



## 100V 2.1mΩ N-Ch Power MOSFET

### Features

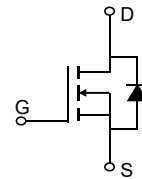
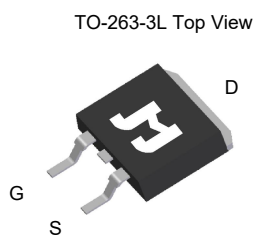
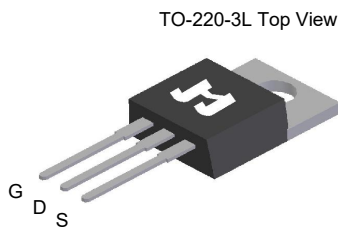
- Ultra-low  $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100%  $R_g$  Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

### Product Summary

Parameter	Value	Unit
$V_{DS}$	100	V
$V_{GS(th)}$ Typ	2.9	V
$I_D$ (@ $V_{GS} = 10V$ ) <sup>(1)</sup>	193	A
$R_{DS(ON)}$ Typ (@ $V_{GS} = 10V$ )	2.1	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

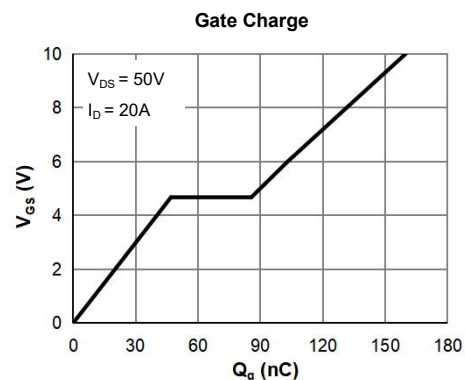
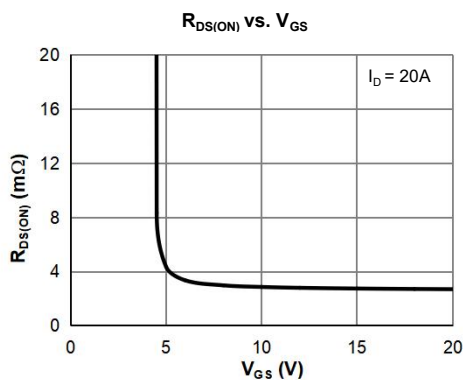


### Ordering Information

Device	Package	# of Pins	Marking	MSL	$T_J$ (°C)	Media	Quantity (pcs)
JMSH1002TC-U	TO-220-3L	3	SH1002T	NA	-55 to 150	Tube	50
JMSH1002TE-13	TO-263-3L	3	SH1002T	3	-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	$V_{DS}$	100	V
Gate-to-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current <sup>(1)</sup>	$I_D$	$T_C = 25^\circ\text{C}$	193
		$T_C = 100^\circ\text{C}$	121
Pulsed Drain Current <sup>(2)</sup>	$I_{DM}$	772	A
Avalanche Energy <sup>(3)</sup>	$E_{AS}$	1536	mJ
Power Dissipation <sup>(4)</sup>	$P_D$	$T_C = 25^\circ\text{C}$	178
		$T_C = 100^\circ\text{C}$	71
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	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	100			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 80\text{V}, V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$			1.0 5.0	$\mu\text{A}$
Gate-Body Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$			$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2.0	2.9	4.0	V
Static Drain-Source ON-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$	TO-263-3L	2.1	2.4	$\text{m}\Omega$
			TO-220-3L	2.2	2.6	$\text{m}\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{V}, I_D = 20\text{A}$		56.7		S
Diode Forward Voltage	$V_{SD}$	$I_S = 1\text{A}, V_{GS} = 0\text{V}$		0.70	1.0	V
Diode Continuous Current	$I_S$	$T_C = 25^\circ\text{C}$			178	A

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

Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{V}, V_{DS} = 50\text{V}, f = 1\text{MHz}$		10093		pF
Output Capacitance	$C_{oss}$			1559		pF
Reverse Transfer Capacitance	$C_{rss}$			67		pF
Gate Resistance	$R_g$	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$		3.2		$\Omega$

