MOSFETs Silicon 500V N-Channel MOS

■ Applications

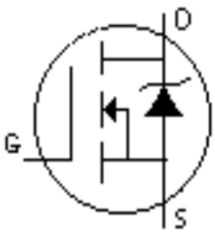
- PWM Inverters
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply（UPS）

■ Features

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

■ Product Summary

V_{DS}	500	V
I_D	50	A
$R_{DS(ON)\ ,Typ}$@10V	0.087	Ω
Q_g	137	nC



Gate： 1

Drain： 2

Source： 3

TO-247L

Marking	Package	Packaging	Min. package quantity
MSLIRF50N50	TO-247L	Tube	450

■ Absolute Maximum Ratings（Tc=25℃ 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)	TC=25℃	I_D	50	A
	TC=100℃		25	A
Drain Current-Pulsed (Note 1)		I_{DM}	160	A
Total Dissipation		P_D	417	W
Junction Temperature		T_j	150	℃
Storage Temperature		T_{stg}	-55-150	℃
Single Pulse Avalanche Energy (Note 2)		E_{AS}	5450	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	$R_{\theta JC}$	0.3	℃/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	40	℃/W

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

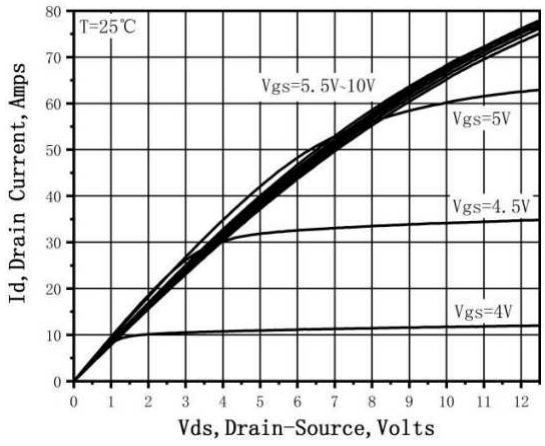
Note 2：V_{DD}=50V, T_{ch}= 25℃(initial), L=10mH, R_g=25Ω.

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

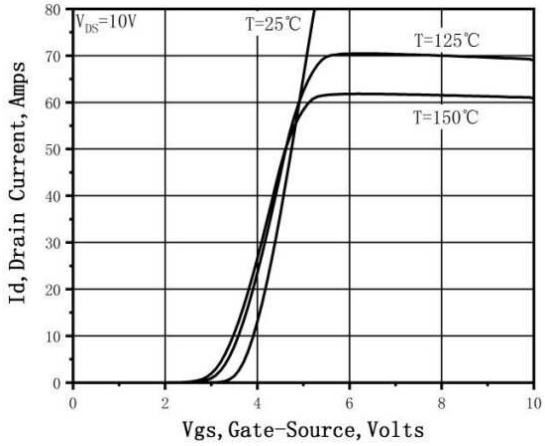
■ Electrical Characteristics（Tc=25℃ unless otherwise noted)

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	2.7	4	V
Drain-Source On Resistance	$R_{DS(ON)}$	V_{GS}=10V,I_D=25A	-	0.087	0.1	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1.0MHz	-	8490	-	pF
Output Capacitance	C_{oss}		-	720	-	pF
Reverse Transfer Capacitance	C_{rss}		-	40	-	pF
Gate Resistance	R_g	V_{DS}=0V,V_{GS}=0V, f=1.0MHz	-	1.3	-	Ω
Switching Paramters						
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=250V,I_D=25A, V_{GS}=10V,R_G=25Ω	-	25	-	ns
Turn-On Rise Time	t_r		-	170	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	50	-	ns
Turn-Off Fall Time	t_f		-	70	-	ns
Total Gate Charge	Q_g	V_{DS}=400V,I_D=25A, V_{GS}=10V	-	137	-	nC
Gate-Source Charge	Q_{gs}		-	14	-	nC
Gate-Drain Charge	Q_{gd}		-	26	-	nC
Source-Drain Characteristics						
Max. Diode Forward Cuurent	I_S		-	-	50	A
Max. Pulsed Forward Cuurent	I_{SM}		-	-	160	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=25A	-	0.9	1.5	V
Reverse Recovery Time	t_{rr}	V_R=400V,I_F=30A, di/dt=100A/us	-	470	-	ns
Reverse Recovery Charge	Q_{rr}		-	7.7	-	μC

