40V 4.7mΩ N-Ch Power MOSFET

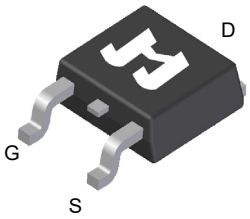
Features

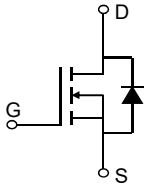
- Ultra-low ON-resistance, $R_{DS(ON)}$
- Low Gate Charge, Q_g
- 100% UIS and R_g Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant
- AEC-Q101 Qualified for Automotive Applications

Product Summary

Parameter	Value	Unit
V_{DS}	40	V
$V_{GS(th)\_Typ}$	1.6	V
I_D (@ V_{GS} = 10V) (1)	78	A
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 10V)	4.7	mΩ
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 4.5V)	6.0	mΩ

TO-252-3L Top View



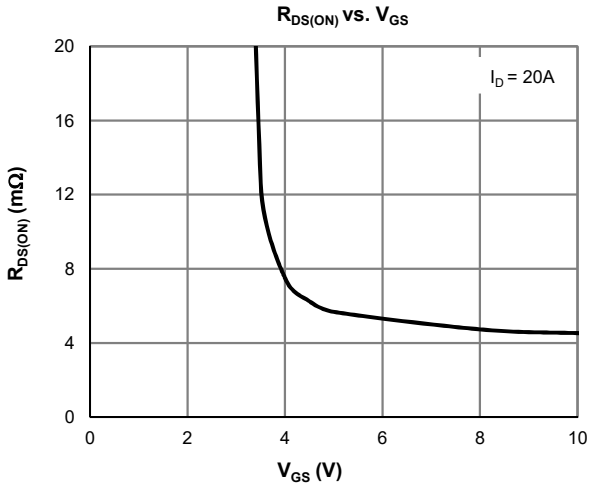


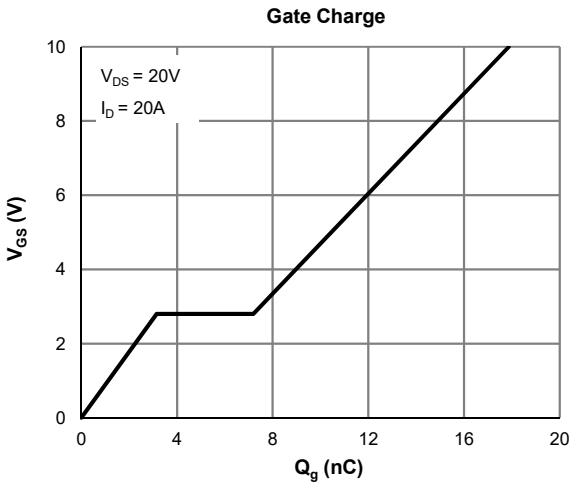
Ordering Information

Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
JMSL0406AKQ-13	TO-252-3L	3	SL0406A	1	-55 to 175	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	78	A
	T_C = 100°C		55	
Pulsed Drain Current (2)		I_{DM}	312	A
Avalanche Current (3)		I_{AS}	27	A
Avalanche Energy (3)		E_{AS}	36	mJ
Power Dissipation (4)	T_C = 25°C	P_D	60	W
	T_C = 100°C		30	
Junction & Storage Temperature Range		T_J, T_{STG}	-55 to 175	°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	1.6	2.5	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 20A		4.7	5.6	mΩ
		V_{GS} = 4.5V, I_D = 15A		6.0	7.8	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 20A		80		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			60	A
DYNAMIC PARAMETERS (5)						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz		1204		pF
Output Capacitance	C_{oss}			536		pF
Reverse Transfer Capacitance	C_{rss}			51		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz		1.7		Ω
SWITCHING PARAMETERS (5)						
Total Gate Charge (@ V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V V_{DS} = 20V, I_D = 20A		17.9		nC
Total Gate Charge (@ V_{GS} = 4.5V)	Q_g			9.7		nC
Gate Source Charge	Q_{gs}			3.2		nC
Gate Drain Charge	Q_{gd}			4.0		nC
Turn-On DelayTime	$t_{D(on)}$	V_{GS} = 10V, V_{DS} = 20V R_L = 1.0Ω, R_{GEN} = 6Ω		4.8		ns
Turn-On Rise Time	t_r			8.6		ns
Turn-Off DelayTime	$t_{D(off)}$			23		ns
Turn-Off Fall Time	t_f			15.2		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F = 20A, dI_F/dt = 100A/μs		50		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F = 20A, dI_F/dt = 100A/μs		42		nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	48	58	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	3.0	°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} = 175°C.
3. This single-pulse measurement was taken under the following condition [L = 100μH, V_{GS} = 10V, V_{DD} = 20V] while its value is limited by T_{J_Max} = 175°C.
4. The power dissipation P_D is based on T_{J_Max} = 175°C.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical & Thermal Characteristics