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

Total Gate Charge (@ $V_{GS} = 10\text{V}$ )	$Q_g$	$V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DS} = 50\text{V}, I_D = 20\text{A}$		160		nC
Total Gate Charge (@ $V_{GS} = 6\text{V}$ )	$Q_g$			103		nC
Gate Source Charge	$Q_{gs}$			47		nC
Gate Drain Charge	$Q_{gd}$			39		nC
Turn-On DelayTime	$t_{D(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 50\text{V}$ $R_L = 2.5\Omega, R_{GEN} = 3\Omega$		26		ns
Turn-On Rise Time	$t_r$			43		ns
JMSH1002TC-U	$t_{D(off)}$			113		ns
JMSH1002TE-13	$t_r$			64		ns
Body Diode Reverse Recovery Time	$t_{rr}$		$I_F = 15\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$		100	
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F = 15\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$		258		nC

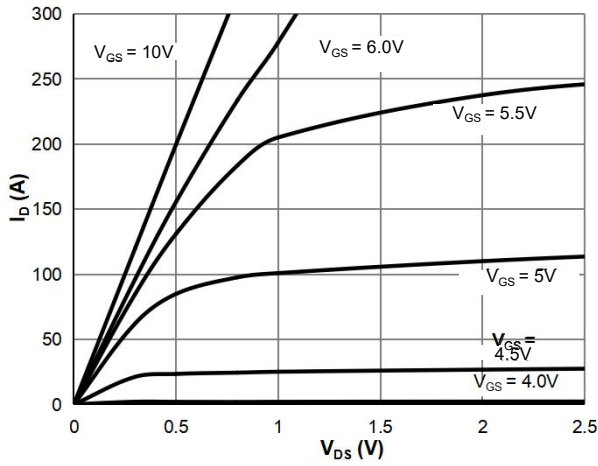
**Thermal Performance**

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	52	59	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.63	0.70	$^\circ\text{C}/\text{W}$

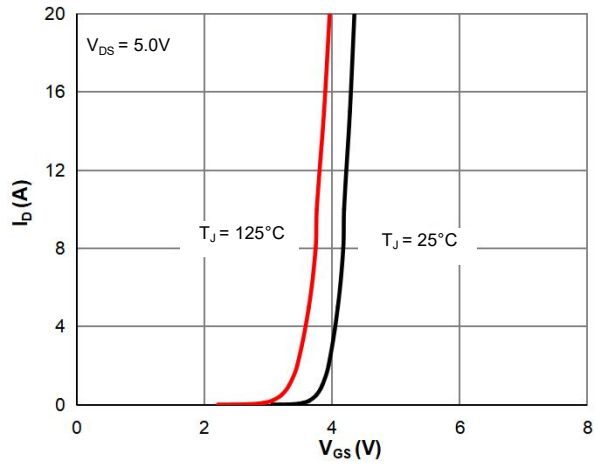
**Notes:**

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 1536 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 3.0\text{mH}$ ,  $I_{AS} = 45\text{A}$ ,  $V_{GS} = 10\text{V}$ ,  $V_{DD} = 50\text{V}$ ; 100% test at  $L = 0.5\text{mH}$ ,  $I_{AS} = 64\text{A}$ .
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.

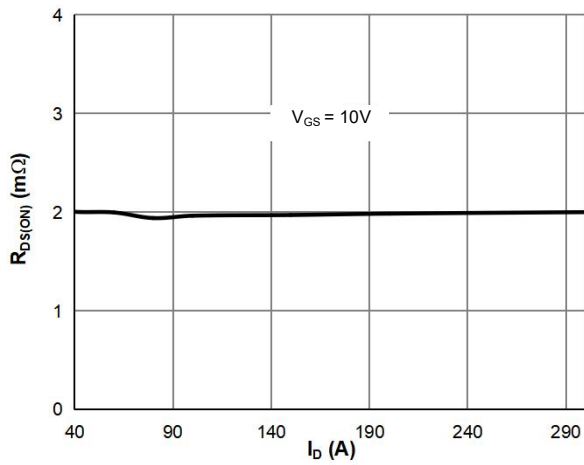
**Typical Electrical & Thermal Characteristics**



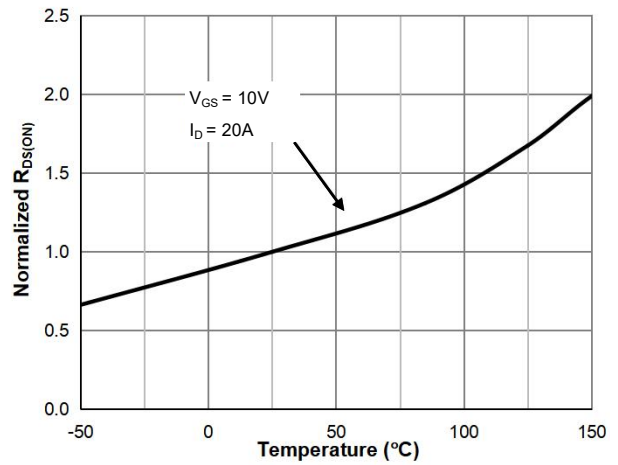
**Figure 1: Saturation Characteristics**



