



90V 3.6mΩ N-Ch Power MOSFET

Features

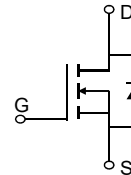
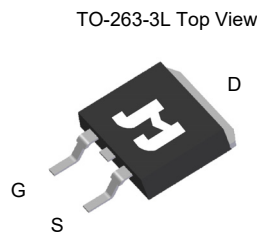
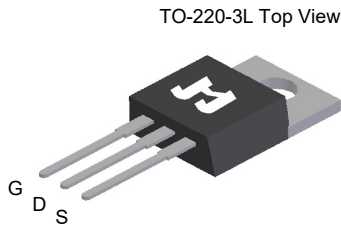
- Ultra-low $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100% R_g Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

Product Summary

Parameter	Value	Unit
V_{DS}	90	V
$V_{GS(th)}$	3.0	V
I_D (@ $V_{GS} = 10V$) ⁽¹⁾	151	A
$R_{DS(ON)}$ (@ $V_{GS} = 10V$)	3.6	mΩ

Applications

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

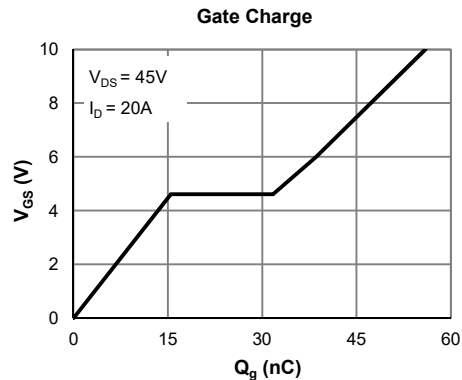
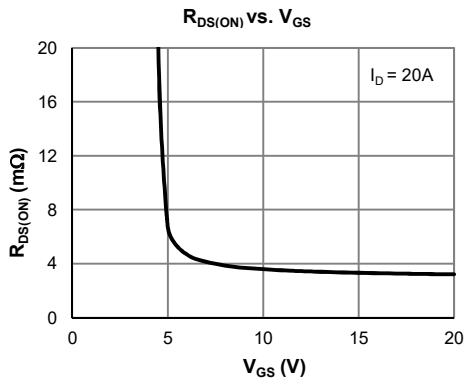


Ordering Information

Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
JMSH0904NC-U	TO-220-3L	3	SH0904N	NA	-55 to 150	Tube	50
JMSH0904NE-13	TO-263-3L	3	SH0904N	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}	90	V
Gate-to-Source Voltage	V_{GS}	±20	V
Continuous Drain Current ⁽¹⁾	I_D	$T_C = 25^\circ\text{C}$	151
		$T_C = 100^\circ\text{C}$	95
Pulsed Drain Current ⁽²⁾	I_{DM}	336	A
Avalanche Energy ⁽³⁾	E_{AS}	600	mJ
Power Dissipation ⁽⁴⁾	P_D	$T_C = 25^\circ\text{C}$	192
		$T_C = 100^\circ\text{C}$	76
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
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	90	98		V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 72\text{V}, V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$			1.0 5.0	μA
Gate-Body Leakage Current	I_{GSS}	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2.0	3.0	4.0	V
Static Drain-Source ON-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$	TO-263-3L	3.6	4.5	$\text{m}\Omega$
			TO-220-3L	3.8	4.8	$\text{m}\Omega$
Forward Transconductance	g_{FS}	$V_{DS} = 5\text{V}, I_D = 20\text{A}$		68		S
Diode Forward Voltage	V_{SD}	$I_S = 1\text{A}, V_{GS} = 0\text{V}$		0.67	1.0	V
Diode Continuous Current	I_S	$T_C = 25^\circ\text{C}$			151	A
DYNAMIC PARAMETERS ⁽⁵⁾						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{V}, V_{DS} = 45\text{V}, f = 1\text{MHz}$		3525		pF
Output Capacitance	C_{oss}			960		pF
Reverse Transfer Capacitance	C_{rss}			22		pF
Gate Resistance	R_g	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$		2.8		Ω
SWITCHING PARAMETERS ⁽⁵⁾						
Total Gate Charge (@ $V_{GS} = 10\text{V}$)	Q_g	$V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DS} = 45\text{V}, I_D = 20\text{A}$		56		nC
Total Gate Charge (@ $V_{GS} = 6.0\text{V}$)	Q_g			37		nC
Gate Source Charge	Q_{gs}			15.5		nC
Gate Drain Charge	Q_{gd}			16.2		nC
Turn-On Delay Time	$t_{D(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 45\text{V}$ $R_L = 2.3\Omega, R_{GEN} = 3\Omega$		15.4		ns
Turn-On Rise Time	t_r			29		ns
Turn-Off Delay Time	$t_{D(off)}$			38		ns
Turn-Off Fall Time	t_f			24		ns
Body Diode Reverse Recovery Time	t_{rr}		$I_F = 20\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$		57	
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F = 20\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$		69		nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	45	52	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.65	0.80	$^\circ\text{C}/\text{W}$

