



# 150V 3.8mΩ N-Ch Power MOSFET

## Features

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

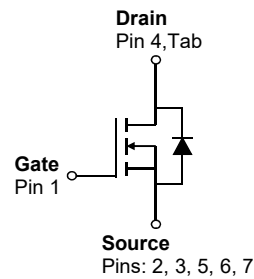
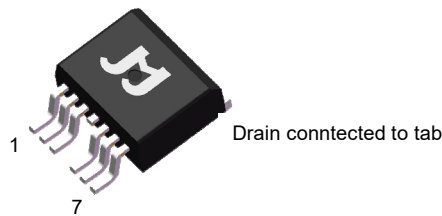
## Product Summary

Parameter	Value	Unit
$V_{DS}$	150	V
$V_{GS(th), Typ}$	3.2	V
$I_D (@ V_{GS} = 10V)^{(1)}$	205	A
$R_{DS(ON), Typ} (@ V_{GS} = 10V)$	3.8	mΩ

## Applications

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

TO-263-7L Top View

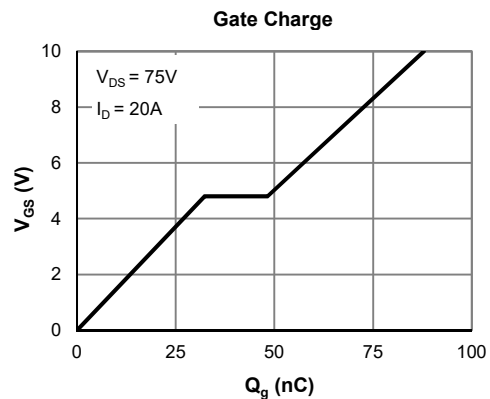
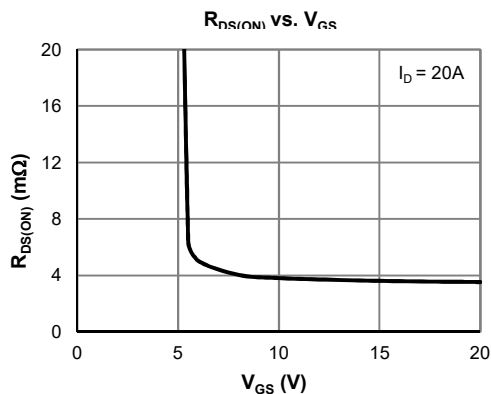


## Ordering Information

Device	Package	# of Pins	Marking	MSL	$T_J$ (°C)	Media	Quantity (pcs)
JMSH1504AE7-13	TO-263-7L	3	SH1504A	1	-55 to 150	13-inch Reel	800

## Absolute Maximum Ratings (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DS}$	150	V
Gate-to-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>(1)</sup>	$I_D$	$T_C = 25^\circ\text{C}$	205
		$T_C = 100^\circ\text{C}$	130
Pulsed Drain Current <sup>(2)</sup>	$I_{DM}$	637	A
Avalanche Current <sup>(3)</sup>	$I_{AS}$	77	A
Avalanche Energy <sup>(3)</sup>	$E_{AS}$	889	mJ
Power Dissipation <sup>(4)</sup>	$P_D$	$T_C = 25^\circ\text{C}$	417
		$T_C = 100^\circ\text{C}$	167
Junction & Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C





**Electrical Characteristics** (@  $T_J = 25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	150			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 120\text{V}, V_{GS} = 0\text{V}$			1.0	$\mu\text{A}$
					5.0	
Gate-Body Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$			$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2.5	3.2	4.5	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$		3.8	4.8	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{V}, I_D = 20\text{A}$		65		S
Diode Forward Voltage	$V_{SD}$	$I_S = 1\text{A}, V_{GS} = 0\text{V}$		0.71	1.0	V
Diode Continuous Current	$I_S$	$T_C = 25^\circ\text{C}$			417	A

