

MOSFETs Silicon 500V N-Channel MOS
■ Applications

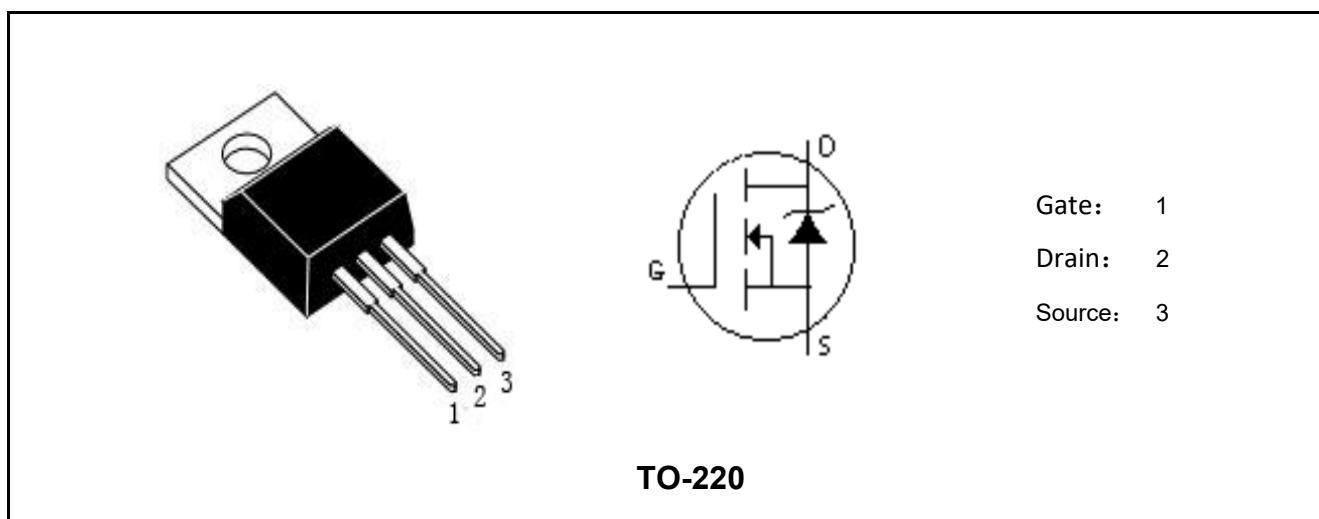
- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)

■ 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	Ω
Q_g	26	nC



Marking	Package	Packaging	Min. package quantity
MCIRF5N50S	TO-220	Tube	1000



■ 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	78	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	$R_{\theta JC}$	1.6	°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.





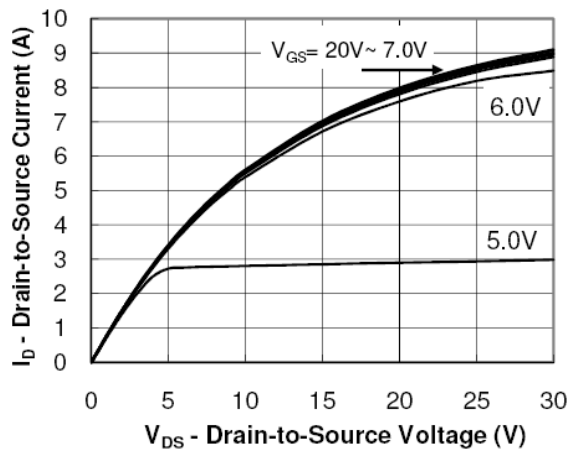
■ Electrical Characteristics (Tc=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	500	-	-	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =500V, V _{GS} =0V	-	-	1	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	2	3	4	V
Drain-Source On Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =2.5A	-	1.3	1.5	Ω
Dynamic Characteristics						
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	-	Ω
Switching Paramters						
Turn-On Delay Time	t _{d(on)}	V _{DS} =300V, I _D =5A, V _{GS} =10V, R _G =25Ω	-	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
Source-Drain Characteristics						
Max. Diode Forward Cuurent	I _S		-	-	5	A
Max. Pulsed Forward Cuurent	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/us	-	290	-	ns
Reverse Recovery Charge	Q _{rr}		-	1.5	-	μC

