

MOSFETs Silicon 500V N-Channel MOS
■ Applications

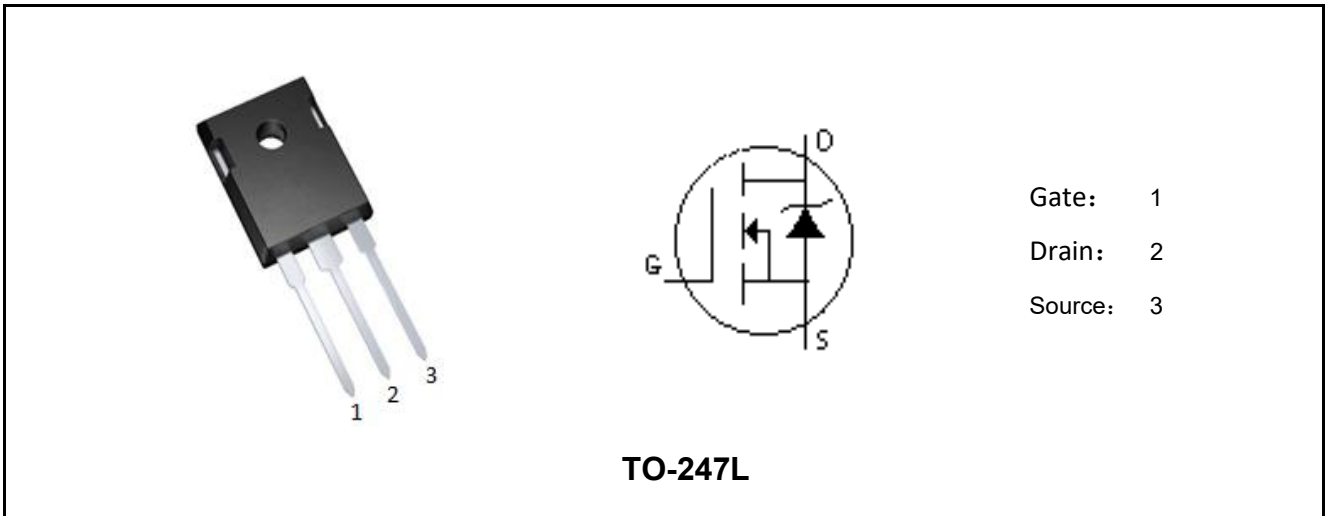
- PWM Inverters
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)

■ 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



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



■ 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)	TC=25°C	I_D	50	A
	TC=100°C		25	A
Drain Current-Pulsed (Note 1)		I_{DM}	160	A
Total Dissipation		P_D	417	W
Junction Temperature		T_j	150	°C
Storage Temperature		T_{stg}	-55-150	°C
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	°C/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	40	°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), $L=10mH$, $R_g=25\Omega$.

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

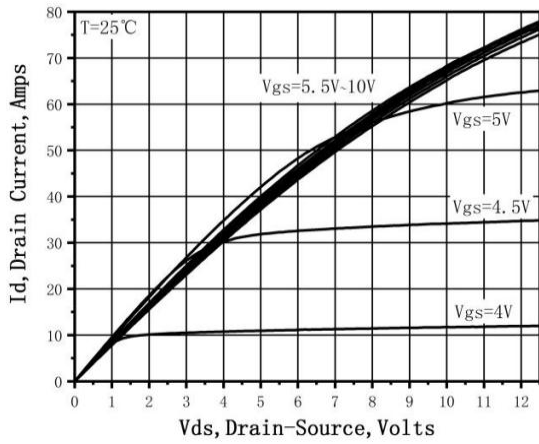


■ Electrical Characteristics (Tc=25°C unless otherwise noted)

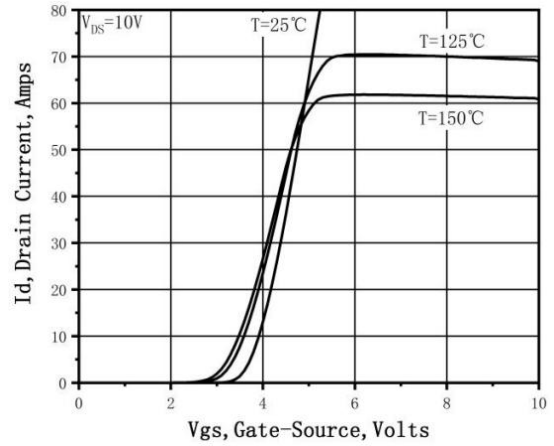
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	500	-	-	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=500V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	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 Parameters						
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=250V, I_D=25A,$ $V_{GS}=10V, R_G=25\Omega$	-	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 Current	I_S		-	-	50	A
Max. Pulsed Forward Current	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}	$V_R=400V, I_F=30A,$ $di/dt=100A/\mu s$	-	470	-	ns
Reverse Recovery Charge	Q_{rr}		-	7.7	-	μC