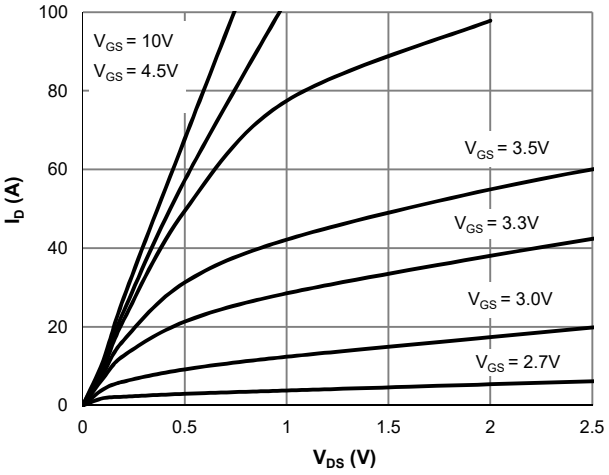


Figure 1: Saturation Characteristics

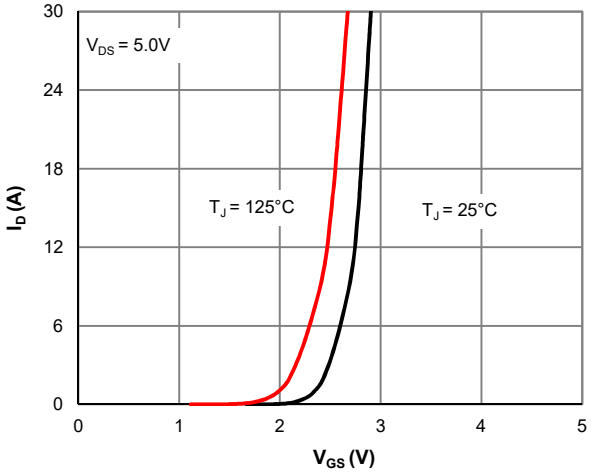


Figure 2: Transfer Characteristics

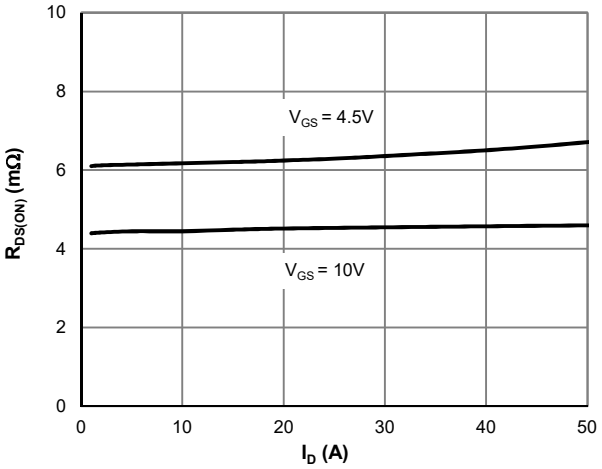


Figure 3: $R_{DS(ON)}$ vs. Drain Current

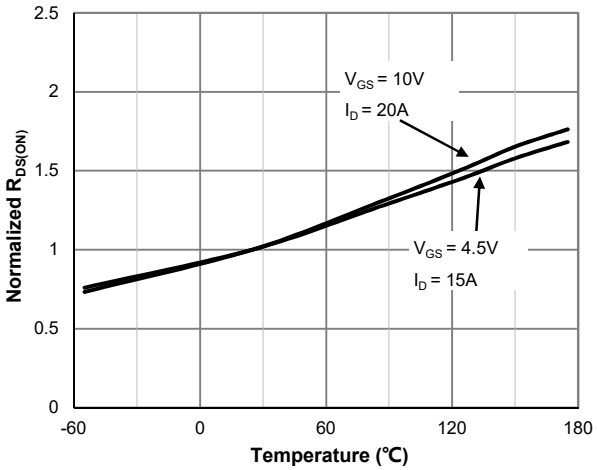


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

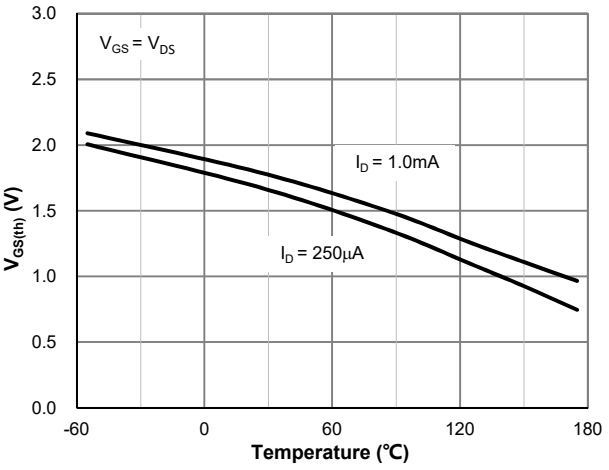


Figure 5: $V_{GS(th)}$ vs. Junction Temperature

