40V 1.8mΩ N-Ch Power MOSFET

Features

- Ultra-low $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability
- 100% UIS Tested, 100% R_g Tested

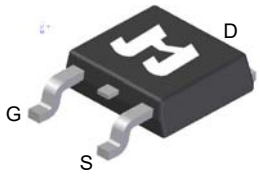
Product Summary

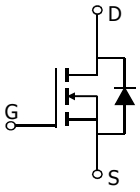
Parameter	Value	Unit
V_{DS}	40	V
$V_{GS(th)\_Typ}$	1.5	V
I_D (@ V_{GS} = 10V) (1)	150	A
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 10V)	1.8	mΩ
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 4.5V)	2.2	mΩ

Applications

- Power Management in Computing, CE, IE 4.0, Communications
- Current Switching in DC/DC & AC/DC (SR) Sub-systems
- Load Switching, Quick/Wireless Charging, Motor Driving

TO252-3L Top View



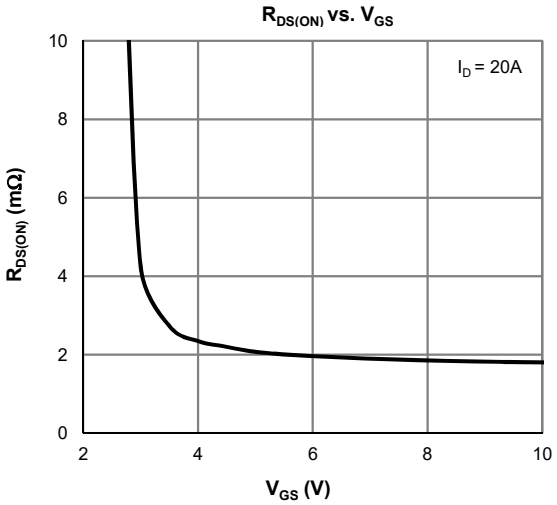


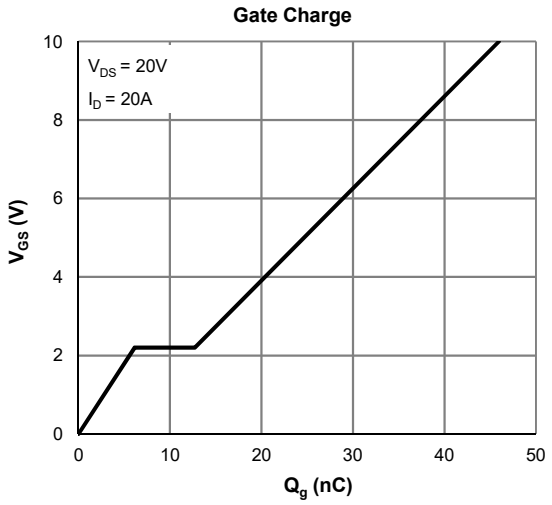
Ordering Information

Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
JMSL0402AK-13	TO252-3L	3	SL0402A	1	-55 to 150	13-inch Reel	2500

Absolute Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DS}	40	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (1)	T_C = 25°C	I_D	150	A
	T_C = 100°C		115	
Pulsed Drain Current (2)		I_{DM}	529	A
Avalanche Current (3)		I_{AS}	33	A
Avalanche Energy (3)		E_{AS}	163	mJ
Power Dissipation (4)	T_C = 25°C	P_D	125	W
	T_C = 100°C		50	
Junction & Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C