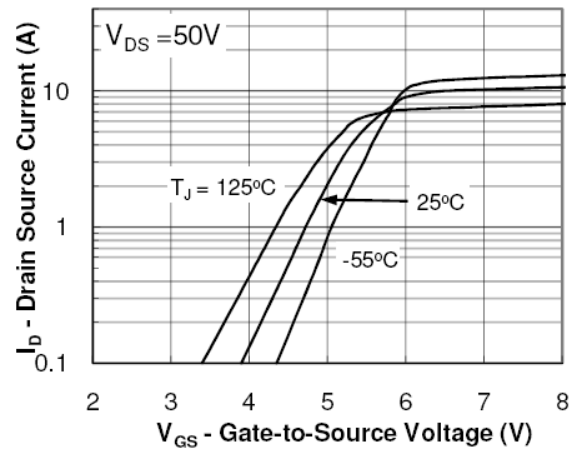




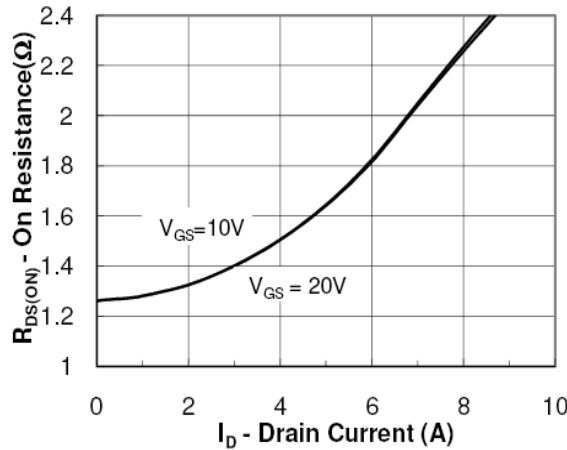
■ Characteristics Curves



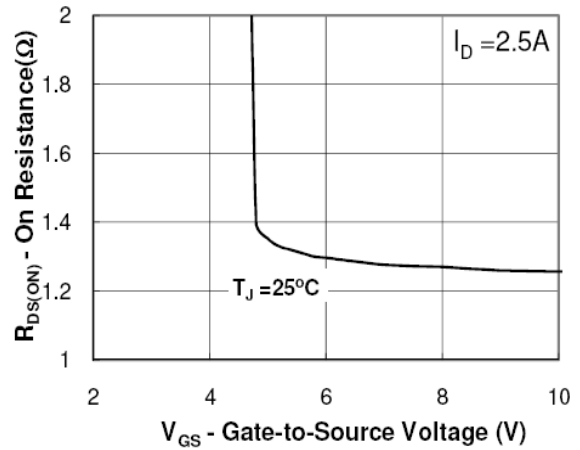
Output Characteristics



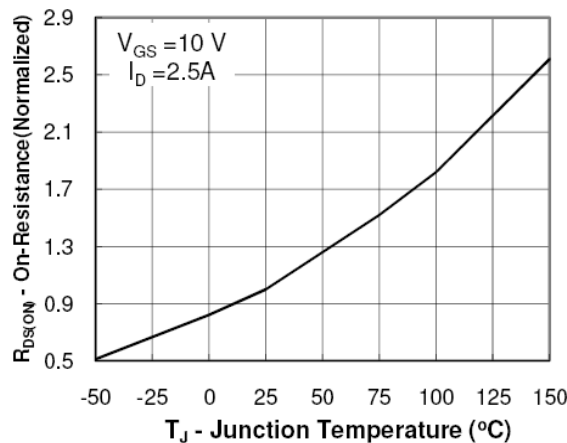
Transfer Characteristics