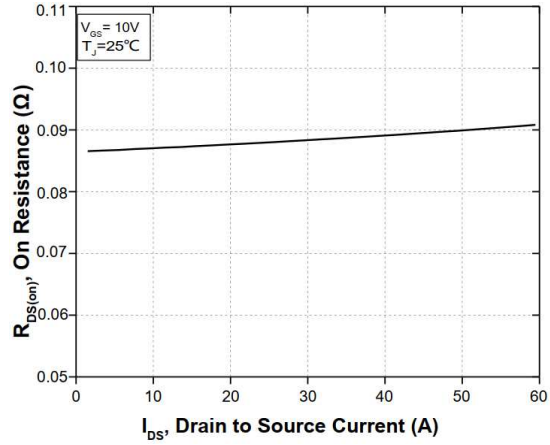
■ Characteristics Curves



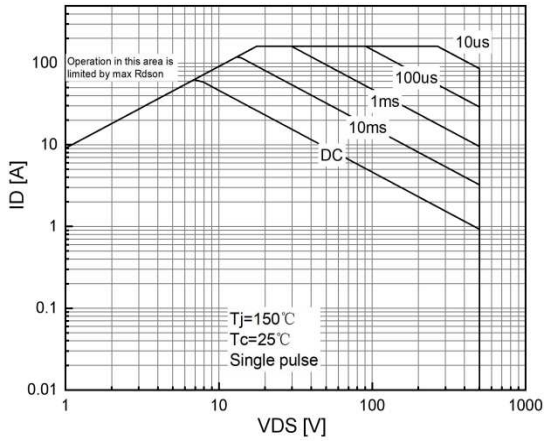
Output Characteritsics



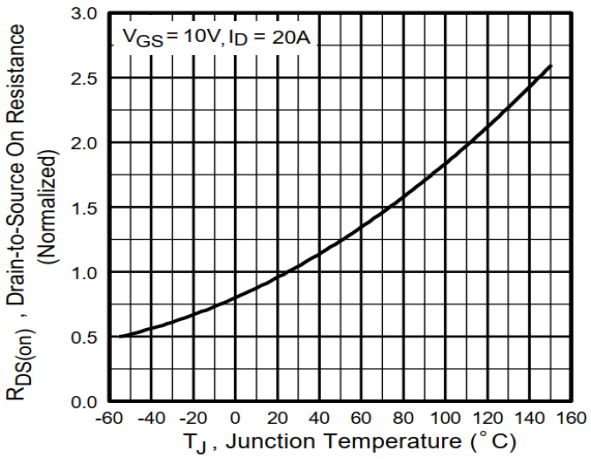
Transfer Characteritsics



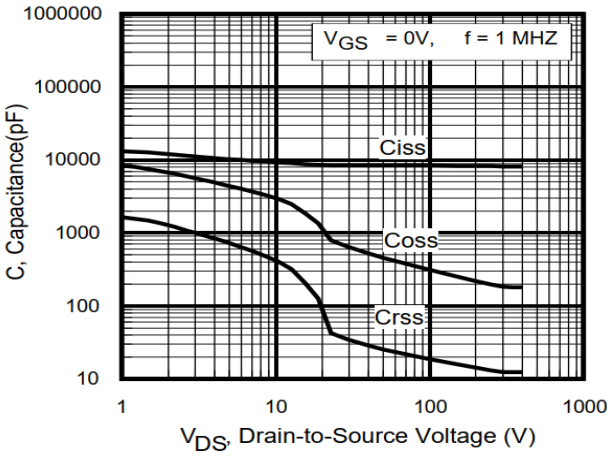
On Resistance Vs Drain Current



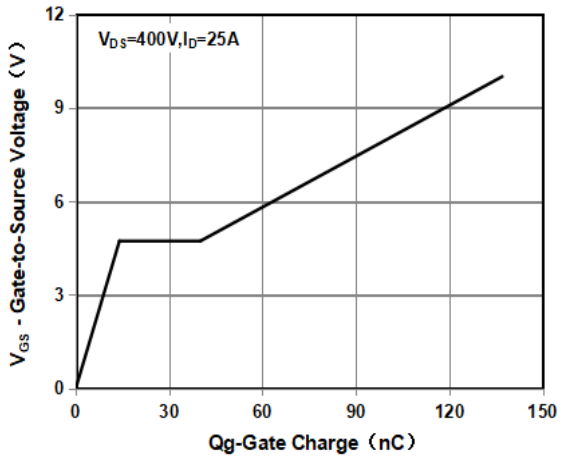
Safe Operating Area



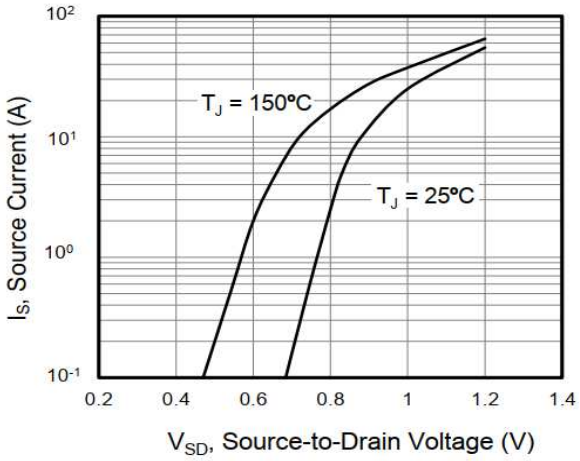
Rdson-JunctionTemperature



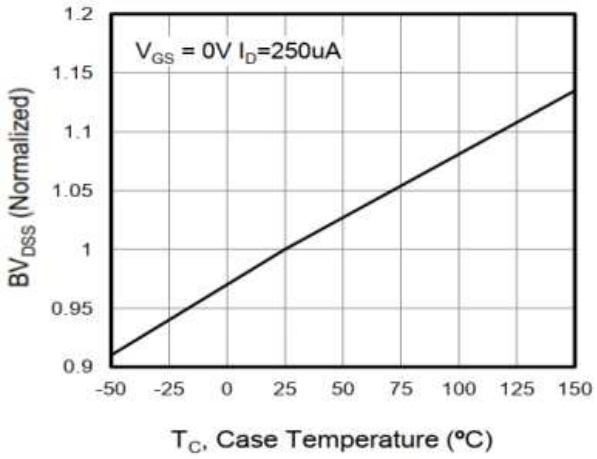
Capacitance



Gate Charge Waveform



Source-Drain Diode Forward Voltage

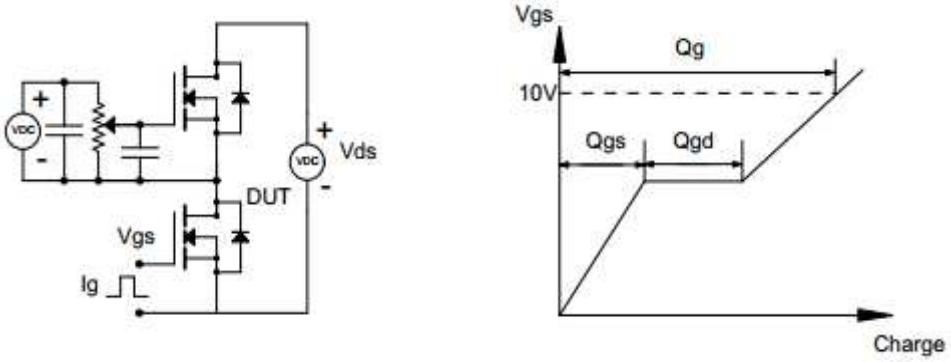


Breakdown Voltage Vs Junction Temperature

