

### Features

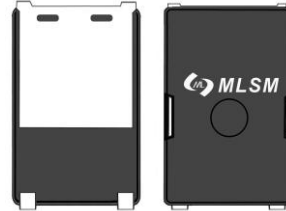
- Fast switching speed
- Low On-Resistance
- Excellent FoM(figure of merit)
- 100% UIS and Rg tested

### Application

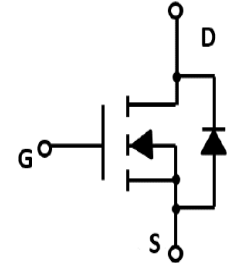
- Motor Driver
- DC/DC Converter
- Battery Management System

### Product Summary

$V_{DS}$	$R_{DS(ON)}$ TYP	$I_D$
150V	6.2m $\Omega$ @10V	120A



TOLL-4L view



Schematic diagram



Halogen-Free

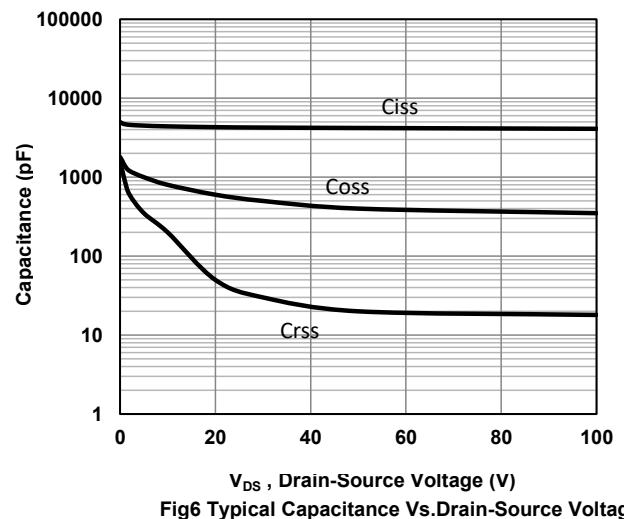
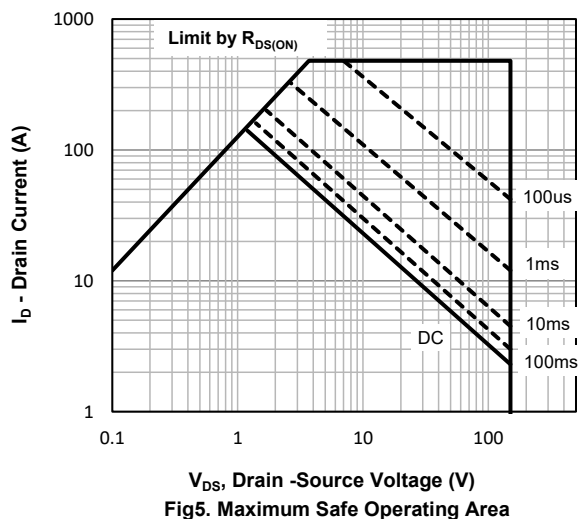
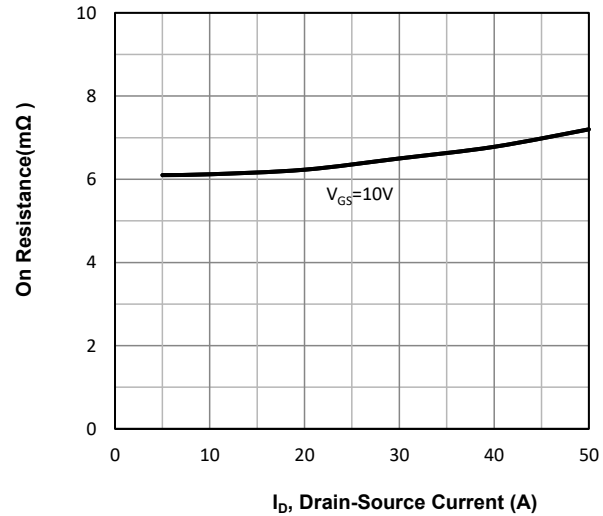
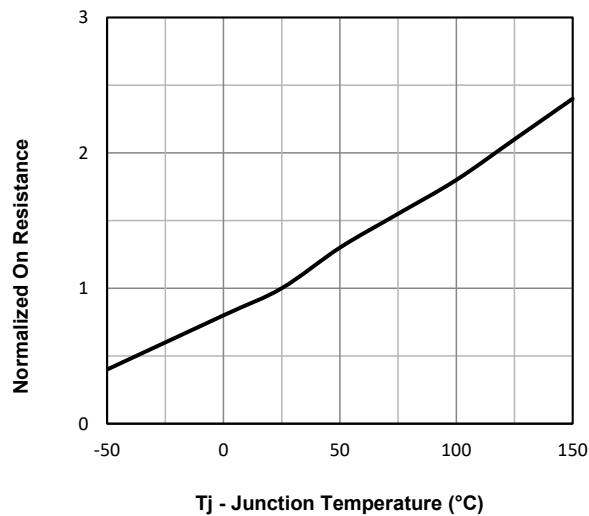
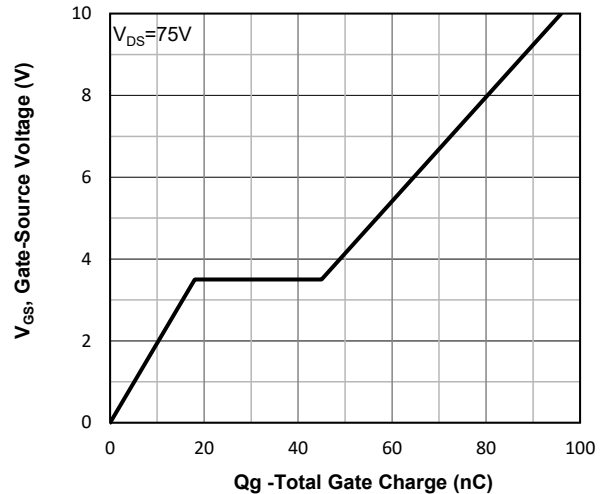
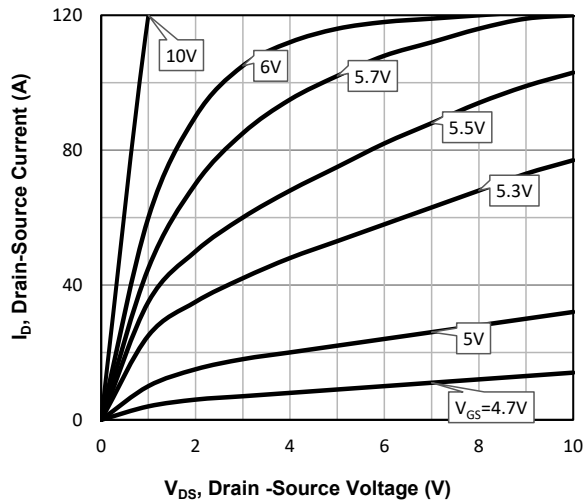
Absolute Maximum Ratings (TA=25°C unless otherwise noted)				
Symbol	Parameter		Rating	Unit
<b>Common Ratings (TC=25°C Unless Otherwise Noted)</b>				
$V_{DS}$	Drain-Source Breakdown Voltage		150	V
$V_{GS}$	Gate-Source Voltage		$\pm 20$	V
$T_J$	Maximum Junction Temperature		150	°C
$T_{STG}$	Storage Temperature Range		-50 to 155	°C
$E_{AS}$	Single Pulse Avalanche Energy <sup>Note1</sup>		680	mJ
$I_S$	Diode Continuous Forward Current	Tc=25°C	120	A
<b>Mounted on Large Heat Sink</b>				
$I_{DM}$	Pulse Drain Current Tested	Tc=25°C	480	A
$I_D$	Continuous Drain Current	Tc=25°C	120	A
$P_D$	Maximum Power Dissipation	Tc=25°C	180	W
$R_{\theta JA}$	Thermal Resistance Junction-to-Ambient		55	°C/W