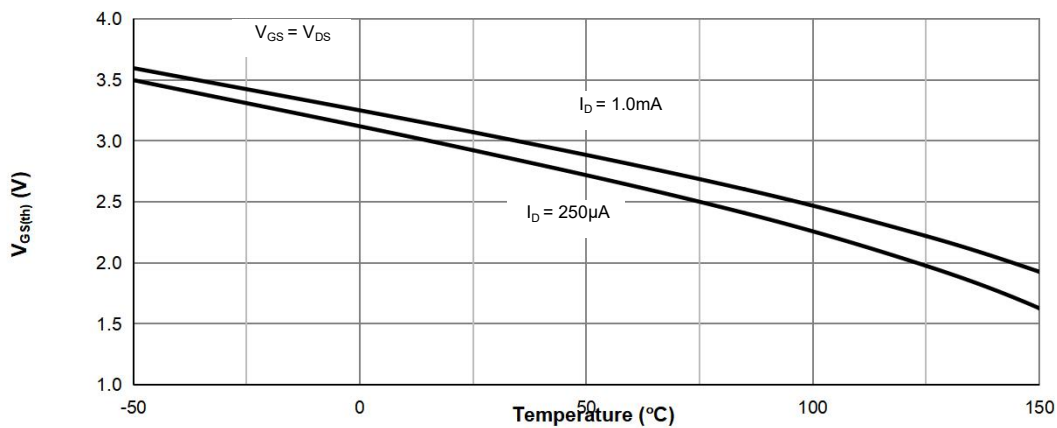
**Figure 2: Transfer Characteristics**



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



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



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

Typical Electrical & Thermal Characteristics

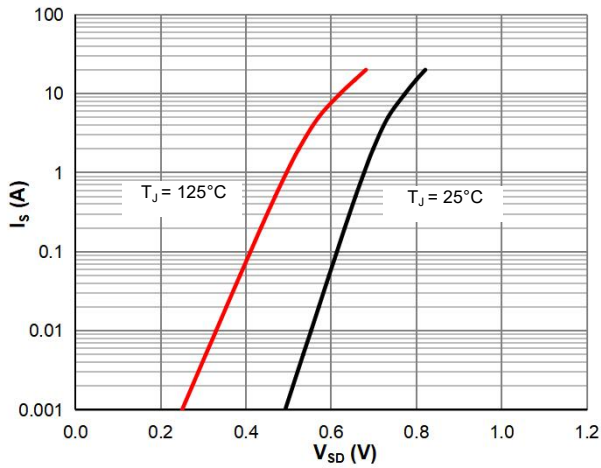


Figure 7: Body-Diode Characteristics

