

MOSFETs Silicon 650V N-Channel MOS
■ Applications

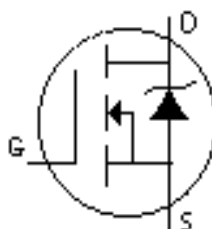
- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)
- HB or AHB or LLC half bridge andfull bridge topologies.

■ Features

- Multi-Epi process SJ-FET
- Low $R_{DS(ON)}$
- Ultra Low Gate Charge
- RoHS and Halogen-Free Compliant
- 100% UIS and RG Tested
- Fast-Recovery body diode

■ Product Summary

$V_{DS} @ T_{j,max}$	700	V
I_D	60	A
$R_{DS(ON)}, Typ @ 10V$	43	mΩ
Q_g	110	nC



Gate: 1
Drain: 2
Source: 3

TO-247L

Marking	Package	Packaging	Min. package quantity
MSL048R65CFD3	TO-247L	Tube	450



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

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current Tc=25°C (Note 1)	I_D	60	A
Continuous Drain Current Tc=100°C (Note 1)		35	
Drain Current-Pulsed (Note 1)	I_{DM}	240	A
Total Dissipation	P_D	350	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	-55-150	°C
Single Pulse Avalanche Energy (Note 2)	E_{AS}	120	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	$R_{\theta JC}$	0.36	°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: $V_{DD}=100V$, $T_{ch}=25^{\circ}C$ (initial), $L=0.5mH$, $R_g=25\Omega$.

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

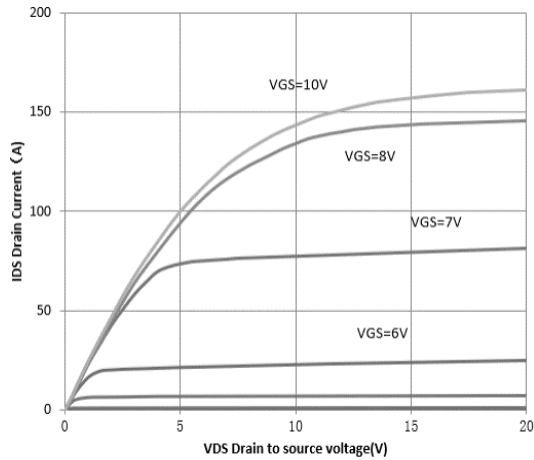


■ Electrical Characteristics (Tc=25°C unless otherwise noted)

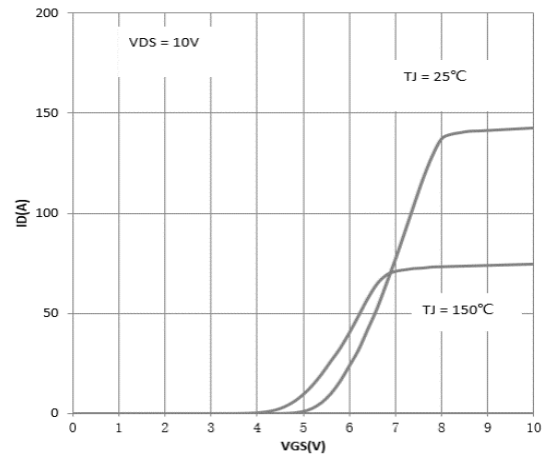
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
Static Parameters							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA		650	-	-	V
			Tj=150°C	700	-	-	
Drain-Source Leakage Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V		-	-	1	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V		-	-	±100	nA
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA		3	4	5	V
Drain-Source On Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =30A		-	43	48	mΩ
			Tj=150°C	-	100	-	
Dynamic Characteristics							
Input Capacitance	C _{iss}	V _{DS} =35V, V _{GS} =0V, f=1.0MHz		-	5300	-	pF
Output Capacitance	C _{oss}			-	230	-	pF
Reverse Transfer Capacitance	C _{rss}			-	17	-	pF
Gate Resistance	R _g	V _{DS} =0V, V _{GS} =0V, f=1.0MHz		-	3.2	-	Ω
Switching Paramters							
Turn-On Delay Time	t _{d(on)}	V _{DS} =400V, I _D =30A, V _{GS} =10V, R _G =1.8Ω		-	15	-	ns
Turn-On Rise Time	t _r			-	35	-	ns
Turn-Off Delay Time	t _{d(off)}			-	87	-	ns
Turn-Off Rise Time	t _f			-	6	-	ns
Total Gate Charge	Q _g	V _{DS} =400V, I _D =30A, V _{GS} =10V		-	110	-	nC
Gate-Source Charge	Q _{gs}			-	35	-	nC
Gate-Drain Charge	Q _{gd}			-	45	-	nC
Source-Drain Characteristics							
Max. Diode Forward Cuurent	I _S			-	-	60	A
Max. Pulsed Forward Cuurent	I _{SM}			-	-	240	A
Diode Forward Voltage	V _{sd}	V _{GS} =0V, I _S =30A		-	0.95	1.5	V
Reverse Recovery Time	t _{rr}	V _R =400V, I _F =30A, di/dt=100A/us		-	180	-	ns
Reverse Recovery Charge	Q _{rr}			-	1.3	-	μC



