



Applications

- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power applications

Features

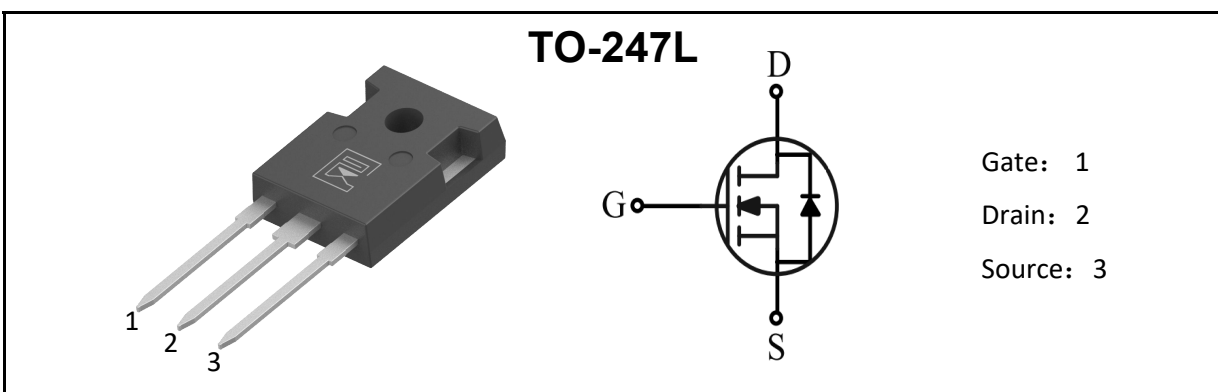
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Fast intrinsic diode with low reverse recovery (Qrr)

Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Product Summary

V_{DS}	650	V
I_D	50	A
$R_{DS(ON)}, Typ@18V$	40	mΩ
Q_g	41	nC



Package Marking and Ordering Information

Ordering code	Marking	Package	Packaging	Min. package quantity
MSL3C040R065	MSL3C040R065	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}	- 7/+20	V
Recommended operational values	V_{GSop}	- 5/+18	V
Continuous Drain Current Tc=25°C V _{GS} =18V (Note 1)	I_D	50	A
Continuous Drain Current Tc=100°C V _{GS} =18V (Note 1)		35	A
Drain Current-Pulsed (Note 1)	I_{DM}	120	A
Total Dissipation	P_D	150	W
Junction Temperature	T_j	175	°C
Storage Temperature	T_{stg}	- 55~175	°C
Single Pulse Avalanche Energy (Note 2)	E_{AS}	400	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 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	°C/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	40	°C/W

Note 1: Ensure that the channel temperature does not exceed 175°C.

Note 2: VDD=100V, Tch= 25°C(initial), L=0.5mH

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

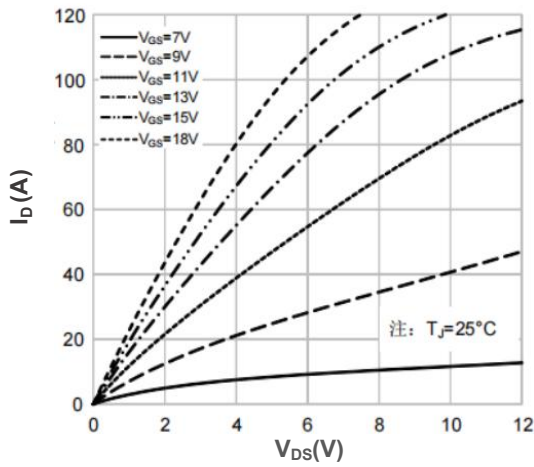


Electrical Characteristics (Tc=25°C unless otherwise noted)