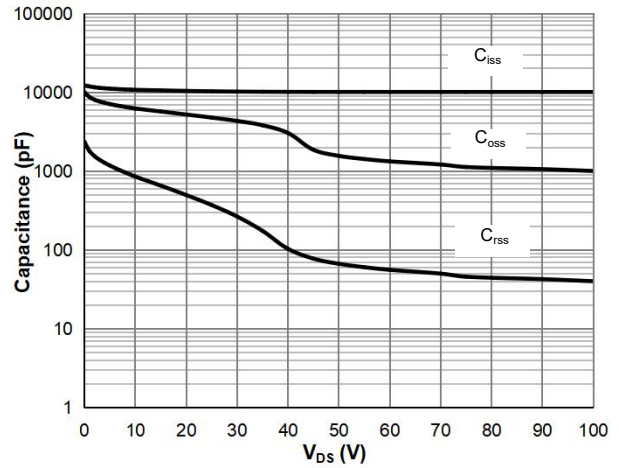


Figure 8: Capacitance Characteristics

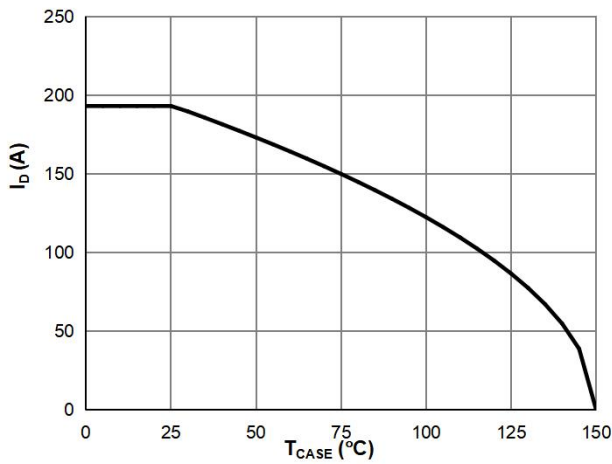


Figure 9: Current De-rating

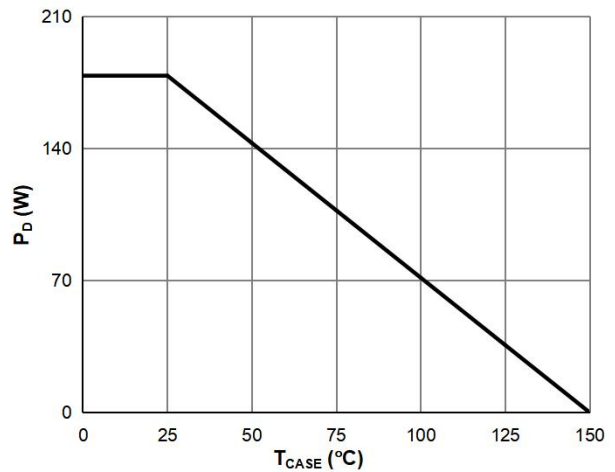


Figure 10: Power De-rating

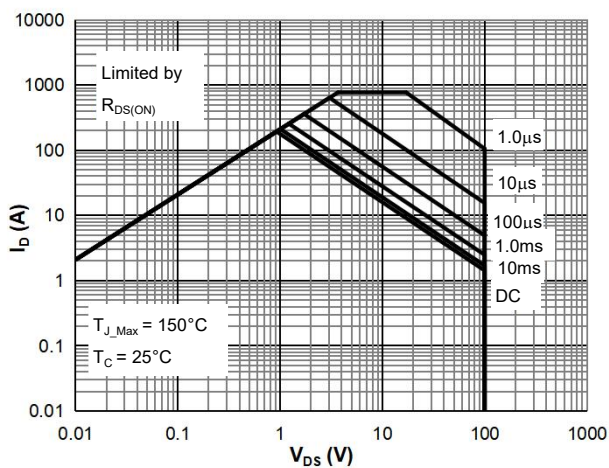


Figure 11: Maximum Safe Operating Area

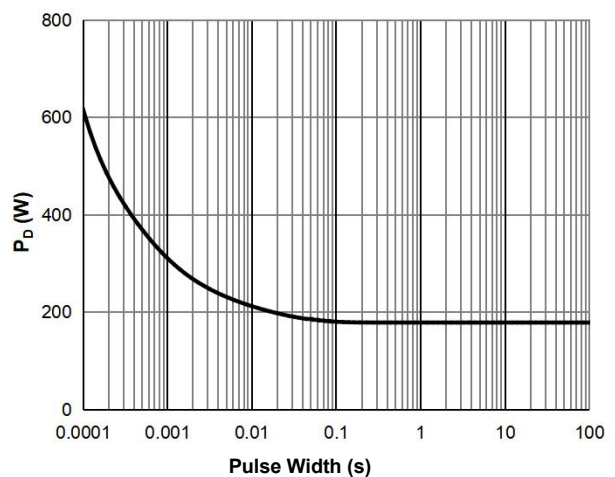


Figure 12: Single Pulse Power Rating, Junction-to-Case