**DYNAMIC PARAMETERS** <sup>(5)</sup>

Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{V}, V_{DS} = 75\text{V}, f = 1\text{MHz}$		6540		pF
Output Capacitance	$C_{oss}$			772		pF
Reverse Transfer Capacitance	$C_{rss}$			6.7		pF
Gate Resistance	$R_g$	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$		2.4		$\Omega$

**SWITCHING PARAMETERS** <sup>(5)</sup>

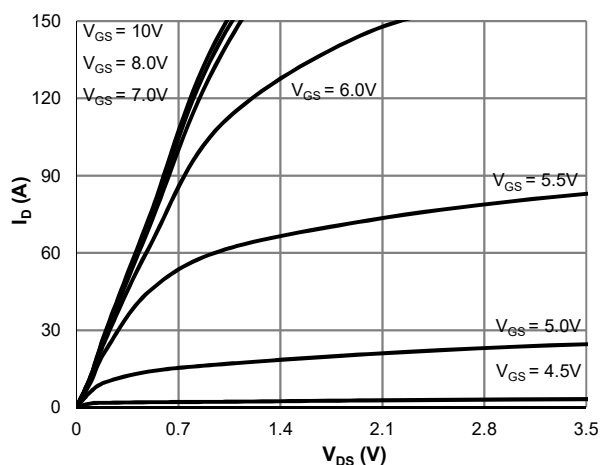
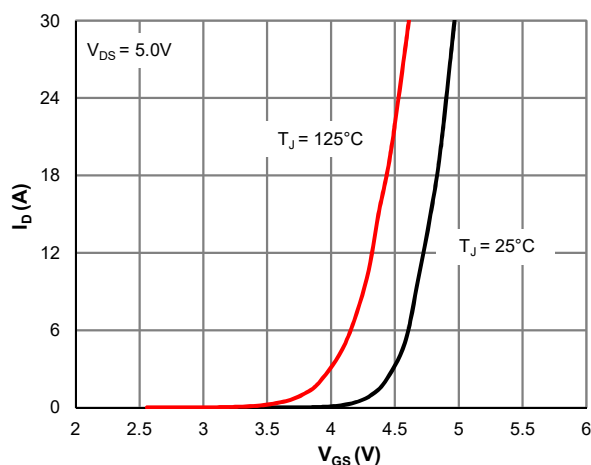
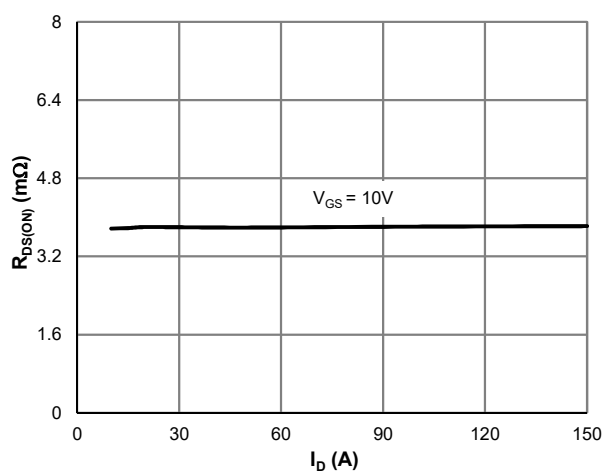
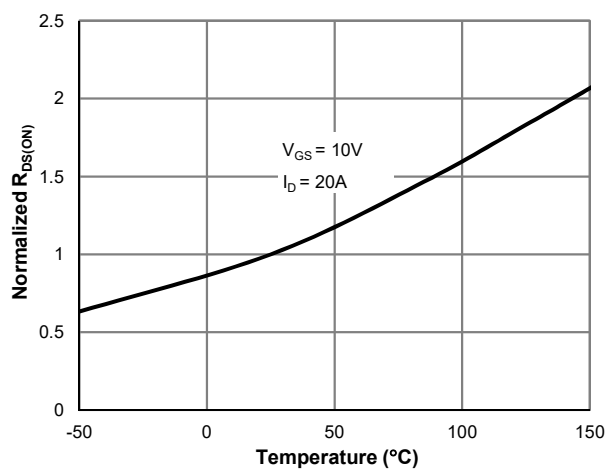
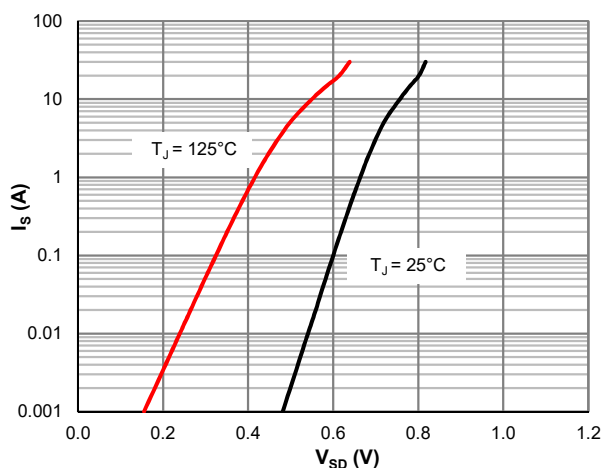
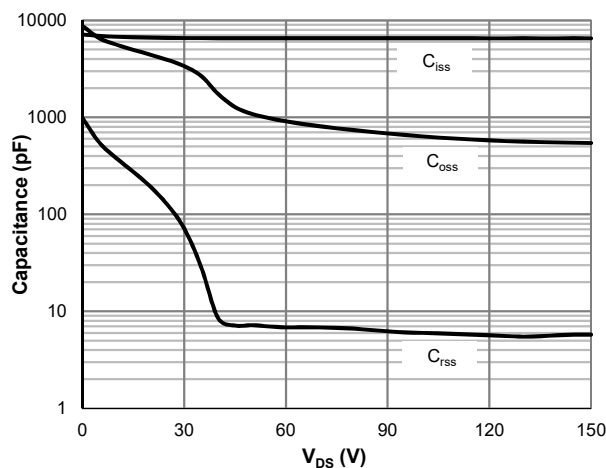
Total Gate Charge (@ $V_{GS} = 10\text{V}$ )	$Q_g$	$V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DS} = 75\text{V}, I_D = 20\text{A}$		88		nC
Total Gate Charge (@ $V_{GS} = 6.0\text{V}$ )	$Q_g$			57		nC
Gate Source Charge	$Q_{gs}$			32		nC
Gate Drain Charge	$Q_{gd}$			16		nC
Turn-On DelayTime	$t_{D(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 75\text{V}$ $R_L = 3.75\Omega, R_{GEN} = 6\Omega$		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	$t_{rr}$		$I_F = 15\text{A}, di_F/dt = 100\text{A}/\mu\text{S}$		122	
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F = 15\text{A}, di_F/dt = 100\text{A}/\mu\text{S}$		279		nC