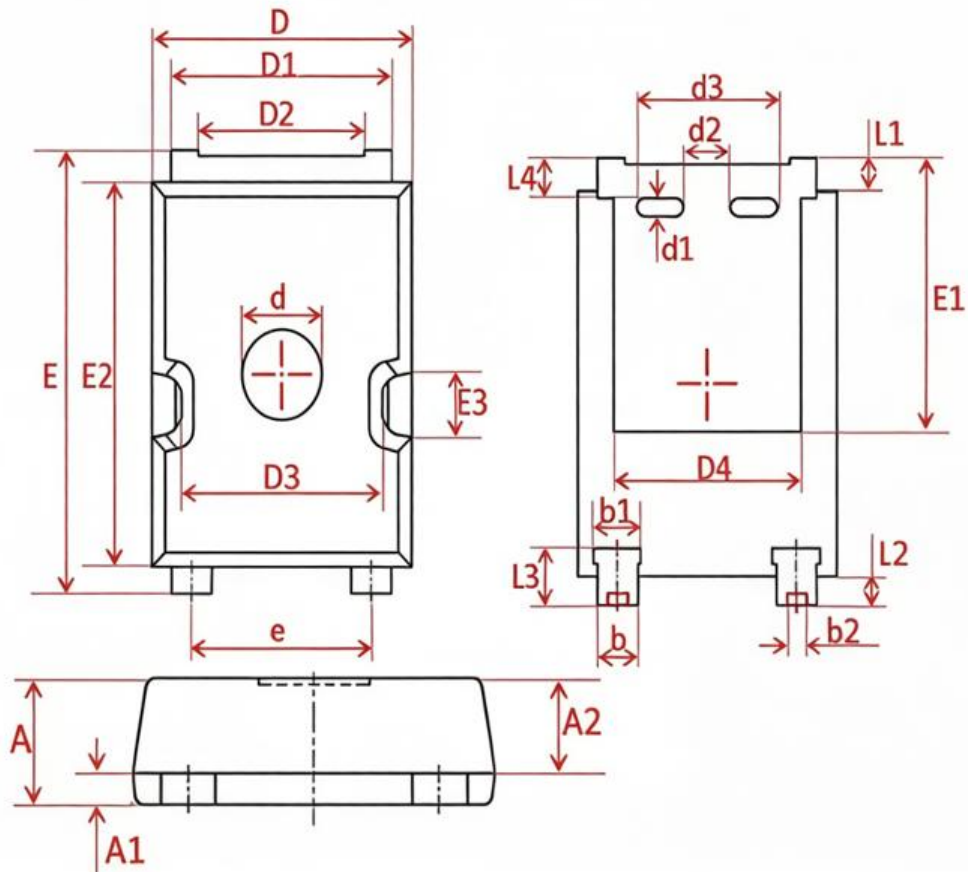
Ordering Information (Example)						
Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
ML1F120AG	TOLL-4L	ML1F120AG	2,500	5,000	35,000	13"reel