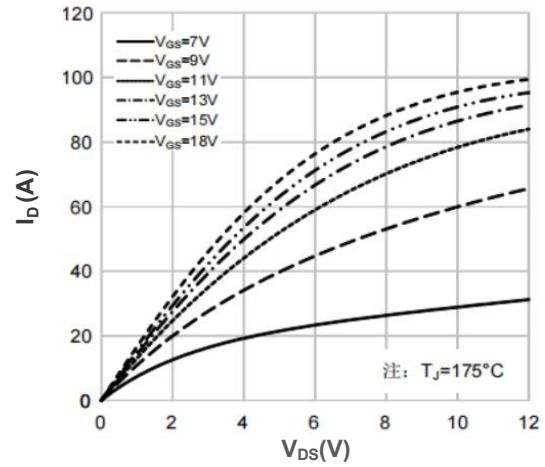
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650	-	-	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=18V, V_{DS}=0V$	-	-	100	nA
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_{DS}=5mA$	2.0	2.6	3.5	V
Drain-Source On Resistance	$R_{DS(ON)}$	$V_{GS}=15V, I_D=20A$	-	50	60	m Ω
		$T_j=175^\circ C$	-	58	-	
		$V_{GS}=18V, I_D=20A$	-	40	50	
		$T_j=175^\circ C$	-	54	-	
Transconductance	g_{fs}	$V_{GS}=20V, I_D=20A$	-	5.2	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$	-	1420	-	pF
Output Capacitance	C_{oss}		-	418	-	pF
Reverse Transfer Capacitance	C_{rss}		-	25	-	pF
Gate Resistance	R_g	$f=1.0MHz$ open drain	-	3.2	-	Ω
Switching Parameters						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=400V, I_D=30A,$ $V_{GS}=-5/18V, R_G=2.5\Omega$ $L=100\mu H$	-	10	-	ns
Turn-On Rise Time	t_r		-	26	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	27	-	ns
Turn-Off Fall Time	t_f		-	33	-	ns
Turn-On Switching Energy	E_{ON}		-	441	-	μJ
Turn-Off Switching Energy	E_{OFF}		-	178	-	
Total Gate Charge	Q_g	$V_{DD}=50V, I_D=10A,$ $V_{GS}=18V$	-	41	-	nC
Gate-Source Charge	Q_{gs}		-	11	-	nC
Gate-Drain Charge	Q_{gd}		-	13	-	nC
Source-Drain Characteristics						
Diode Forward Voltage	V_{sd}	$V_{GS}=-5V, I_S=20A$	-	5.4	-	V
Continuous Diode Forward Current	I_S	$T_C=25^\circ C$	-	-	50	A
Reverse Recovery Time	t_{rr}	$V_R=400V, I_F=30A,$ $di/dt=200A/\mu s$	-	35	-	ns
Reverse Recovery Charge	Q_{rr}		-	70	-	nC
Peak Reverse Recovery Current	I_{rrm}		-	4	-	A



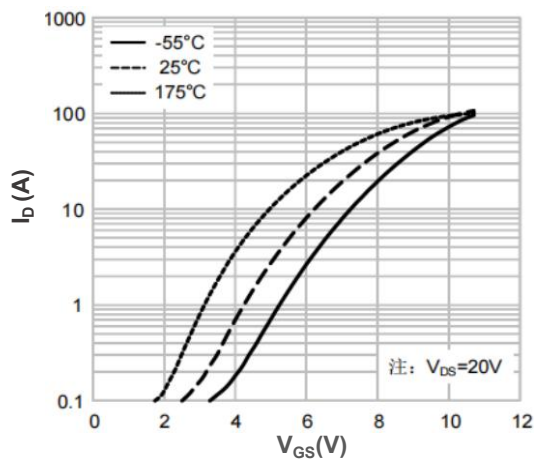
Characteristics Curves



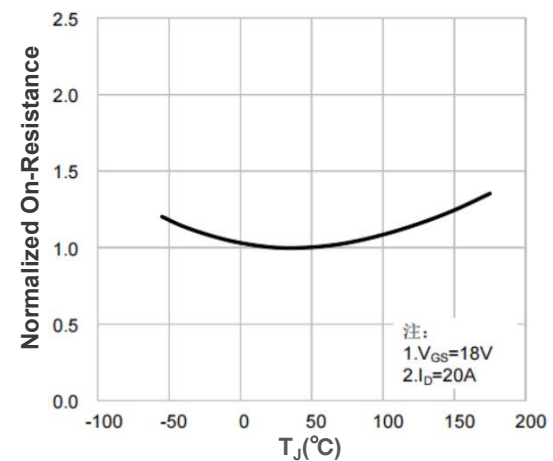
Output Characteritscs $T_J = 25^\circ\text{C}$