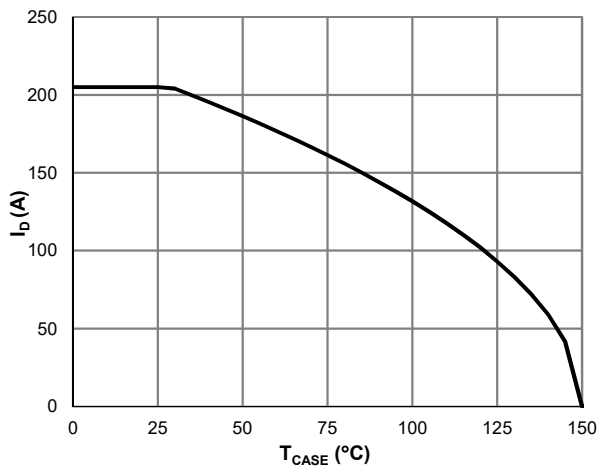
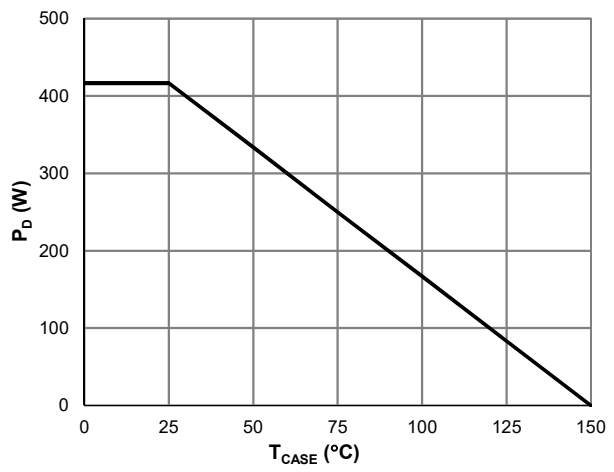
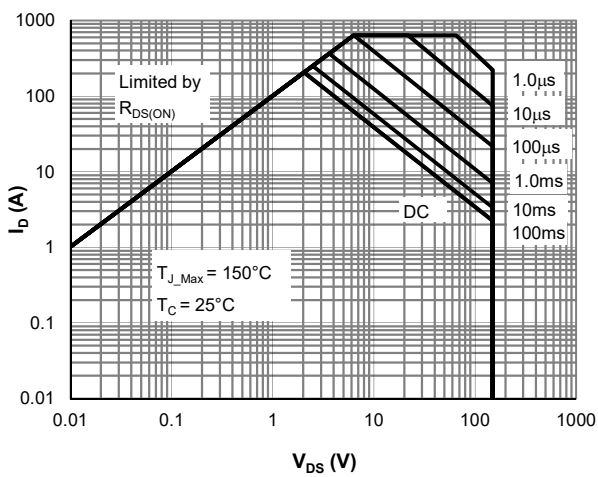
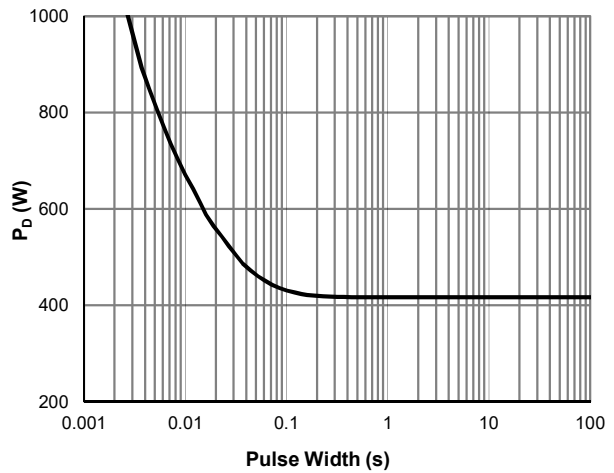
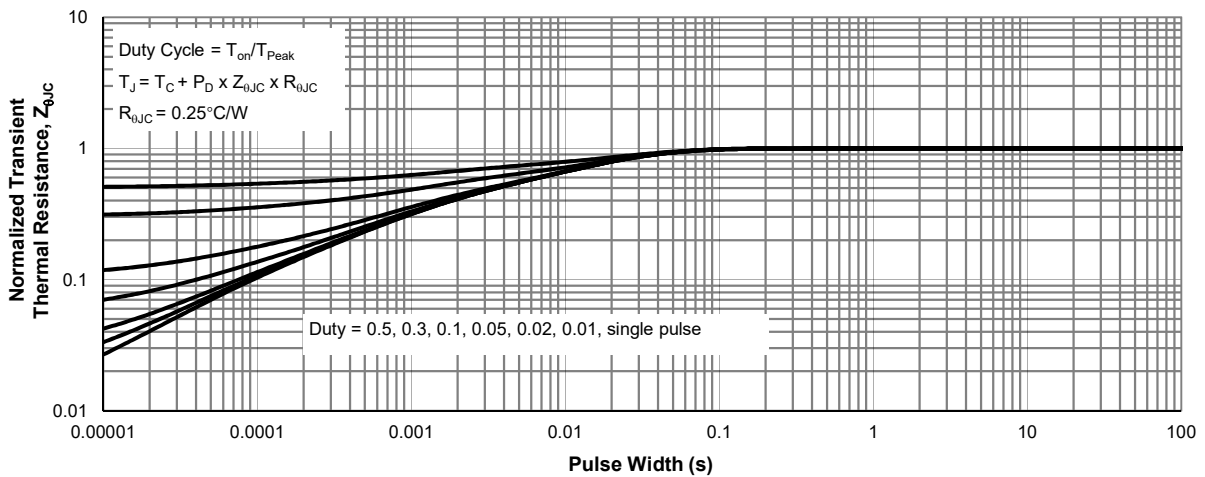
**Thermal Performance**