Electrical Characteristics (@ T_J = 25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 250μA, V_{GS} = 0V	40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 32V, V_{GS} = 0V			1.0	μA
		T_J = 55°C			5.0	
Gate-Body Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.2	1.5	2.5	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 20A		1.8	2.2	mΩ
		V_{GS} = 4.5V, I_D = 15A		2.2	3.0	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 20A		171		S
Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V		0.69	1.0	V
Diode Continuous Current	I_S	T_C = 25°C			125	A
DYNAMIC PARAMETERS (5)						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz		3133		pF
Output Capacitance	C_{oss}			1993		pF
Reverse Transfer Capacitance	C_{rss}			75		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz		2.8		Ω
SWITCHING PARAMETERS (5)						
Total Gate Charge (@ V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V V_{DS} = 20V, I_D = 20A		46		nC
Total Gate Charge (@ V_{GS} = 4.5V)	Q_g			23		nC
Gate Source Charge	Q_{gs}			6.2		nC
Gate Drain Charge	Q_{gd}			6.5		nC
Turn-On DelayTime	$t_{D(on)}$	V_{GS} = 10V, V_{DS} = 20V R_L = 1Ω, R_{GEN} = 6Ω		6.7		ns
Turn-On Rise Time	t_r			20		ns
Turn-Off DelayTime	$t_{D(off)}$			72		ns
Turn-Off Fall Time	t_f			52		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F = 15A, dI_F/dt = 100A/μs		50		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F = 15A, dI_F/dt = 100A/μs		29		nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	38	45	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.8	1.0	°C/W

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under T_{J_Max} = 150°C.
3. This single-pulse measurement was taken under the following condition [L = 300μH, V_{GS} = 10V, V_{DS} = 20V] while its value is limited by T_{J_Max} = 150°C.
4. The power dissipation P_D is based on T_{J_Max} = 150°C.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical & Thermal Characteristics

