150V 4.0mΩ N-Ch Power MOSFET

Features

- Ultra-low $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100% R_g Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

Product Summary

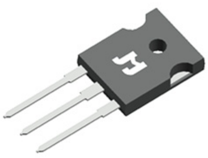
Parameter	Value	Unit
V_{DS}	150	V
$V_{GS(th)\_Typ}$	3.2	V
I_D (@ V_{GS} = 10V) (1)	203	A
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 10V)	4.0	mΩ

Applications

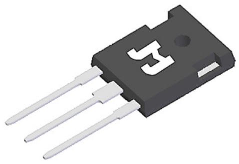
- Power Managerment in Telecom., Industrial Automation, CE
- Current Switching in DC/DC & AC/DC (SR) Sub-systems
- Motor Driving in Power Tool, E-vehicle, Robotics

TO-247-3L Top View

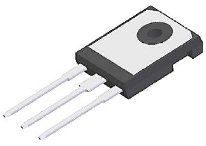
Type A

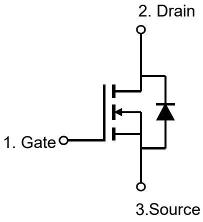


Type B



TO-247-3L Bottom View



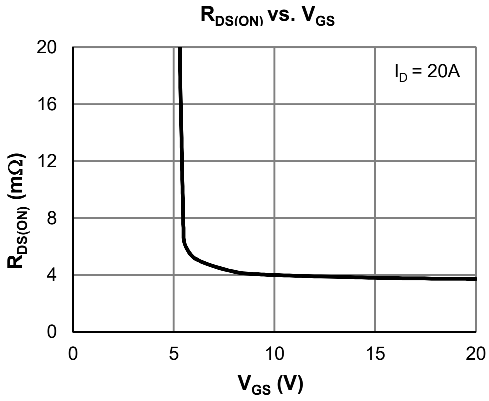


Ordering Information

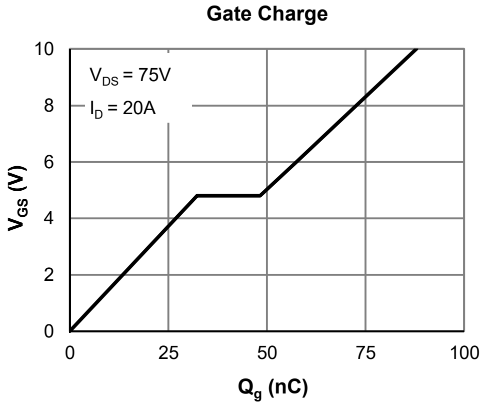
Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
JMSH1504AS-U	TO-247-3L	3	SH1504A	N/A	-55 to 150	Tube	30

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

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DS}	150	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (1)	T_C = 25°C	I_D	203	A
	T_C = 100°C		128	
Pulsed Drain Current (2)		I_{DM}	630	A
Avalanche Current (3)		I_{AS}	77	A
Avalanche Energy (3)		E_{AS}	889	mJ
Power Dissipation (4)	T_C = 25°C	P_D	417	W
	T_C = 100°C		167	
Junction & Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C



$R_{DS(ON)}$ vs. V_{GS}



Gate Charge

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		150			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 120V, 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		2.5	3.2	4.5	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 20A			4.0	4.9	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 20A			65		S
Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V			0.71	1.0	V
Diode Continuous Current	I_S	T_C = 25°C				417	A
DYNAMIC PARAMETERS (5)							
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 75V, f = 1MHz			6540		pF
Output Capacitance	C_{oss}				772		pF
Reverse Transfer Capacitance	C_{rss}				6.7		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz			2.4		Ω
SWITCHING PARAMETERS (5)							
Total Gate Charge (@ V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V V_{DS} = 75V, I_D = 20A			88		nC
Total Gate Charge (@ V_{GS} = 6.0V)	Q_g				57		nC
Gate Source Charge	Q_{gs}				32		nC
Gate Drain Charge	Q_{gd}				16		nC
Turn-On DelayTime	$t_{D(on)}$	V_{GS} = 10V, V_{DS} = 75V R_L = 3.75Ω, R_{GEN} = 6Ω			48		ns
Turn-On Rise Time	t_r				90		ns
Turn-Off DelayTime	$t_{D(off)}$				94		ns
Turn-Off Fall Time	t_f				60		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F = 15A, dI_F/dt = 100A/μs			122		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F = 15A, dI_F/dt = 100A/μs			279		nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	40	48	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.25	0.30	°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} = 75V] 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