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. E_{AS} of 600 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 3.0\text{mH}$, $I_{AS} = 20\text{A}$, $V_{GS} = 10\text{V}$, $V_{DD} = 45\text{V}$; 100% test at $L = 0.3\text{mH}$, $I_{AS} = 42\text{A}$, $T_{J_Max} = 150^\circ\text{C}$.
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

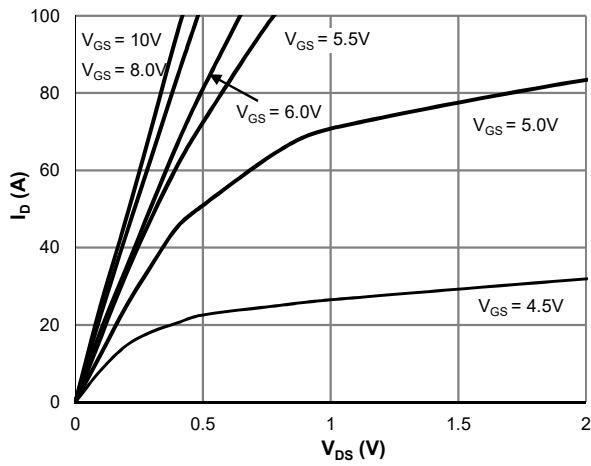


Figure 1: Saturation Characteristics

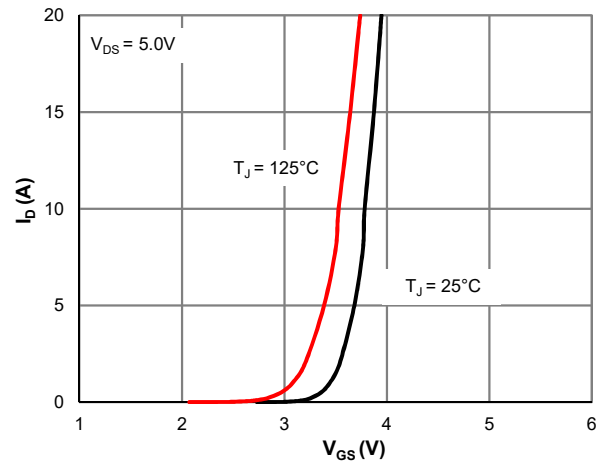


Figure 2: Transfer Characteristics

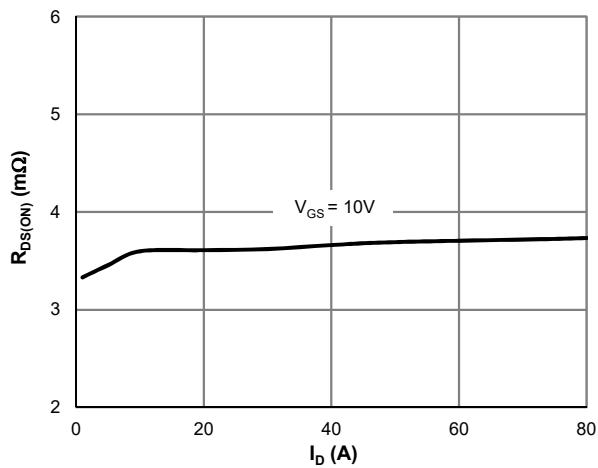