Electrical Characteristics (T <sub>J</sub> =25°C unless otherwise noted)						
Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
BV <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	150	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =150V, V <sub>GS</sub> =0V	--	--	1.0	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	3.0	4.0	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	--	6.2	8.0	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	--	5290	--	pF
C <sub>OSS</sub>	Output Capacitance		--	470	--	pF
C <sub>RSS</sub>	Reverse Transfer Capacitance		--	28	--	pF
<b>Switching Characteristics</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =75V, I <sub>D</sub> =40A, V <sub>GS</sub> =10V	--	95	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	18	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	35	--	nC
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =75V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω	--	21	--	nS
t <sub>r</sub>	Turn-on Rise Time		--	35	--	nS
t <sub>d(off)</sub>	Turn-Off Delay Time		--	30	--	nS
t <sub>f</sub>	Turn-off fall Time		--	50	--	nS
<b>Source- Drain Diode Characteristics</b>						
V <sub>SD</sub>	Forward on voltage	T <sub>J</sub> =25°C, I <sub>S</sub> =30A	--	0.83	1.2	V

Note 1:L=0.5mH, R<sub>G</sub>=25Ω, V<sub>GS</sub>=20V, V<sub>DD</sub>=50V, Start T<sub>J</sub>=25°C

**Typical Operating Characteristics**



**TOLL-4L Package information**


Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	1.900	2.100	0.074	0.082
A1	0.400	0.600	0.015	0.023
A2	1.400	1.600	0.055	0.062
b	0.900	1.100	0.035	0.043
b1	1.090	1.290	0.430	0.051
b2	0.400	0.600	0.016	0.024
D	6.500	6.700	0.256	0.264
D1	5.500	5.700	0.217	0.224
D2	4.100	4.300	0.161	0.169
D3	5.000	5.200	0.196	0.204
D4	4.700	4.900	0.185	0.192
d	2.000REF		0.07874REF	
d1	0.400	0.600	0.016	0.024
d2	1.000	1.200	0.039	0.047
d3	3.600	3.800	0.141	0.149
E	9.800	10.000	0.385	0.393
E1	5.900	6.200	0.232	0.244
E2	8.500	8.700	0.335	0.343
E3	1.400REF		0.05511REF	
e	4.470	4.670	0.176	0.184
L1	0.600	0.800	0.024	0.031
L2	0.500	0.700	0.020	0.028
L3	1.100	1.400	0.043	0.055
L4	0.700	0.900	0.028	0.035