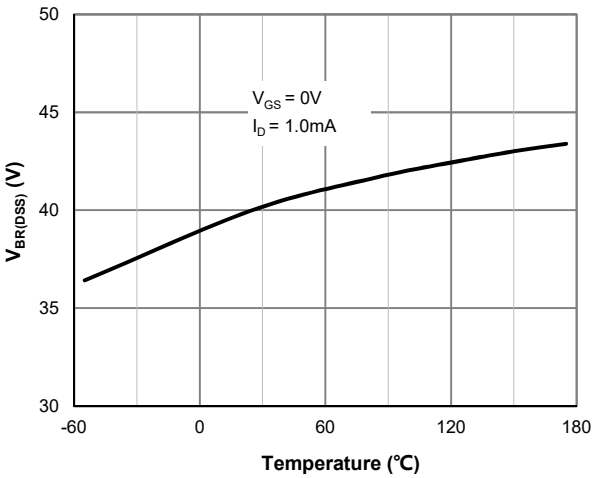


Figure 6: $V_{BR(DSS)}$ vs. Junction Temperature

Typical Electrical & Thermal Characteristics

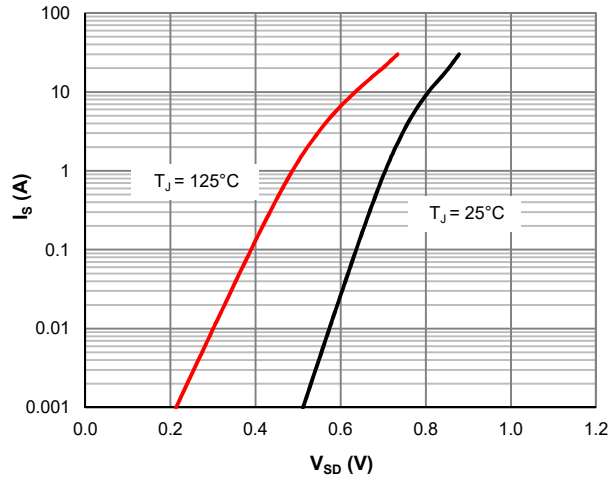


Figure 7: Body-Diode Characteristics

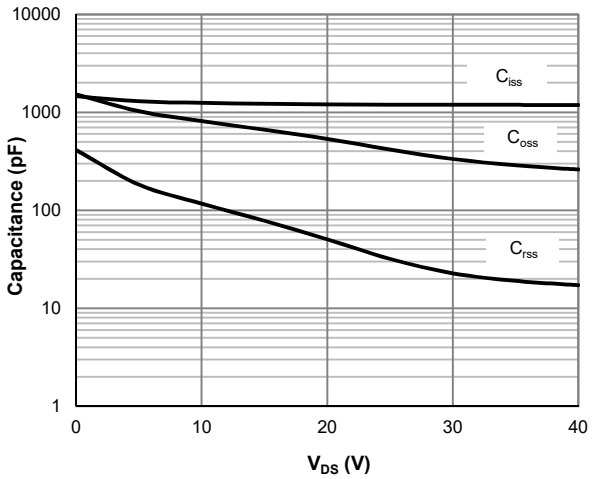


Figure 8: Capacitance Characteristics

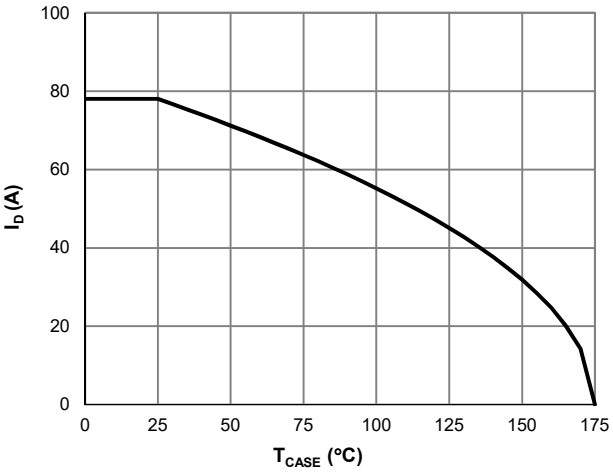


Figure 9: Current De-rating

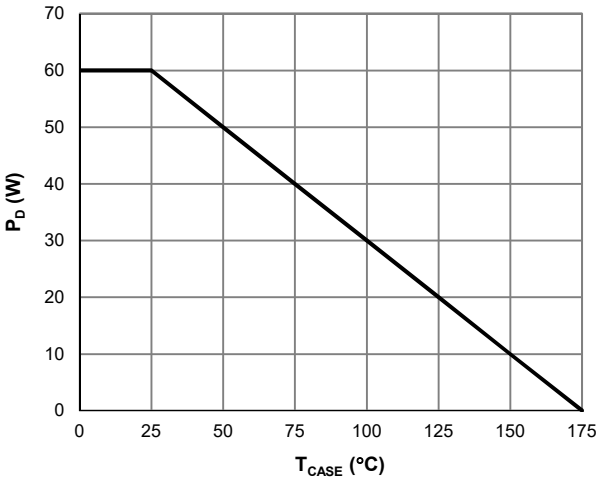