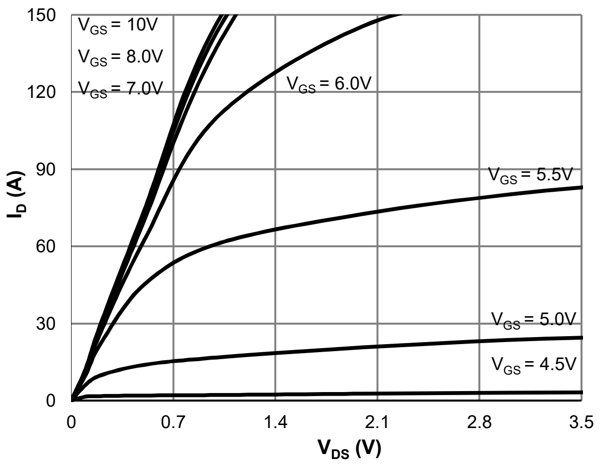


Figure 1: Saturation Characteristics

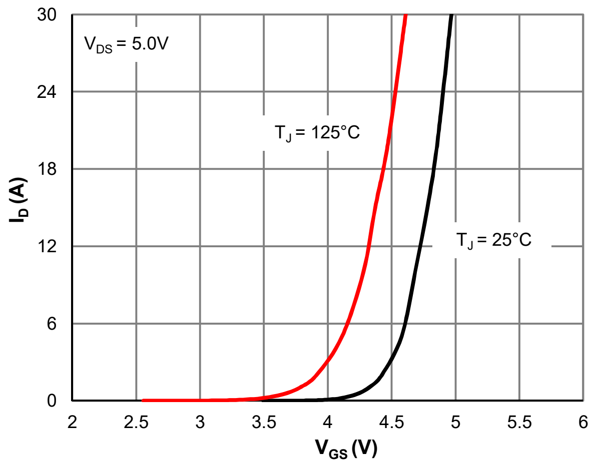


Figure 2: Transfer Characteristics

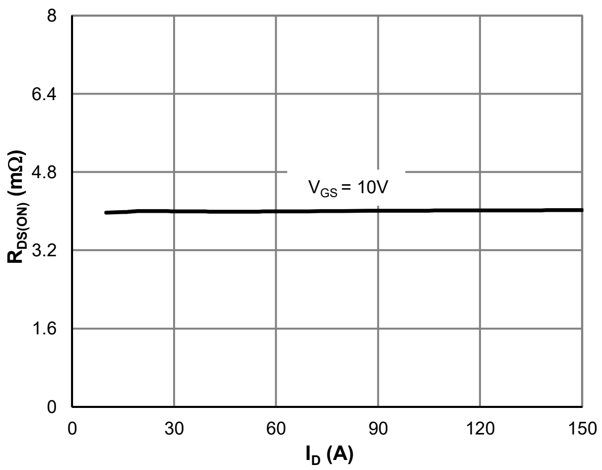


Figure 3: $R_{DS(ON)}$ vs. Drain Current

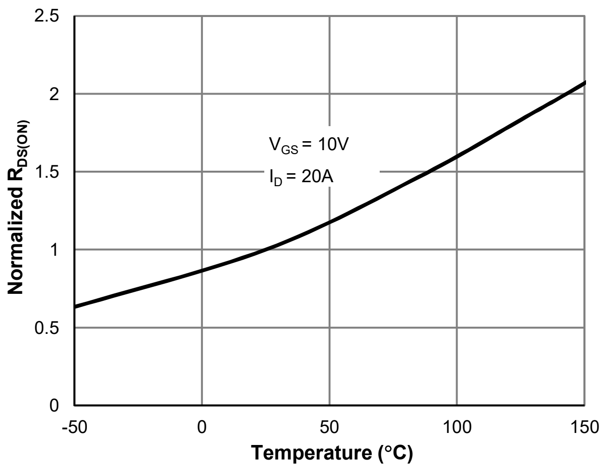


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

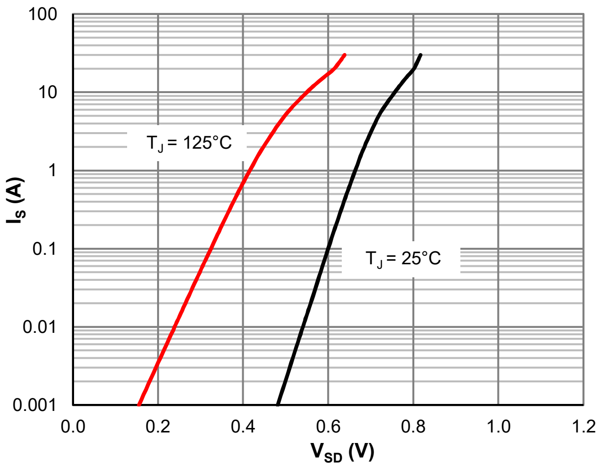


Figure 5: Body-Diode Characteristics

