

**MOSFETs Silicon 500V N-Channel MOS**
**■ Applications**

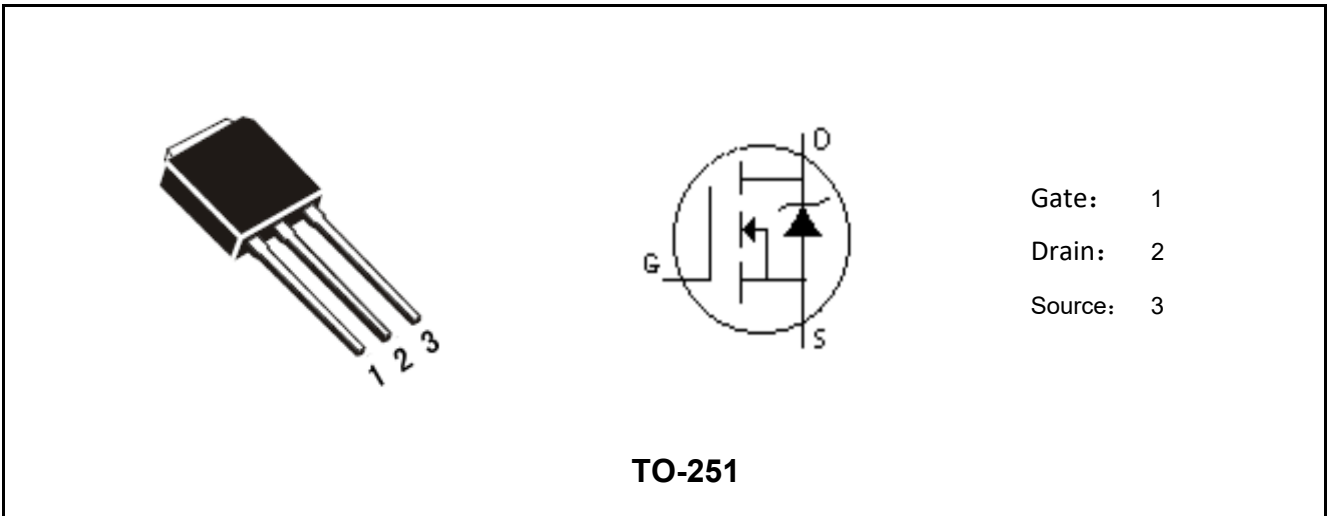
- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)

**■ Features**

- Low  $R_{DS(ON)}$
- Ultra Low Gate Charge
- RoHS Compliant
- 100% UIS and RG Tested

**■ Product Summary**

$V_{DS}$	500	V
$I_D$	5	A
$R_{DS(ON) ,Typ@10V}$	1.3	$\Omega$
$Q_g$	26	nC



Marking	Package	Packaging	Min. package quantity
MJIRF5N50S	TO-251	Tube	2400





### ■ Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DS}$	500	V
Gate-Source Voltage	$V_{GS}$	±30	V
Continuous Drain Current (Note 1)	$I_D$	5	A
Drain Current-Pulsed (Note 1)	$I_{DM}$	20	A
Total Dissipation	$P_D$	76	W
Junction Temperature	$T_j$	150	°C
Storage Temperature	$T_{stg}$	-55-150	°C
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	300	mJ

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

### ■ Thermal Characteristics

Parameter	Symbol	Max	Unit
Maximum Junction-to-Case	$R_{\theta JC}$	1.65	°C/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	60	°C/W

Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2:  $V_{DD}=50V$ ,  $T_{ch}=25^\circ C$ (initial),  $I_{AS}=5A$ ,  $R_g=25\Omega$ .

Note: This transistor is sensitive to electrostatic discharge and should be handled with care.