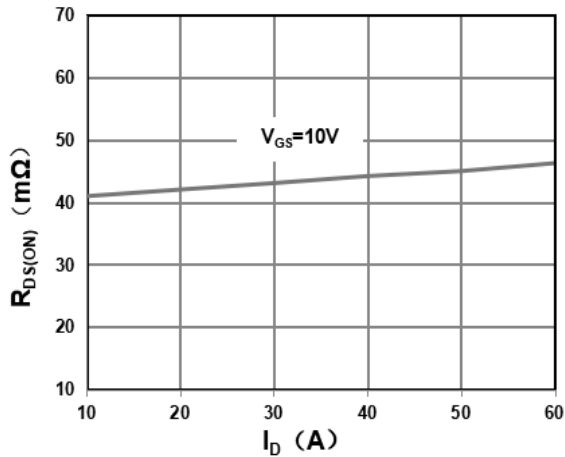
■ Characteristics Curves



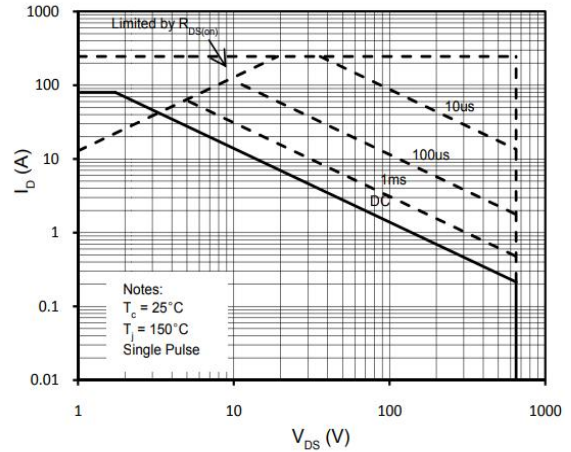
Output Characteristcs



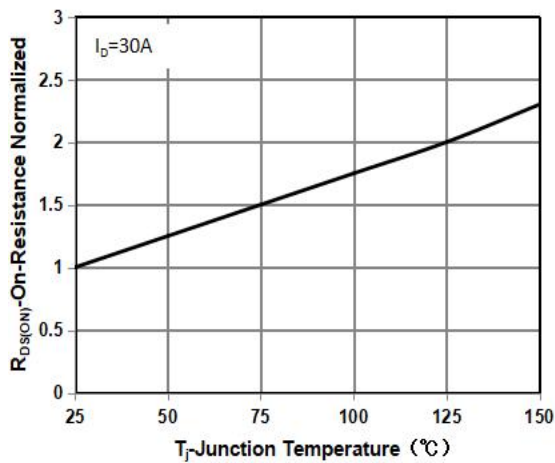
Transfer Characteristcs



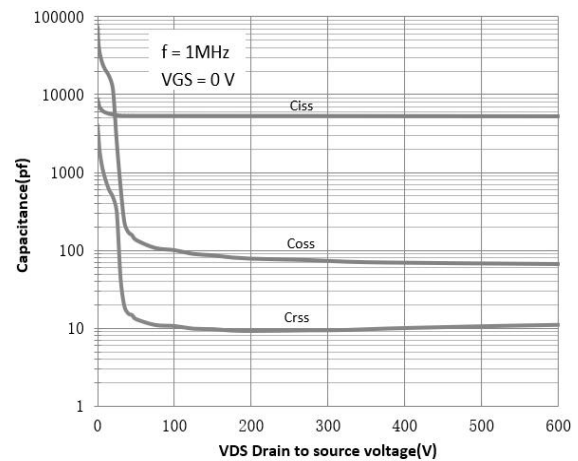
On Resistance Vs Drain Current



Maximum Safe Operating Area

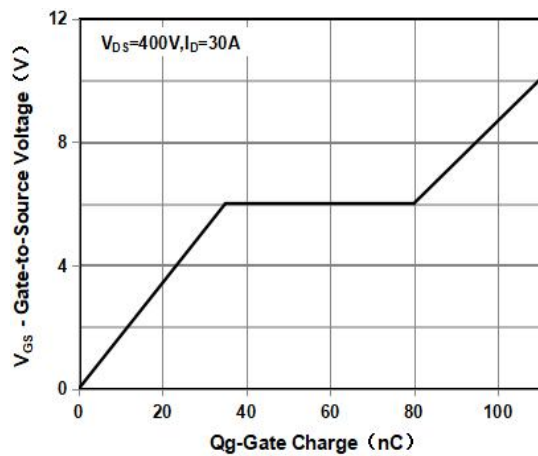


Rdson-JunctionTemperature

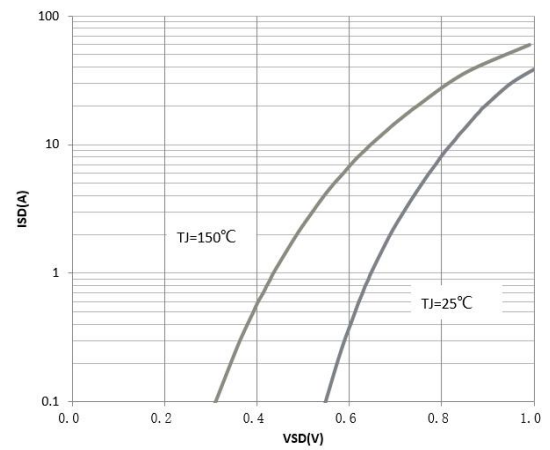


Capacitance

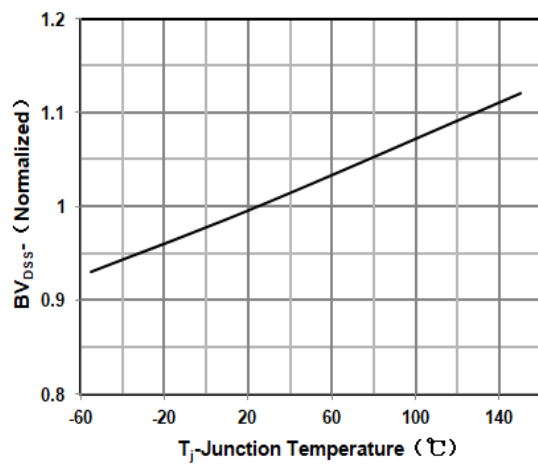




Gate Charge Waveform