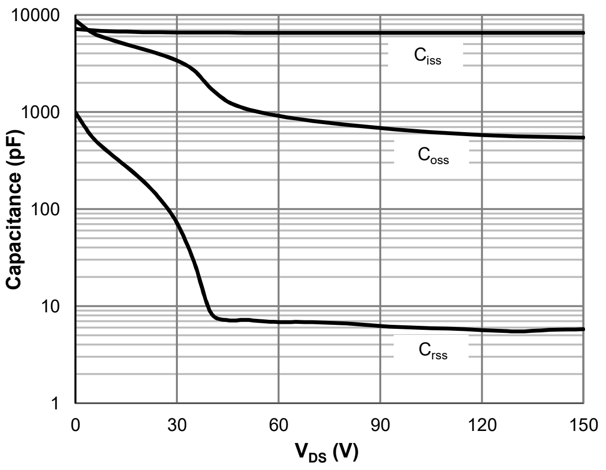


Figure 6: Capacitance Characteristics

Typical Electrical & Thermal Characteristics

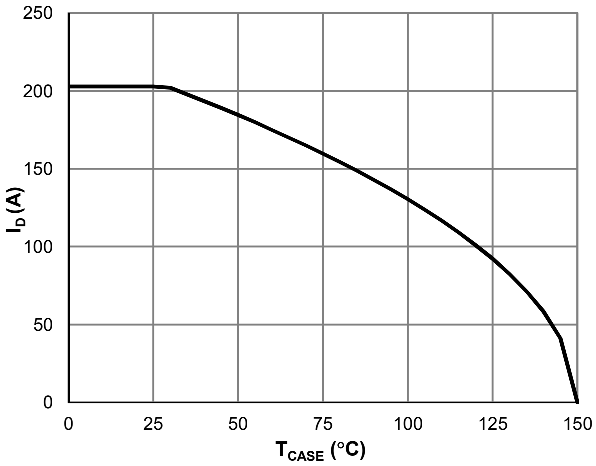


Figure 7: Current De-rating

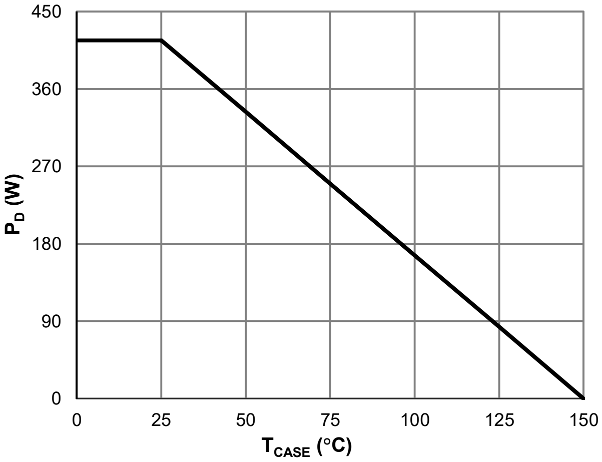


Figure 8: Power De-rating

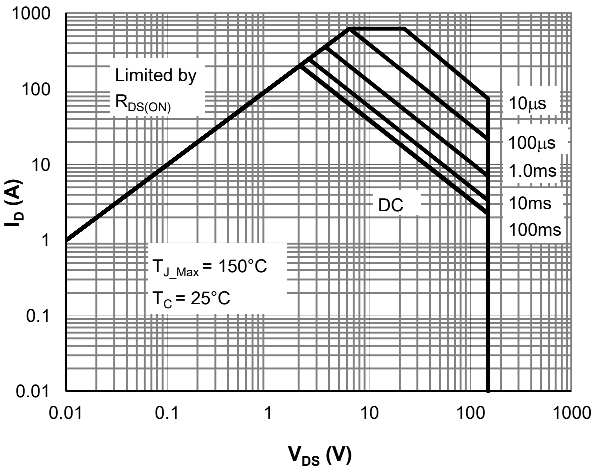


Figure 9: Maximum Safe Operating Area

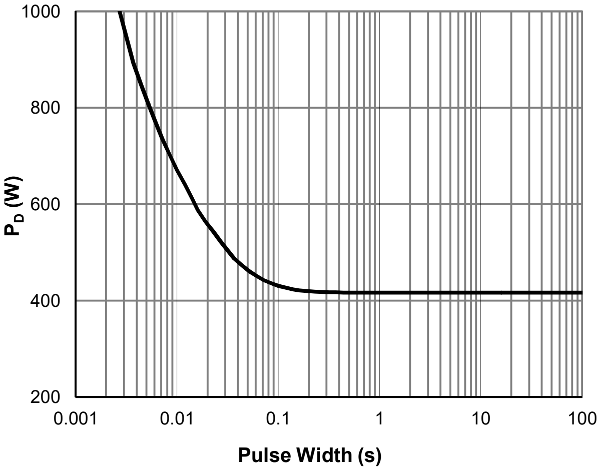