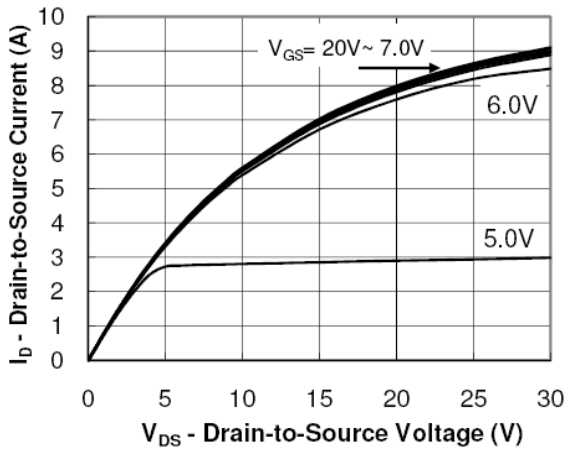
### ■ Electrical Characteristics (Tc=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	500	-	-	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=500V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	3	4	V
Drain-Source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.5A$	-	1.3	1.5	$\Omega$
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$	-	550	-	pF
Output Capacitance	$C_{oss}$		-	58	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	5	-	pF
Gate Resistance	$R_g$	$V_{DS}=0V, V_{GS}=0V,$ $f=1.0MHz$	-	3	-	$\Omega$
<b>Switching Parameters</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=300V, I_D=5A,$ $V_{GS}=10V, R_G=25\Omega$	-	18	-	ns
Turn-On Rise Time	$t_r$		-	25	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	23	-	ns
Turn-Off Rise Time	$t_f$		-	25	-	ns
Total Gate Charge	$Q_g$	$V_{DS}=480V, I_D=5A,$ $V_{GS}=10V$	-	26	-	nC
Gate-Source Charge	$Q_{gs}$		-	4	-	nC
Gate-Drain Charge	$Q_{gd}$		-	15	-	nC
<b>Source-Drain Characteristics</b>						
Max. Diode Forward Current	$I_S$		-	-	5	A
Max. Pulsed Forward Current	$I_{SM}$		-	-	20	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=5A$	-	0.92	1.5	V
Reverse Recovery Time	$t_{rr}$	$V_R=400V, I_F=5A,$ $di/dt=100A/\mu s$	-	290	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	1.5	-	$\mu C$