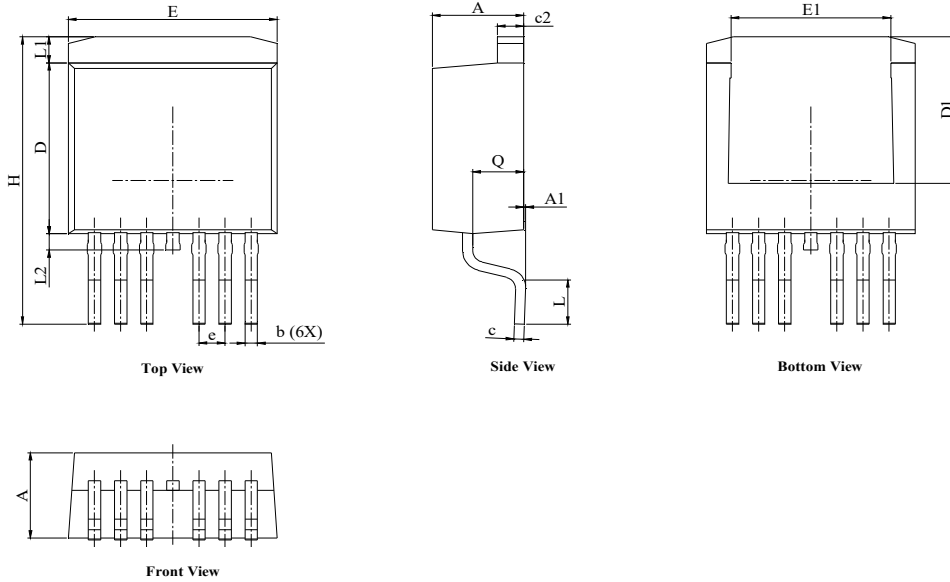
Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	43	52	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.25	0.30	$^\circ\text{C}/\text{W}$

**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  $T_{J\_Max} = 150^\circ\text{C}$ .
3. This single-pulse measurement was taken under the following condition [ $L = 300\mu\text{H}, V_{GS} = 10\text{V}, V_{DS} = 75\text{V}$ ] while its value is limited by  $T_{J\_Max} = 150^\circ\text{C}$ .
4. The power dissipation  $P_D$  is based on  $T_{J\_Max} = 150^\circ\text{C}$ .
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-263-7L Package Information**
**Package Outline**


DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.24	4.44	4.64
A1	0.00	0.10	0.25
b	0.50	0.60	0.70
c	0.40	0.50	0.60
c2	1.15	1.27	1.40
D	8.82	8.92	9.02
D1	7.65 REF.		
E	9.96	10.16	10.36
E1	6.80	7.80	8.00
e	1.27 BSC		
H	14.61	15.00	15.88
L	1.78	2.32	2.80
L1	1.36 REF.		
L2	1.20 REF.		
L3	0.25 BSC		
Q	2.30	2.48	2.70

**Recommended Soldering Footprint**