Typical Electrical & Thermal Characteristics

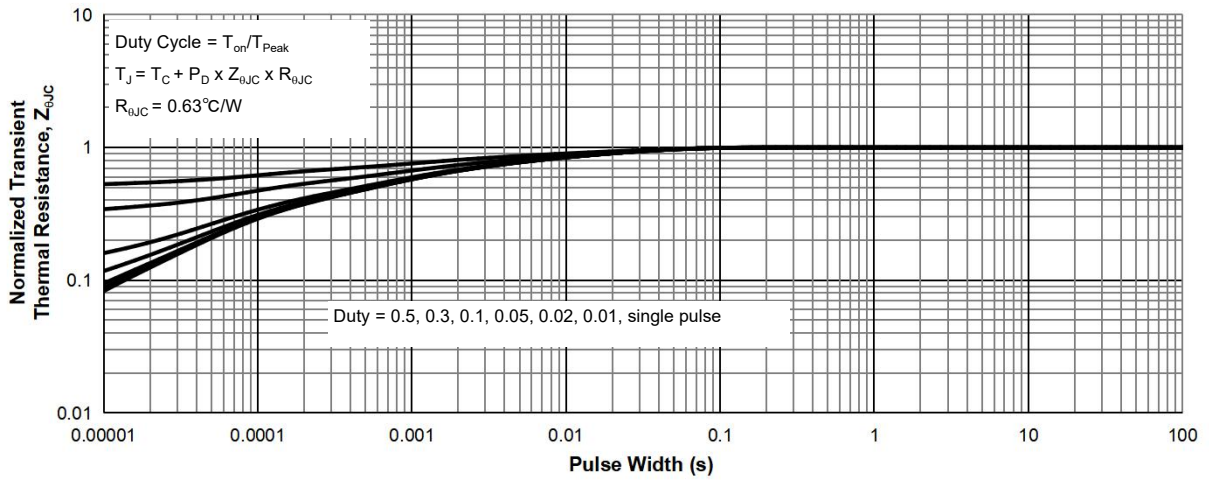
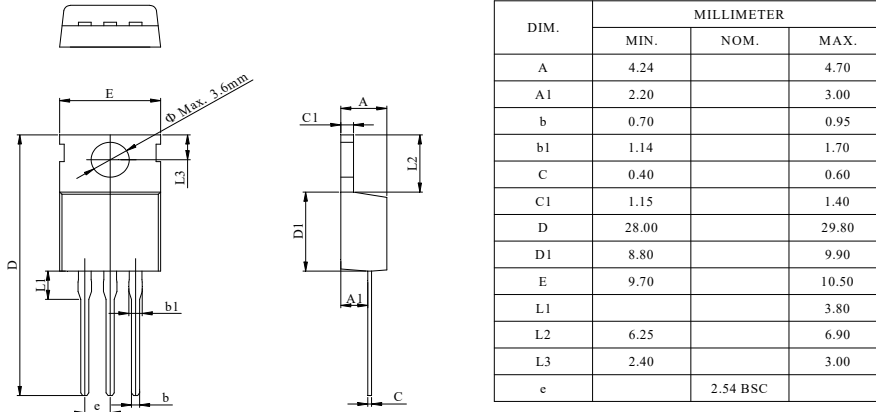


Figure 13: Normalized Maximum Transient Thermal Impedance

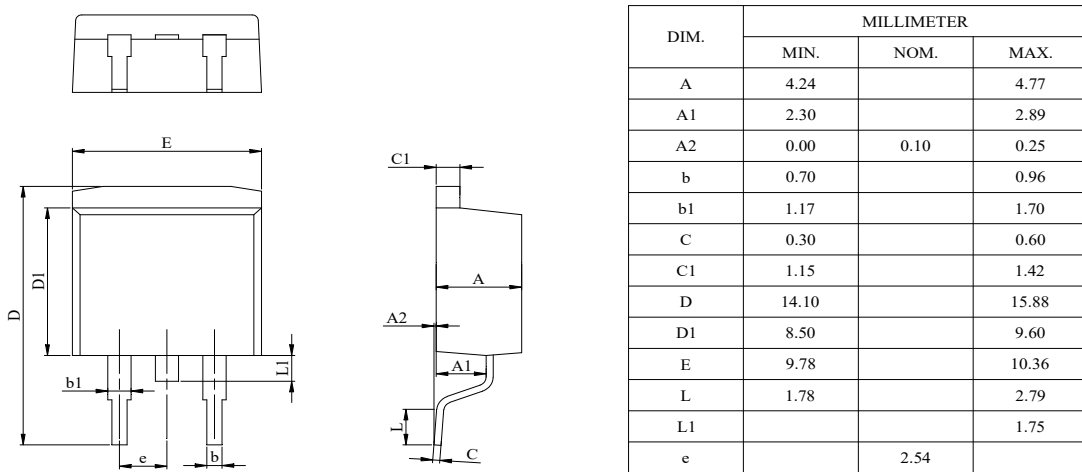
**TO-220-3L Package Information**

**Package Outline**



**TO-263-3L Package Information**

**Package Outline**



**Recommend Soldering Footprint**