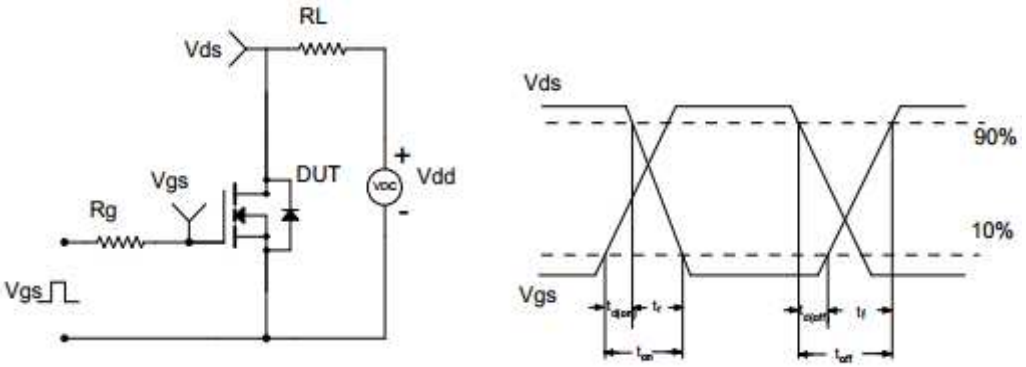
Note： The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

■ Test Circuit & Waveform

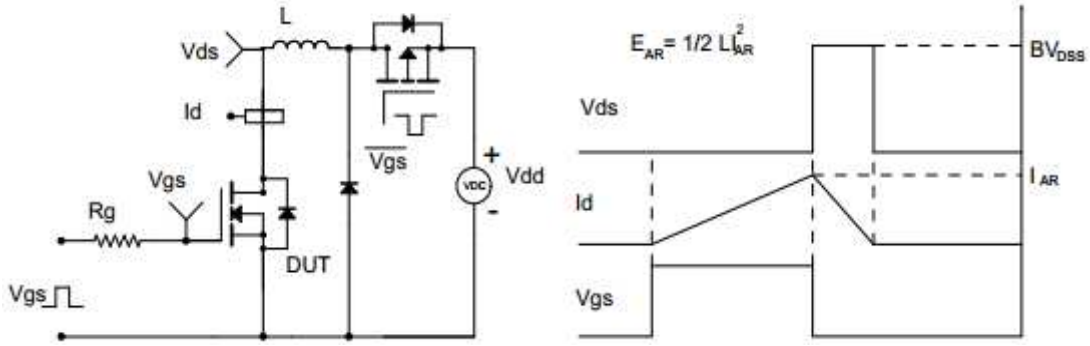
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform



■ TO-247L Package Dimensions

Unit：mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	4.80		5.20	E1	13.00		13.60
A1	2.20	2.40	2.60	E2	5.00		5.50
A2	1.85		2.15	E3	1.90		2.60
b	1.07		1.33	e		5.44	
b2	1.90		2.16	L	19.30		19.90
b4	2.90		3.20	L1	3.75	3.95	4.15
c	0.52		0.68	ΦP	3.40		3.80
D	20.70		21.30	ΦP1	7.00		7.40
D1	16.15		16.95	S	6.04	6.15	6.30
E	15.50		16.10