Figure 3: $R_{DS(ON)}$ vs. Drain Current

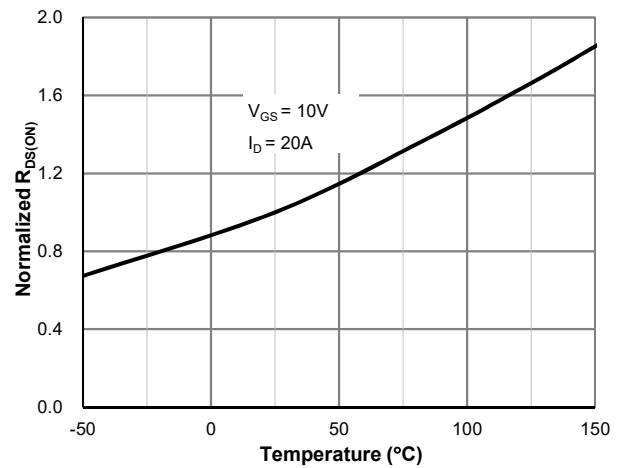


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

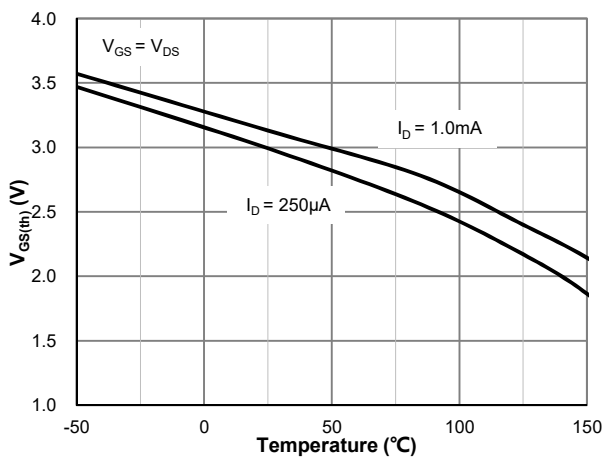


Figure 5: $V_{GS(th)}$ vs. Junction Temperature

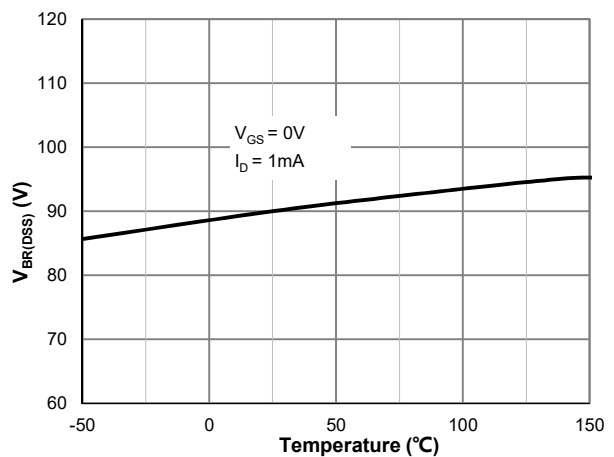


Figure 6: $V_{BR(DSS)}$ vs. Junction Temperature

Typical Electrical & Thermal Characteristics

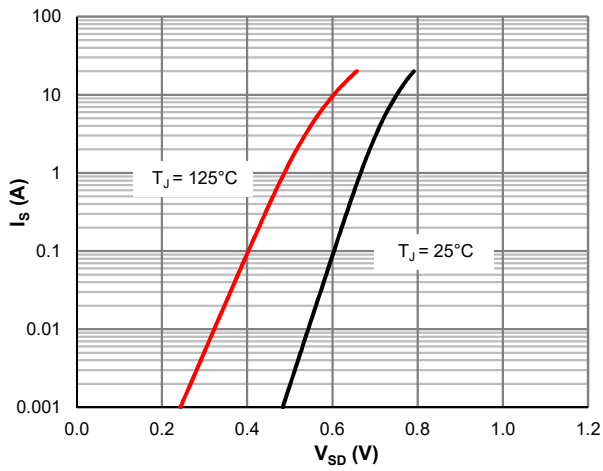


Figure 7: Body-Diode Characteristics

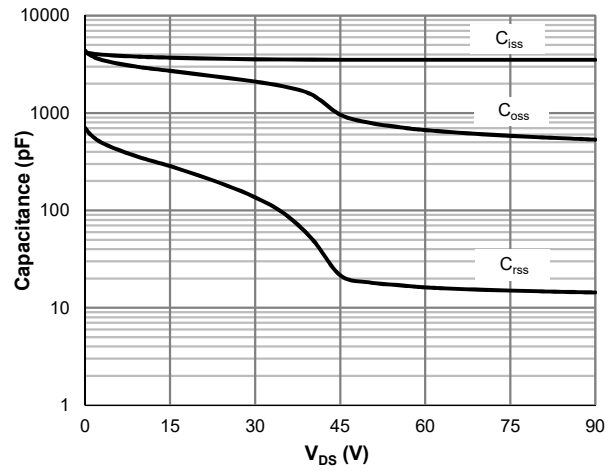


Figure 8: Capacitance Characteristics

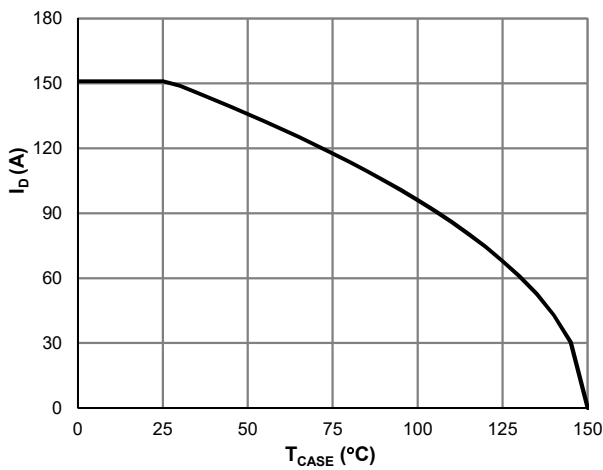