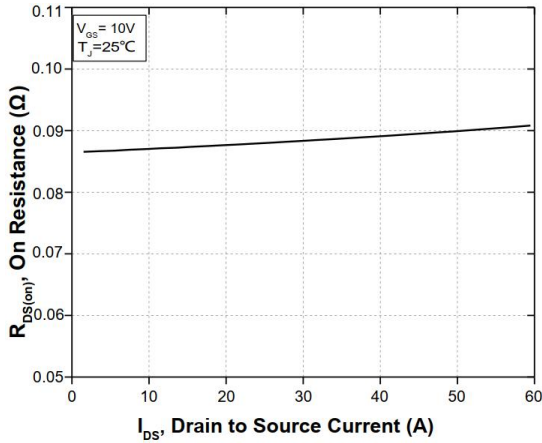
■ Characteristics Curves



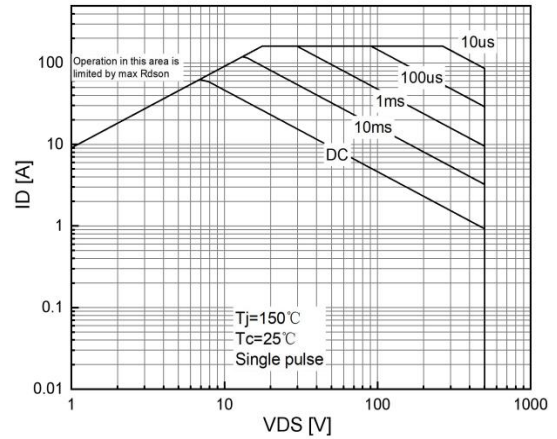
Output Characteristics



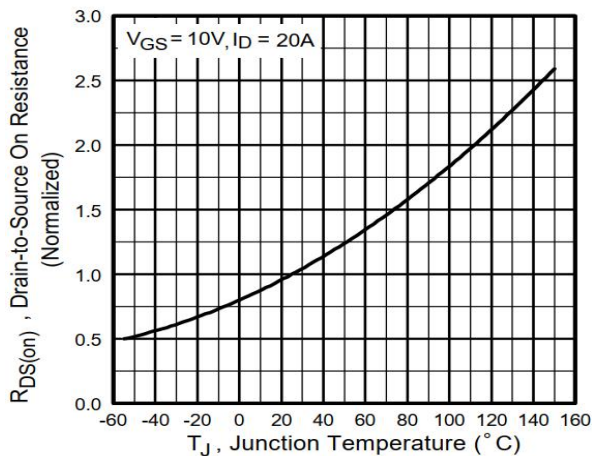
Transfer Characteristics



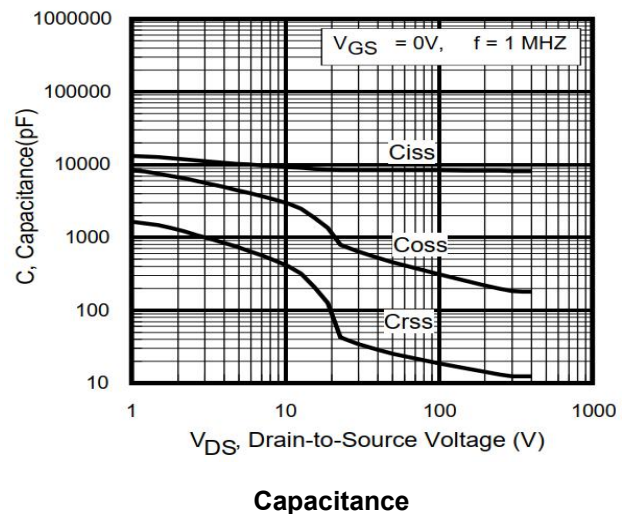
On Resistance Vs Drain Current



Safe Operating Area

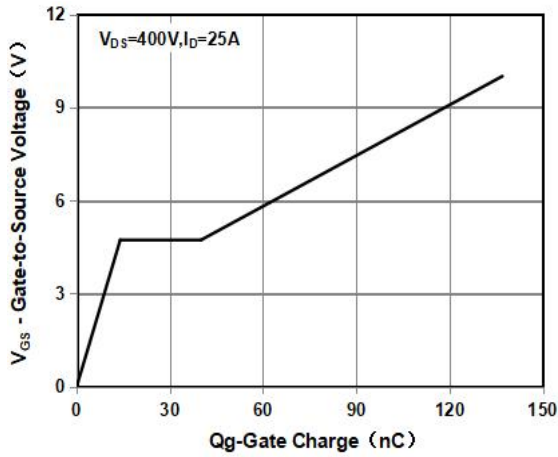


Rdson-Junction Temperature