Figure 10: Single Pulse Power Rating, Junction-to-Case

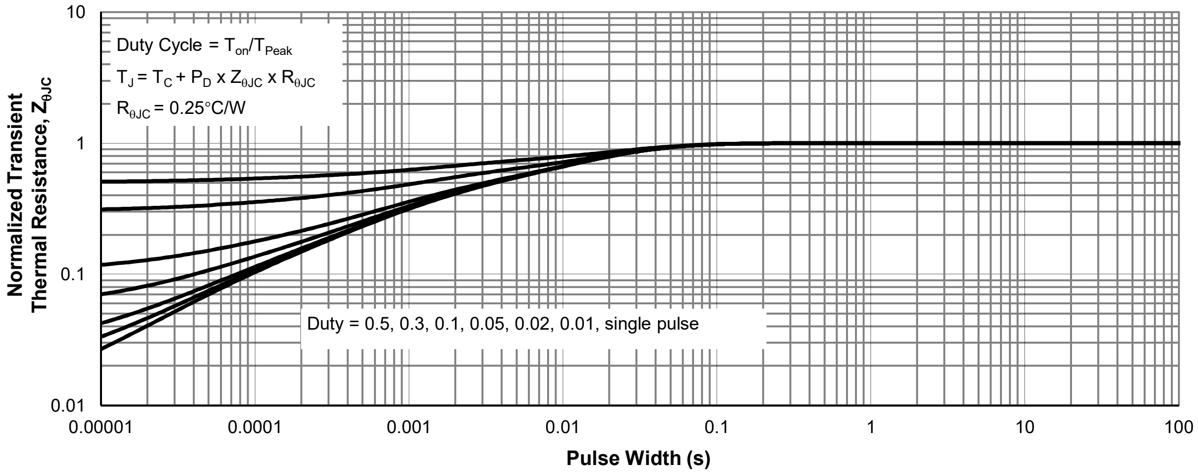
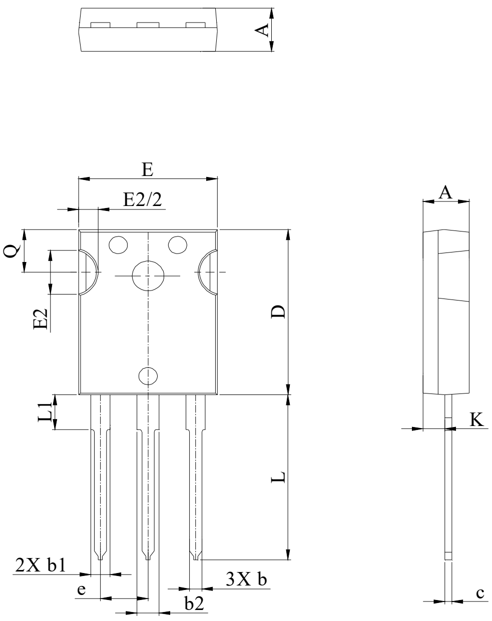


Figure 11: Normalized Maximum Transient Thermal Impedance

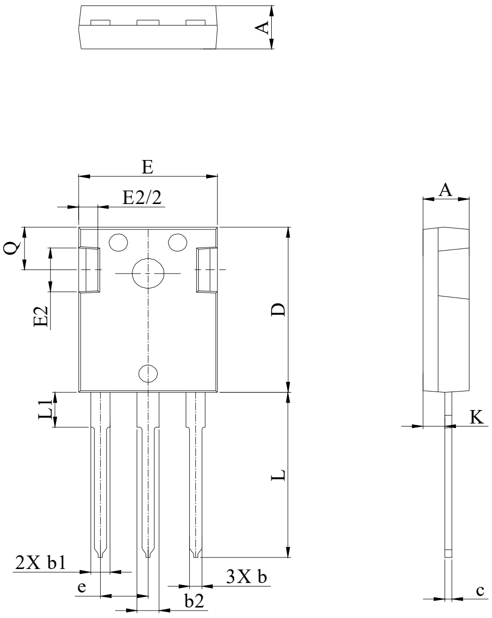
TO-247-3L Package Information

Type_A Package Outline



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.80	5.02	5.21
b	1.00	1.20	1.40
b1	1.90	2.00	2.39
b2	2.87	3.00	3.22
c	0.41	0.60	0.79
D	20.80	21.00	21.20
E	15.50	15.94	16.13
E2	4.32	-	5.49
L	19.70	20.07	20.32
L1	4.00	-	4.40
K	2.20	-	2.50
Q	-	5.80	-
e	5.44 BSC		

Type_B Package Outline



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.80	5.02	5.21
b	1.00	1.20	1.40
b1	1.90	2.00	2.39
b2	2.87	3.00	3.22
c	0.41	0.60	0.79
D	20.80	21.00	21.20
E	15.50	15.94	16.13
E2	4.32	-	5.49
L	19.70	20.07	20.32
L1	4.00	-	4.40
K	2.20	-	2.50
Q	-	5.80	-
e	5.44 BSC		