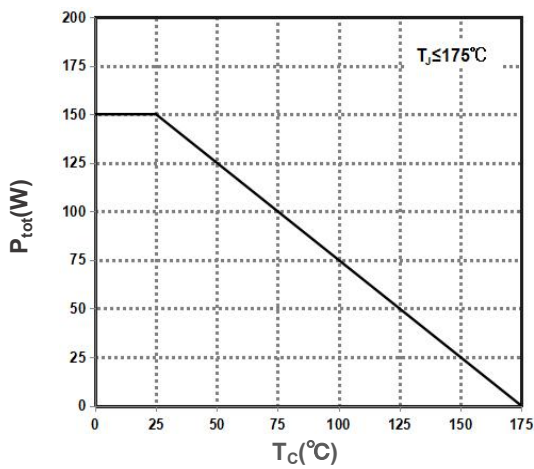
Output Characteritscs $T_J = 175^\circ\text{C}$



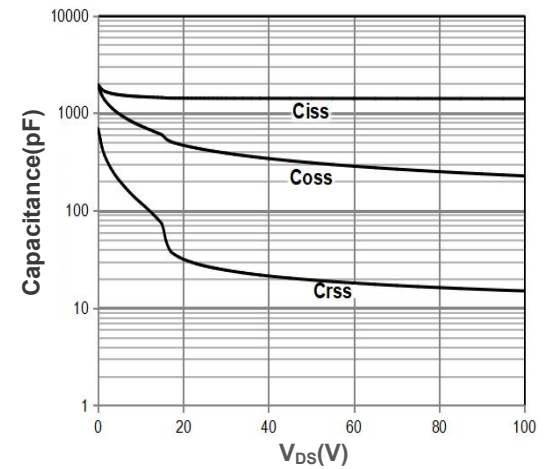
Transfer Characteritscs



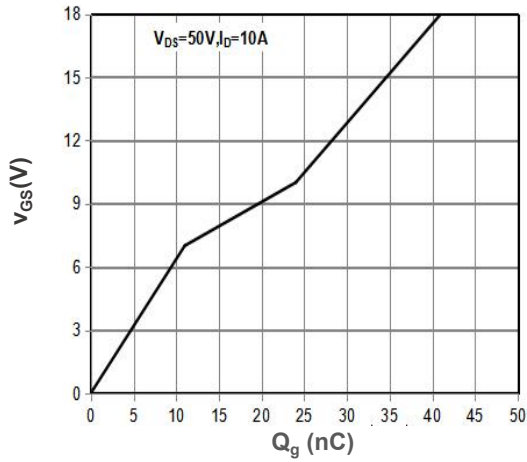
Normalized On-Resistance vs. Temperature