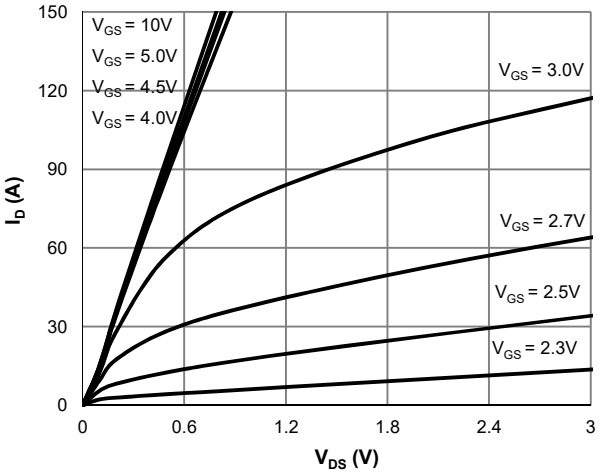


Figure 1: Saturation Characteristics

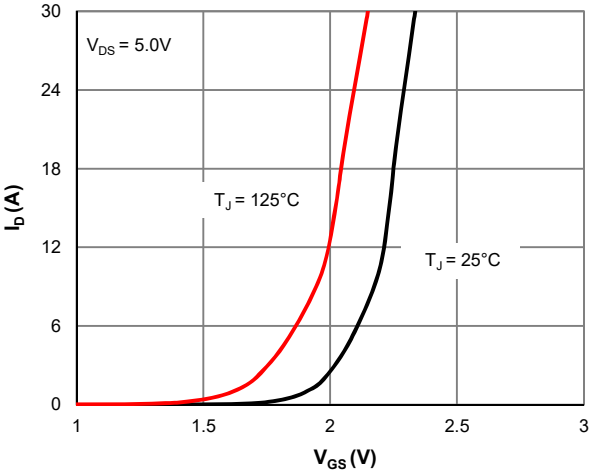


Figure 2: Transfer Characteristics

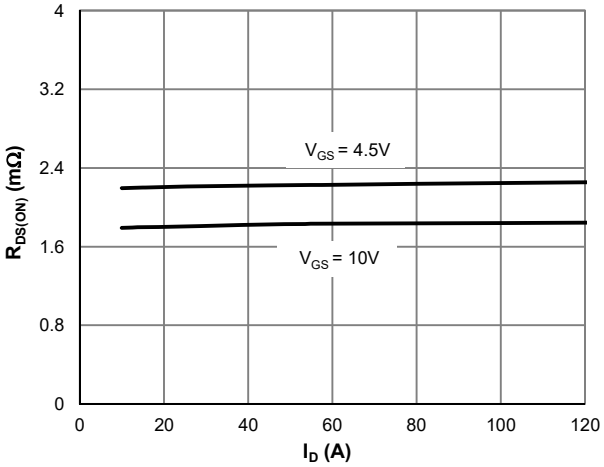


Figure 3: $R_{DS(ON)}$ vs. Drain Current

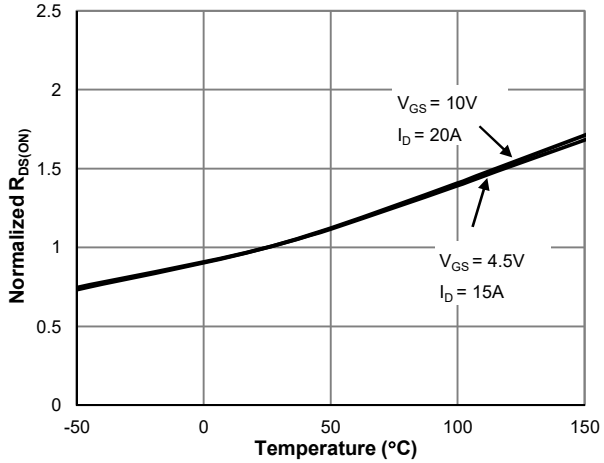


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

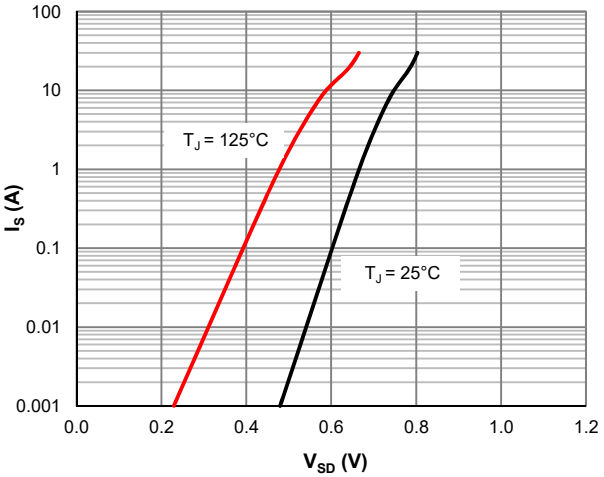


Figure 5: Body-Diode Characteristics

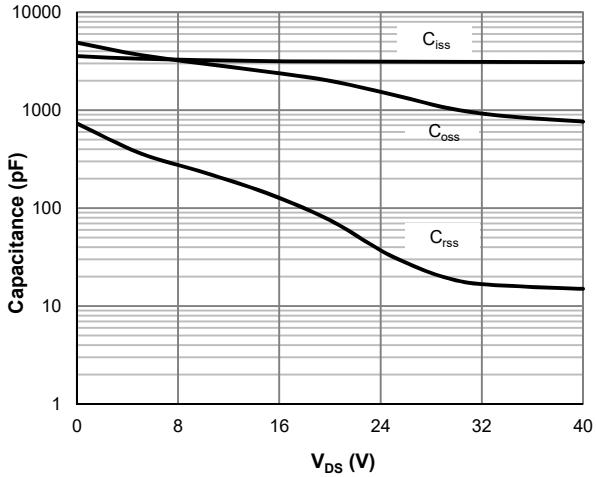


