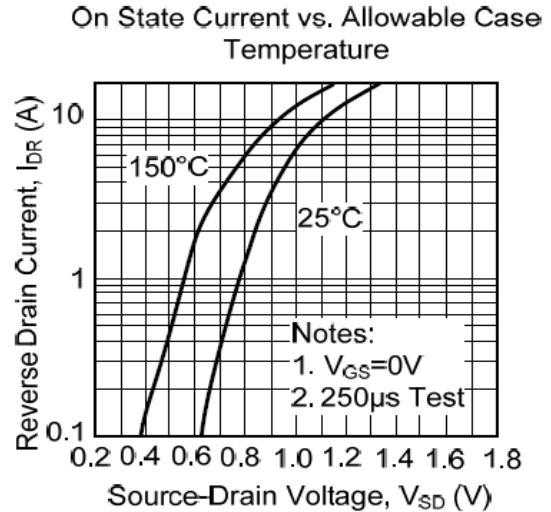
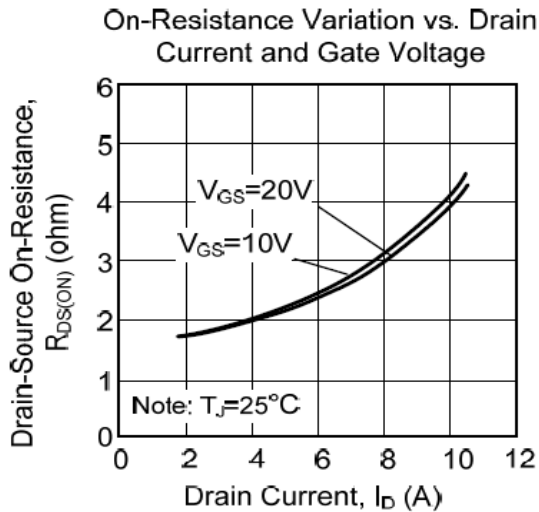
Note:1. Pulse Test: Pulse Width $\leq 300 \mu s$, Duty Cycle $\leq 2\%$

2. Essentially Independent of Operating Temperature

TYPICAL CHARACTERISTICS



■ TYPICAL PERFORMANCE CHARACTERISTICS(cont)



■ **TYPICAL CHARACTERISTICS(cont)**

Maximum Drain Current vs. Case Temperature