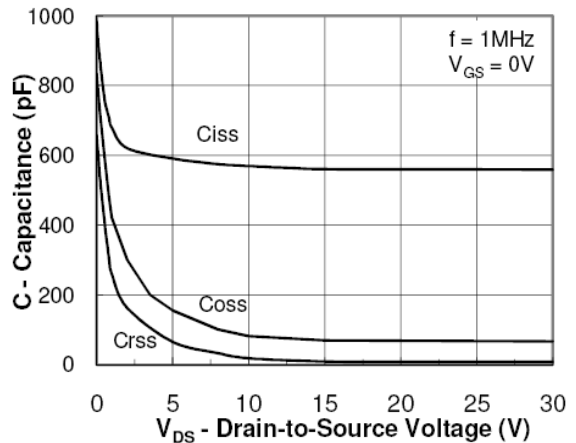
On Resistance Vs Drain Current



On Resistance Vs Gate Source Voltage

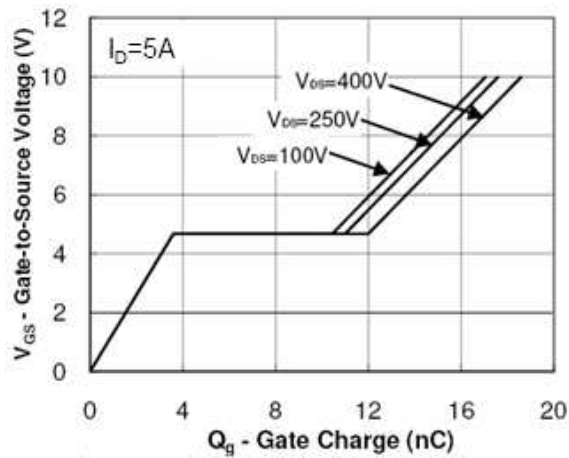
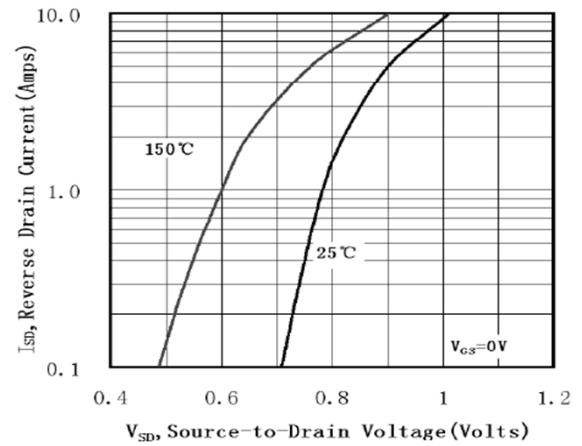
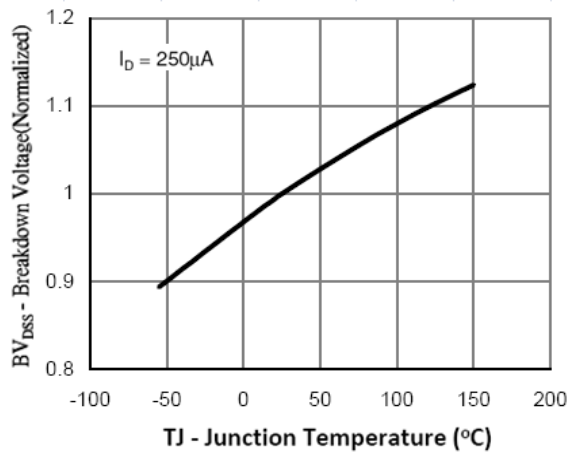