Figure 6: Capacitance Characteristics

Typical Electrical & Thermal Characteristics

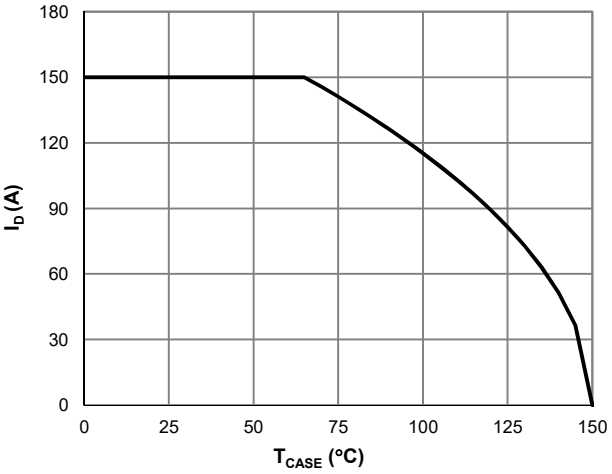


Figure 7: Current De-rating

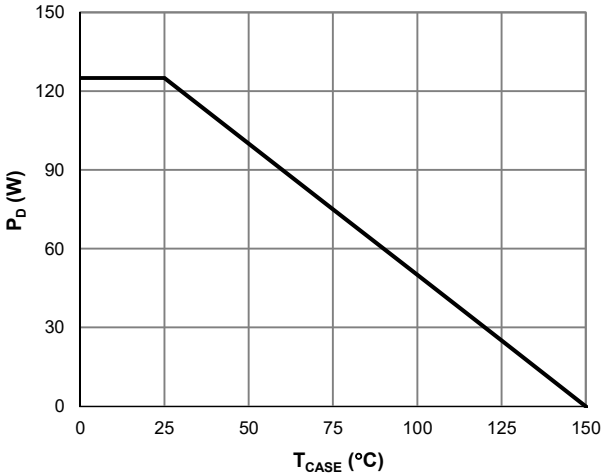


Figure 8: Power De-rating

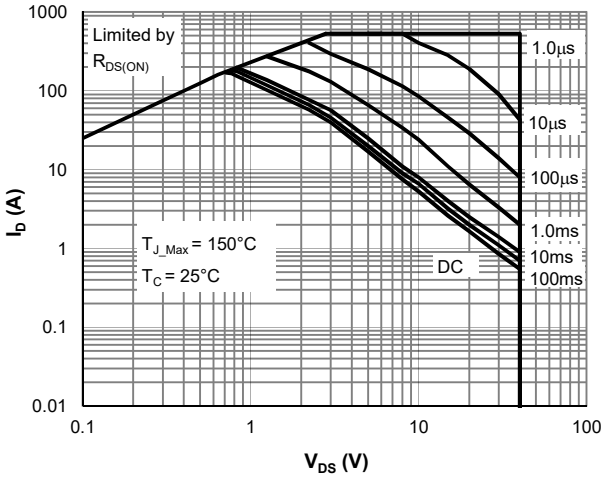


Figure 9: Maximum Safe Operating Area

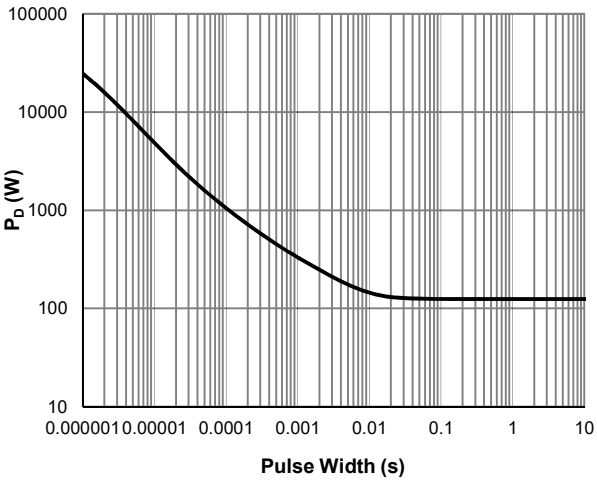


Figure 10: Single Pulse Power Rating, Junction-to-Case

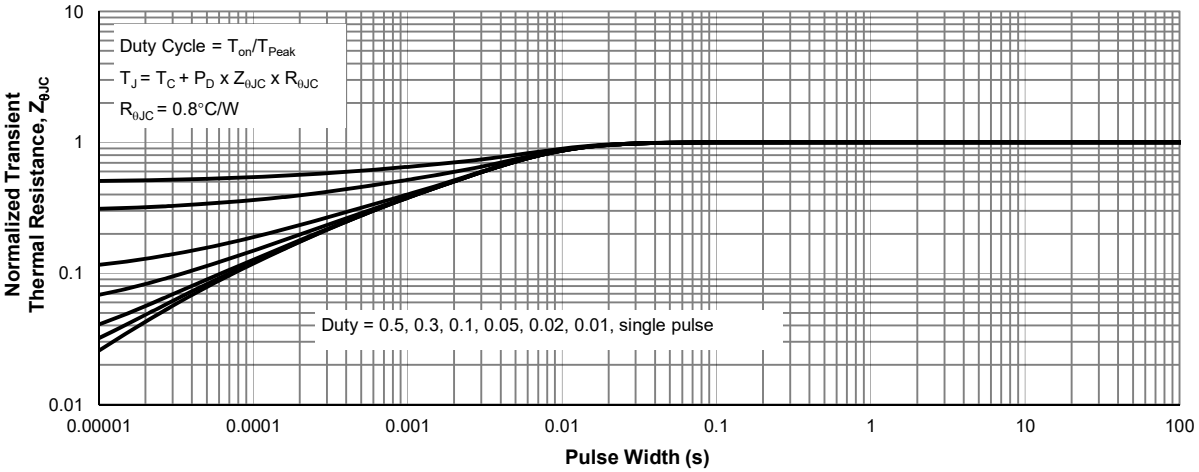
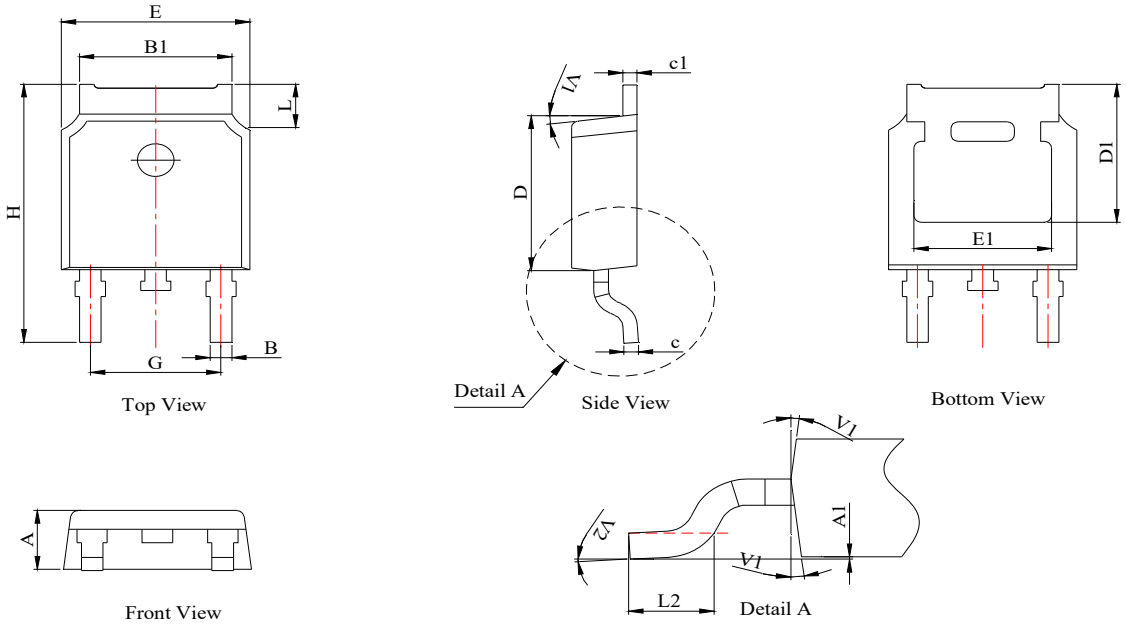


Figure 11: Normalized Maximum Transient Thermal Impedance

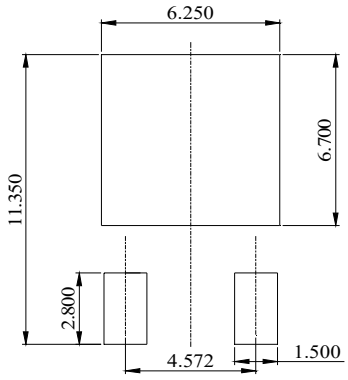
TO252-3L Package Information

Package Outline



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.10		2.50
A1	0	-	0.10
B	0.66		0.86
B1	5.18		5.48
c	0.40		0.60
c1	0.44		0.58
D	5.90		6.30
D1		5.30REF	
E	6.40		6.80
E1	4.63		
G	4.47		4.67
H	9.50		10.70
L	1.09		1.21
L2	1.35		1.65
V1		7°	
V2	0°	-	6°

Recommended Footprint



DIMENSIONS:MILLIMETERS