Source-Drain Diode Forward Voltage



Breakdown Voltage Vs Junction Temperature

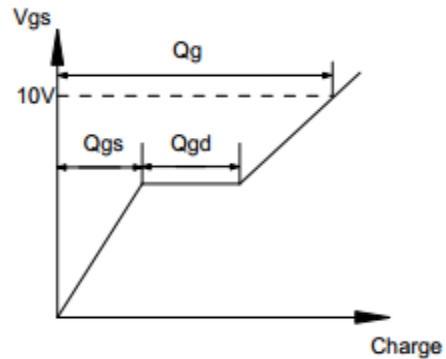
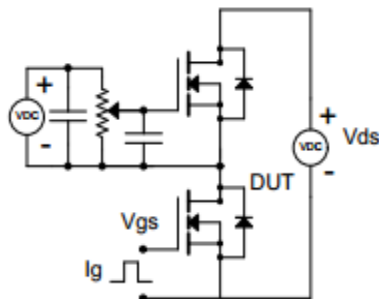
Note : The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



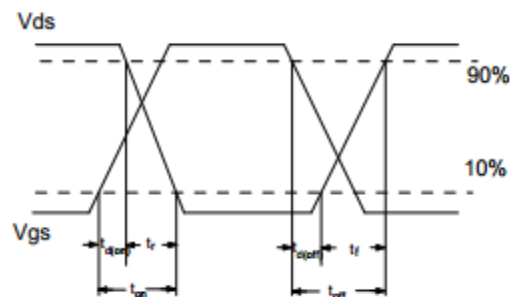
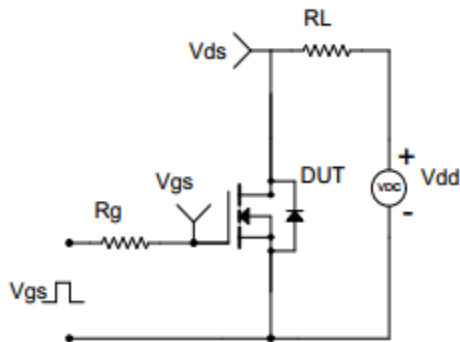


■ Test Circuit & Waveform

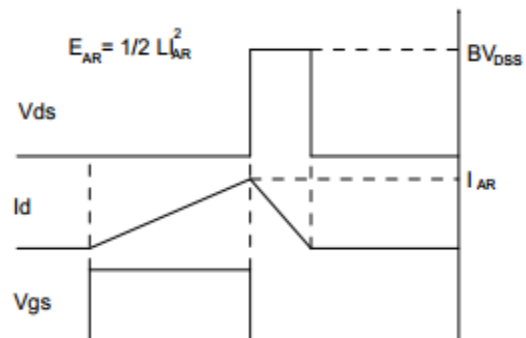
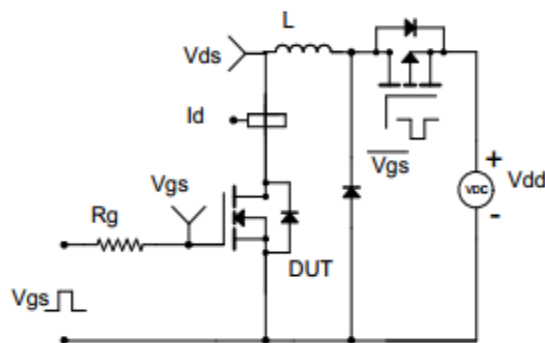
Gate Charge Test Circuit & Waveform



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				