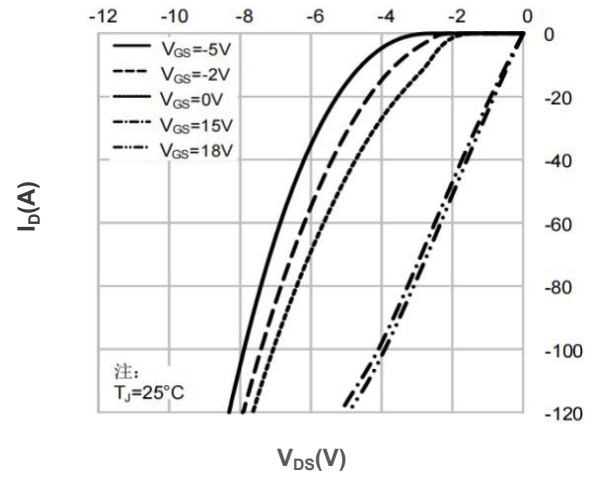
Power Dissipation Derating



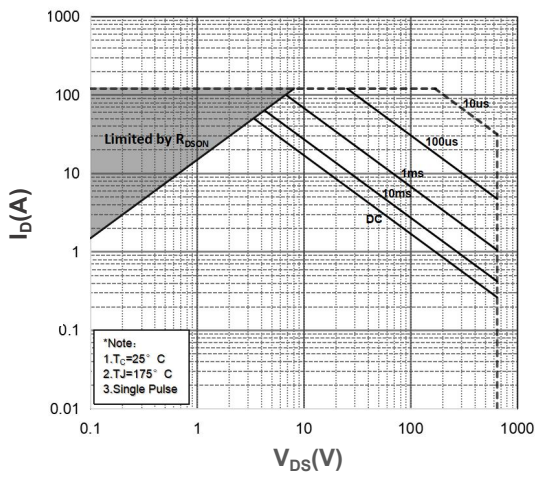
Capacitance



Gate Charge Waveform



Source-Drain Diode Characteristics, $T_J=25^\circ C$



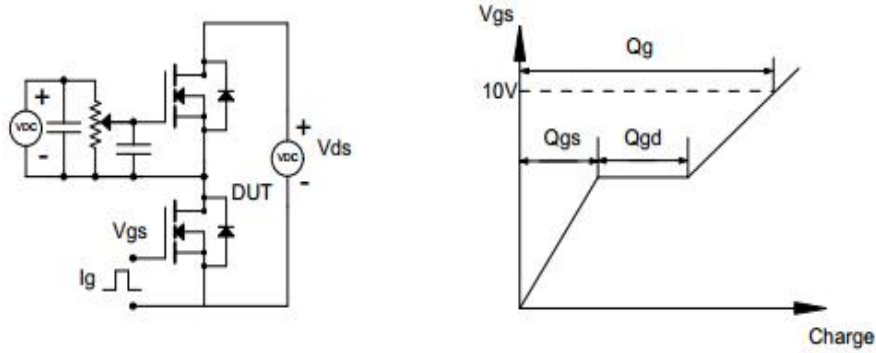
Safe Operating Area

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

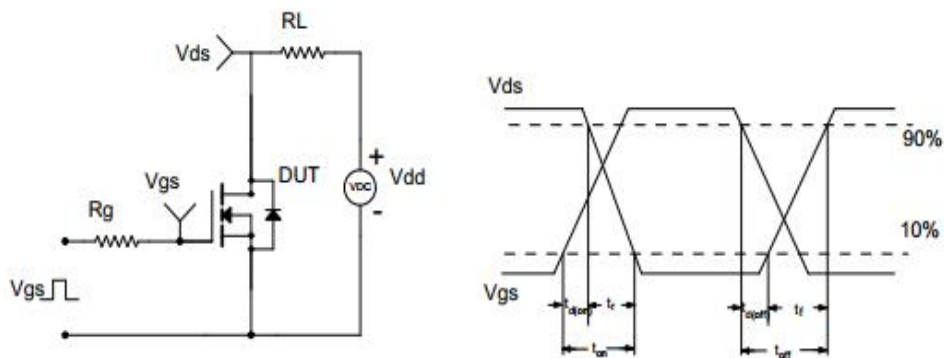


» Test Circuit & Waveform

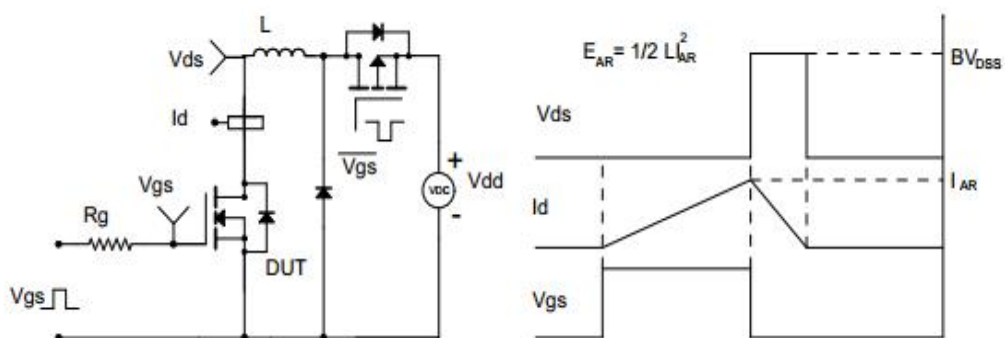
Gate Charge Test Circuit & Waveform



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	3.95	4.15	4.35
c	0.52		0.68	ΦP	3.40		3.80
D	20.70	20.80	21.30	ΦP1	7.00		7.40
D1	16.15		16.95	S	6.04	6.15	6.30
E	15.50	15.60	16.10				