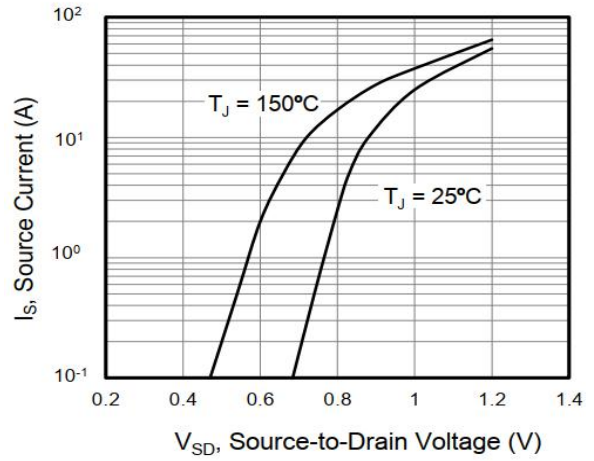


Capacitance

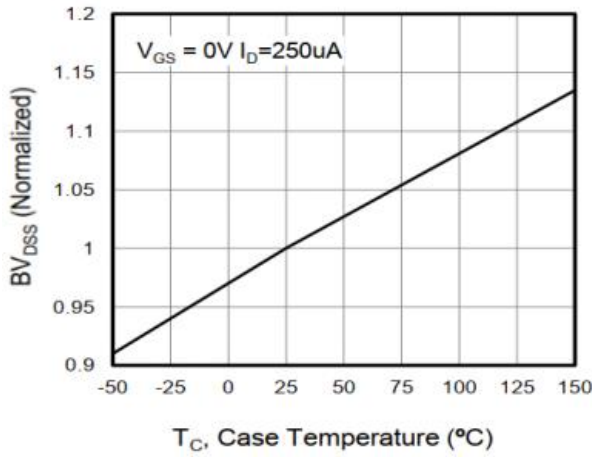




Gate Charge Waveform



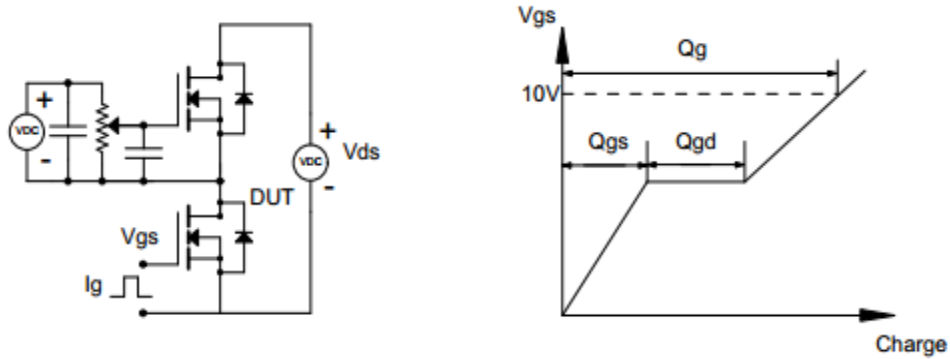
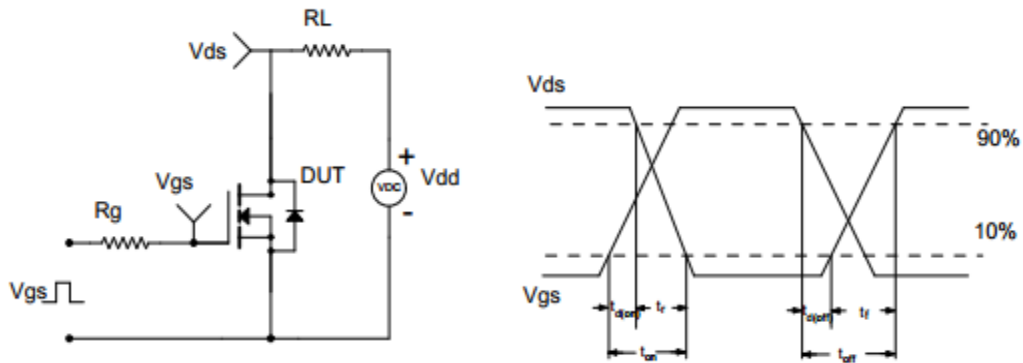
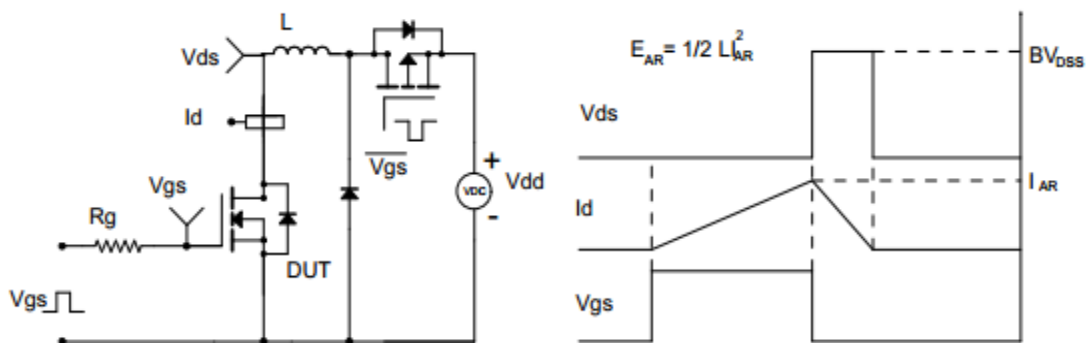
Source-Drain Diode Forward Voltage



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				