Rdson-JunctionTemperature



Capacitance



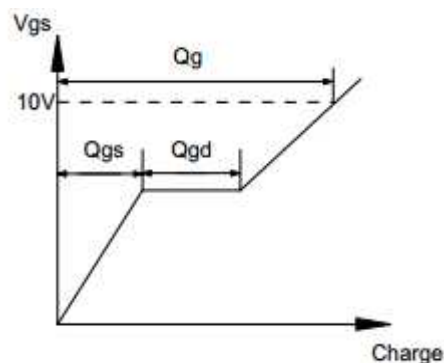
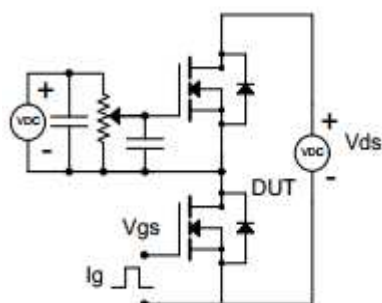
**Gate Charge Waveform****Source-Drain Diode Forward Voltage****Breakdown Voltage Vs Junction Temperature**

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

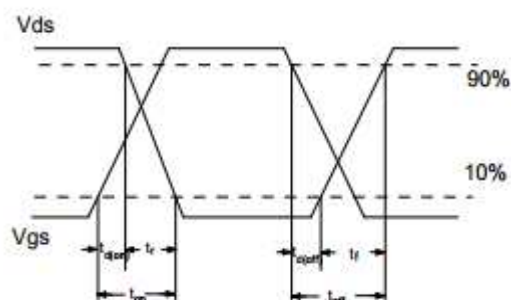
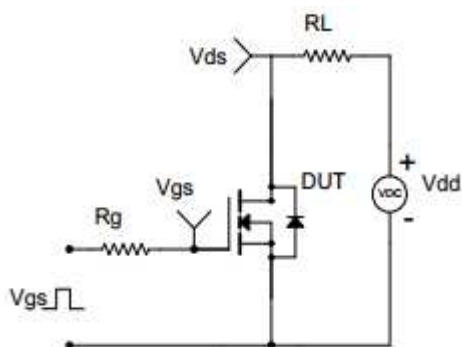


■ Test Circuit & Waveform

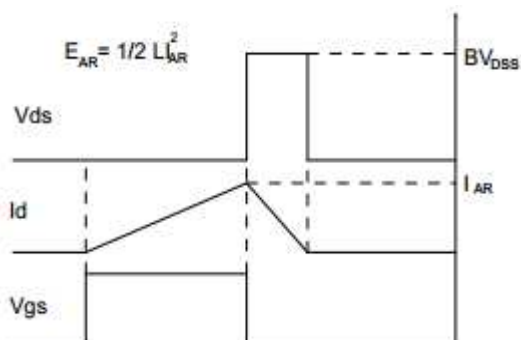
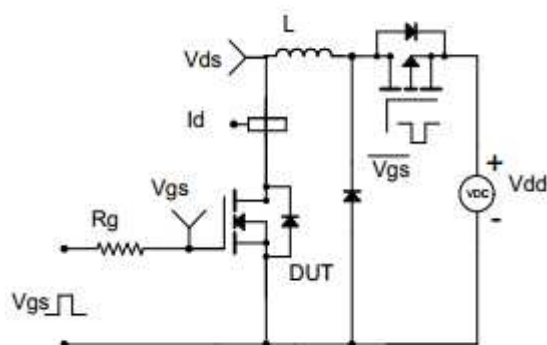
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform



■ TO-220 Package Dimensions

Unit: mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	4.00		4.80	e	2.44	2.54	2.64
B	1.20		1.40	F	1.10		1.40
B1	1.00		1.40	L	12.50		14.50
b1	0.75		0.95	L1	3.00	3.50	4.00
c	0.40		0.55	ΦP	3.70	3.80	3.90
D	15.00		16.50	Q	2.50		3.00
D1	5.90		6.90	Q1	2.00		2.90
E	9.90		10.70	Y	8.02	8.12	8.22