Figure 10: Power De-rating

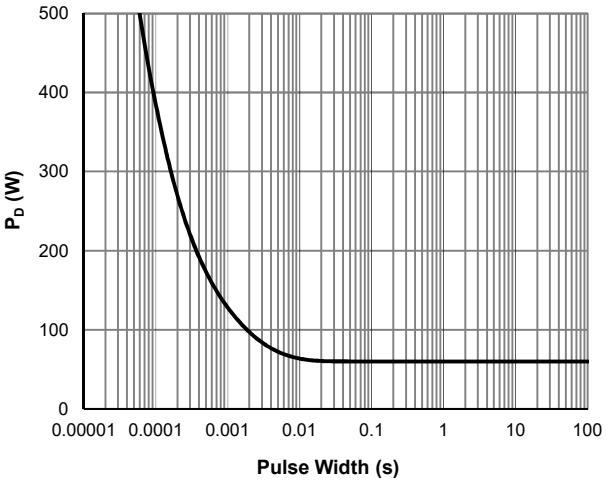


Figure 11: Single Pulse Power Rating, Junction-to-Case

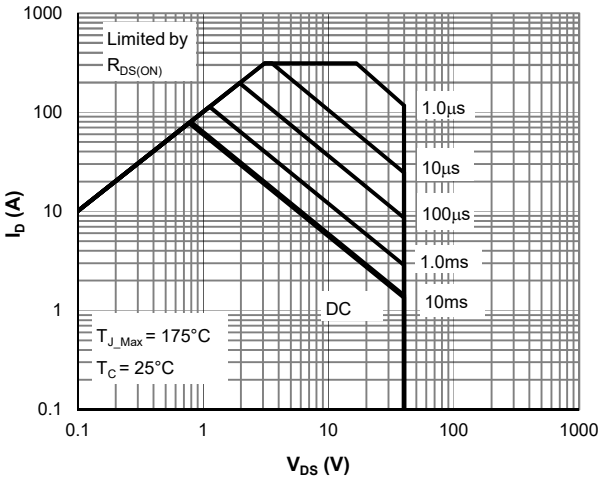


Figure 12: Maximum Safe Operating Area

Typical Electrical & Thermal Characteristics

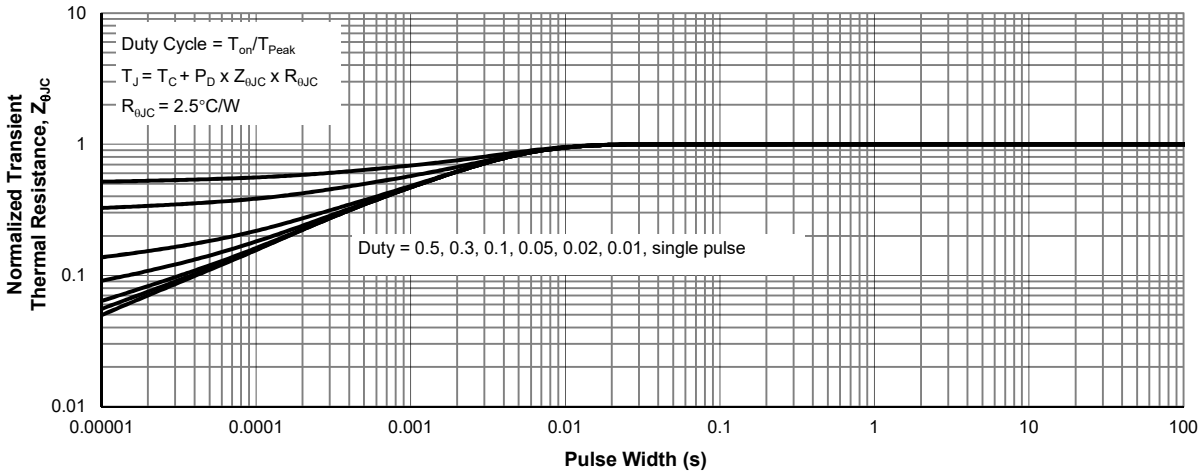
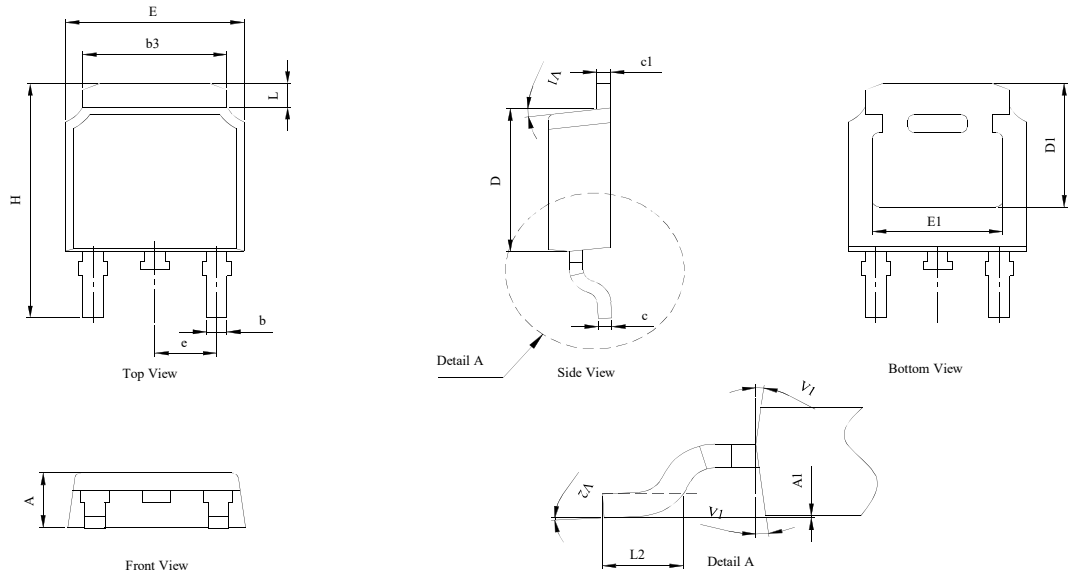


Figure 13: Normalized Maximum Transient Thermal Impedance

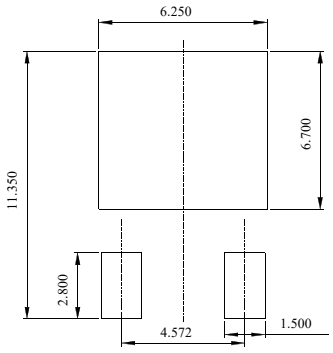
TO-252-3L Package Information

Package Outline



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.18	2.30	2.39
A1	0	-	0.13
b	0.64	0.76	0.89
c	0.40	0.50	0.61
c1	0.46	0.50	0.58
D	5.97	6.10	6.23
D1	5.05	--	--
E	6.35	6.60	6.73
E1	4.32	--	--
b3	5.21	5.38	5.55
e	2.29 BSC		
H	9.40	10.00	10.40
L	0.89	--	1.27
L2	1.40		1.78
V1	7¡ã REF		
V2	0¡ã	-	6¡ã

Recommended Soldering Footprint



DIMENSIONS:MILLIMETERS