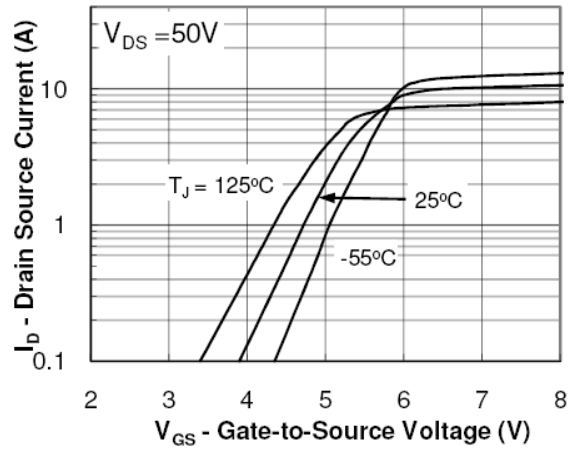




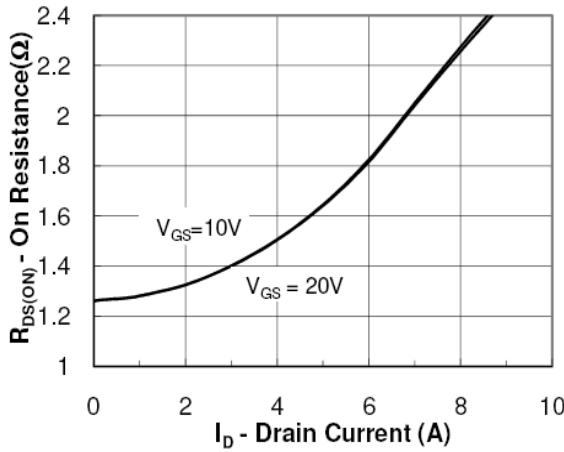
■ Characteristics Curves



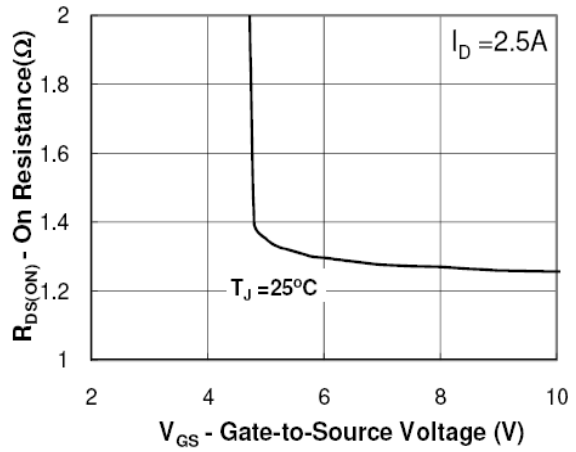
Output Characteristics



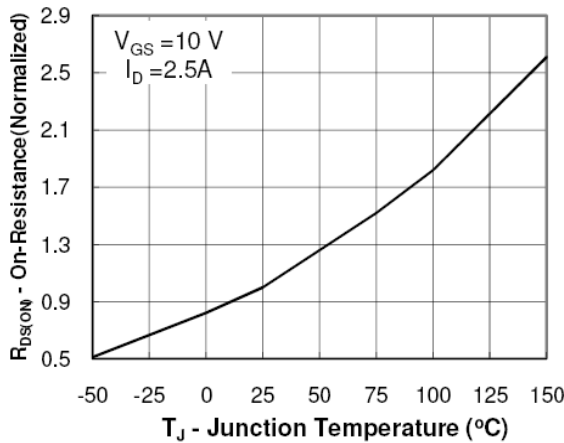
Transfer Characteristics



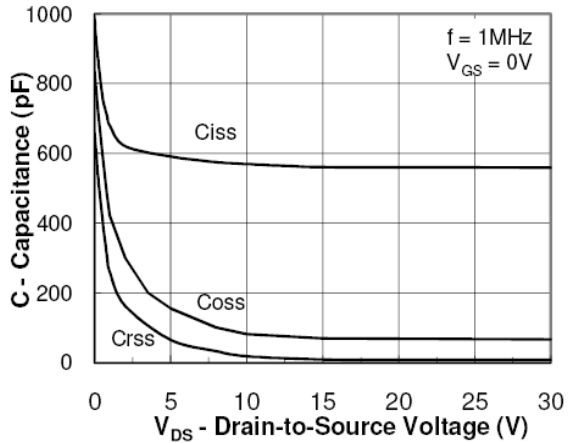
On Resistance Vs Drain Current



On Resistance Vs Gate Source Voltage

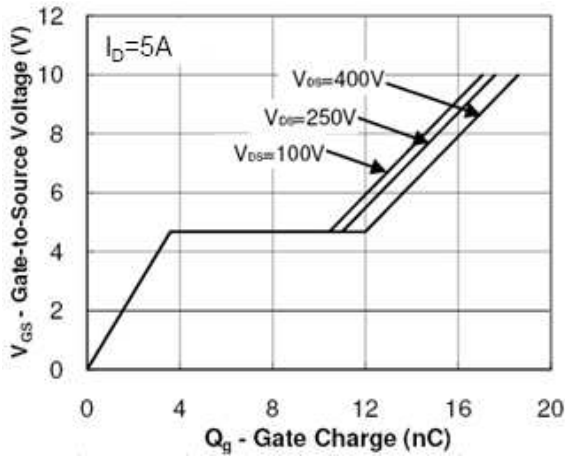


Rdson-JunctionTemperature

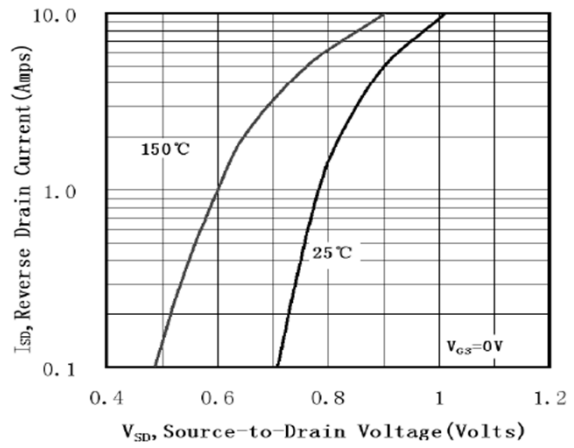


Capacitance

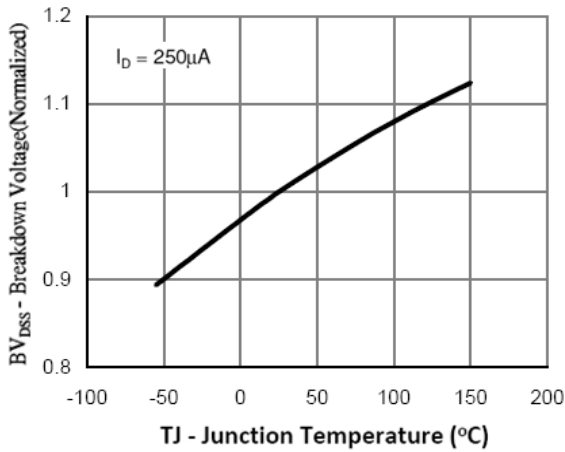




Gate Charge Waveform



Source-Drain Diode Forward Voltage



Breakdown Voltage Vs Junction Temperature

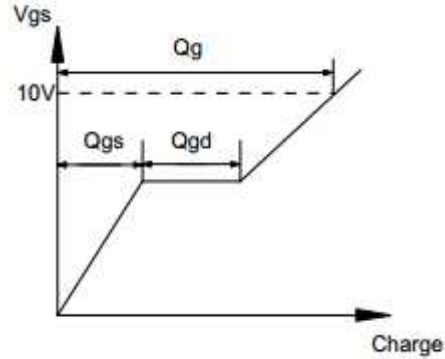