Figure 9: Current De-rating

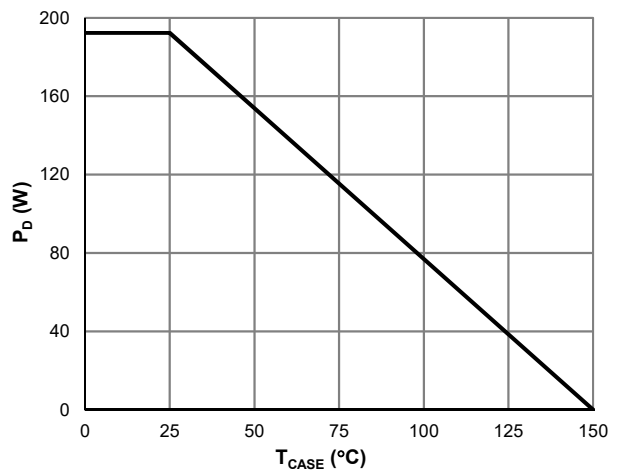


Figure 10: Power De-rating

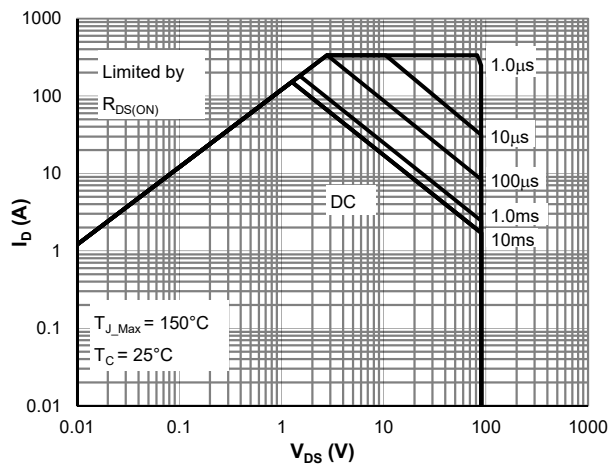


Figure 11: Maximum Safe Operating Area

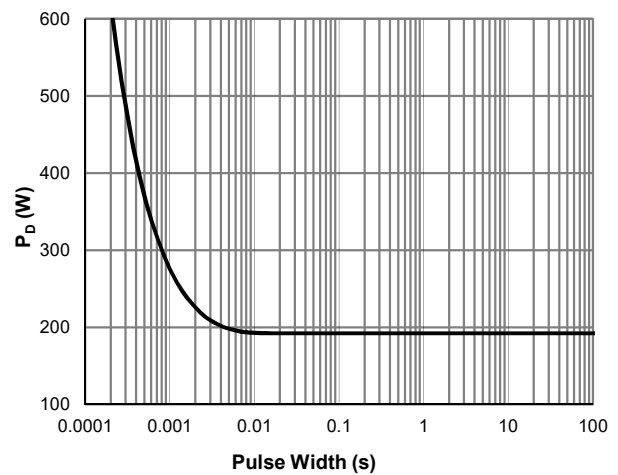


Figure 12: Single Pulse Power Rating, Junction-to-Case



Typical Electrical & Thermal Characteristics

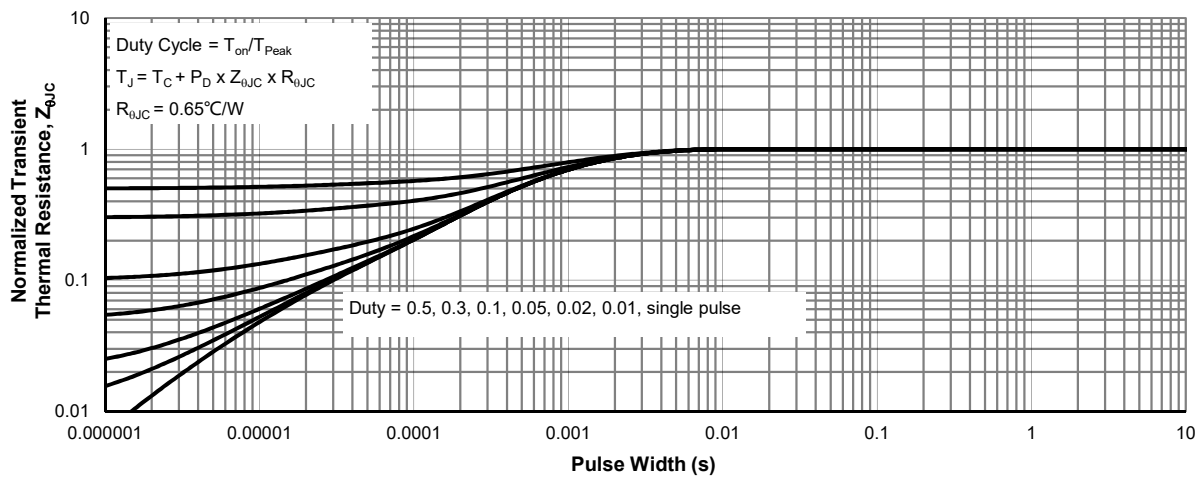
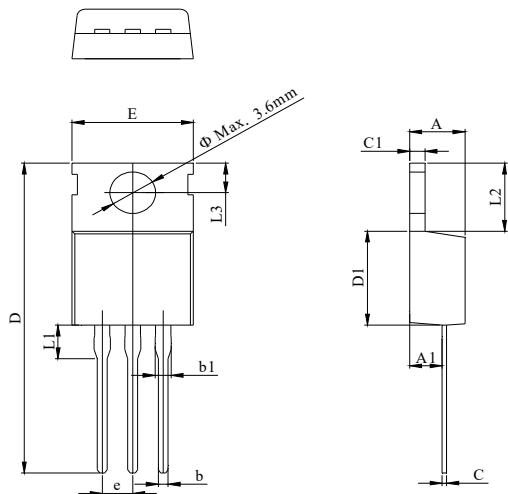


Figure 13: Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information

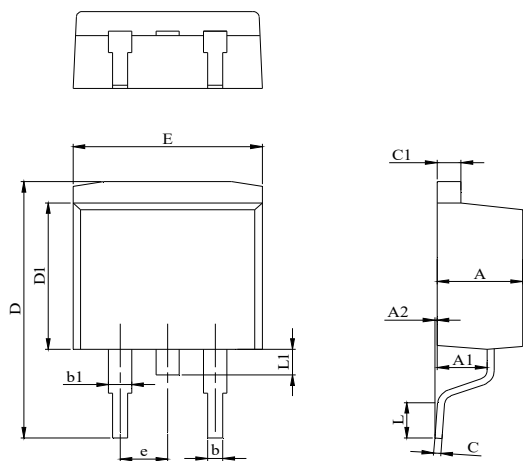
Package Outline



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.24		4.70
A1	2.20		3.00
b	0.70		0.95
b1	1.14		1.70
C	0.40		0.60
C1	1.15		1.40
D	28.00		29.80
D1	8.80		9.90
E	9.70		10.50
L1			3.80
L2	6.25		6.90
L3	2.40		3.00
e		2.54 BSC	

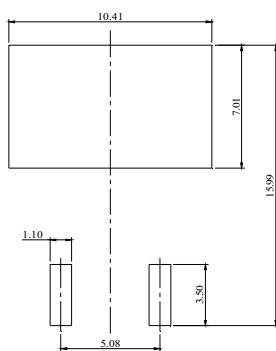
TO-263-3L Package Information

Package Outline



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.24		4.77
A1	2.30		2.89
A2	0.00	0.10	0.25
b	0.70		0.96
b1	1.17		1.70
C	0.30		0.60
C1	1.15		1.42
D	14.10		15.88
D1	8.50		9.60
E	9.78		10.36
L	1.78		2.79
L1			1.75
e		2.54	

Recommend Soldering Footprint



DIMENSIONS: MILLIMETERS