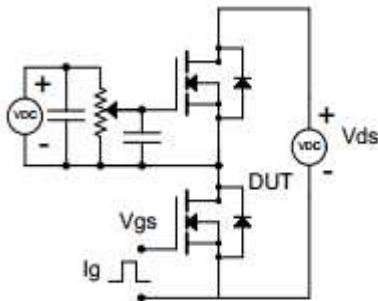
Note : The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



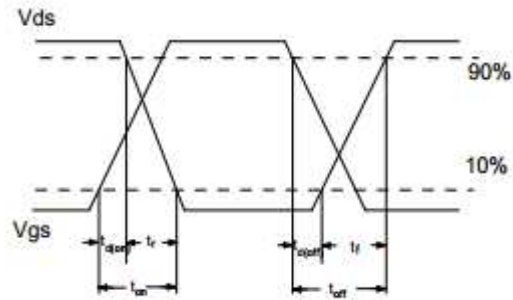
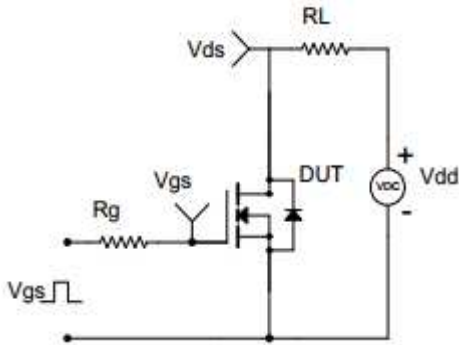


■ Test Circuit & Waveform

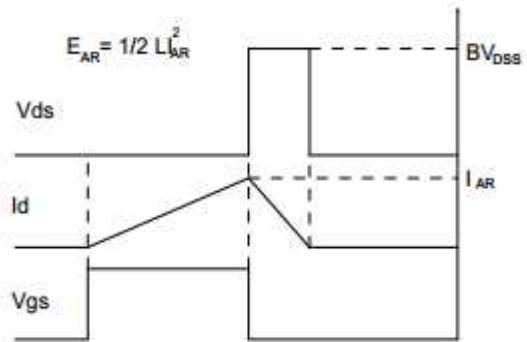
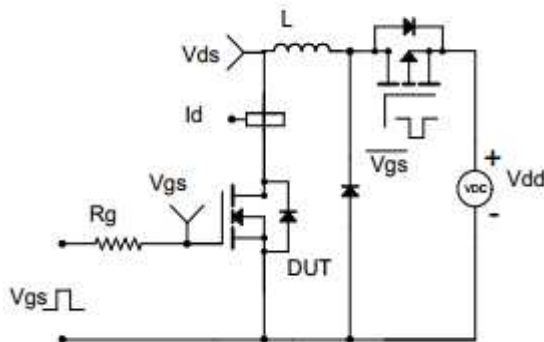
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform





■ TO-251 Package Dimensions

Unit: mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	2.10		2.50	D1	5.10		5.50
A1	0.95		1.30	E	5.80		6.30
B	0.80		1.25	e	2.25	2.30	2.35
b	0.50		0.80	L	7.70		8.50
b1	0.70		0.90	L1	1.45		1.95
C	0.45		0.60	R		0.30	
C1	0.45		0.60				
D	6.35		6.75				

