



## 100V 3.5mΩ N-Ch Power MOSFET

### Features

- Ultra-low  $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability
- 100% UIS Tested, 100%  $R_g$  Tested

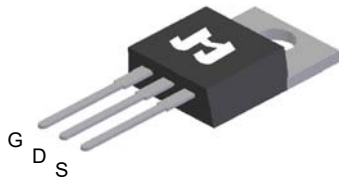
### Applications

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

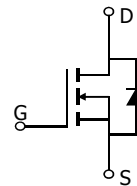
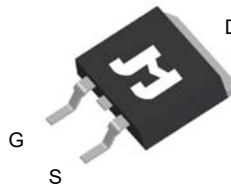
### Product Summary

Parameter	Typ.	Unit
$V_{DS}$	100	V
$V_{GS(th)}$	2.8	V
$I_D$ (@ $V_{GS} = 10V$ )	153	A
$R_{DS(ON)}$ (@ $V_{GS} = 10V$ )	3.5	mΩ

TO220-3L Top View



TO263-3L Top View

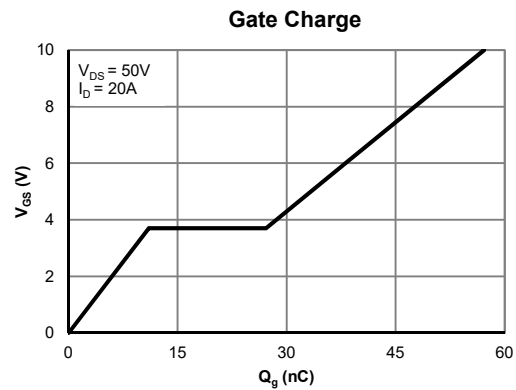
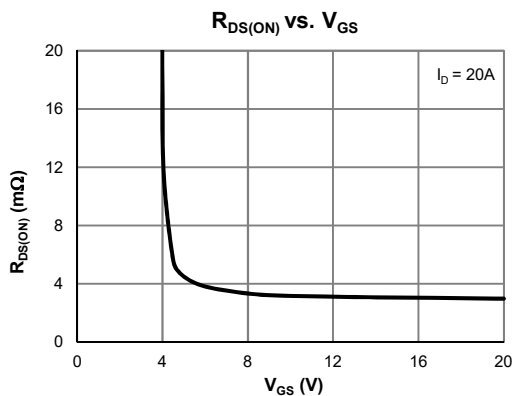


### Ordering information

Device	Package	# of Pins	Marking	MSL	$T_J$ (°C)	Media	Quantity (pcs)
JMSH1004BC-U	TO220-3L	3	SH1004B	N/A	-55 to 175	Tube	50
JMSH1004BE-13	TO263-3L	3	SH1004B	3	-55 to 175	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	$V_{GS}$	$\pm 20$	V
Continuous Drain Current (Silicon Limited)	$I_D$	$T_C = 25^\circ\text{C}$	153
		$T_C = 100^\circ\text{C}$	108
Pulsed Drain Current	$I_{DM}$	560	A
Avalanche Current	$I_{AS}$	55	A
Avalanche Energy (@ $L = 0.1\text{mH}$ )	$E_{AS}$	151	mJ
Power Dissipation	$P_D$	$T_C = 25^\circ\text{C}$	188
		$T_C = 100^\circ\text{C}$	94
Junction & Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	°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	$V_{(BR)DSS}$	$I_D = 1\text{mA}, V_{GS} = 0\text{V}$	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	$\mu\text{A}$
					5	
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	2.8	4	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$		3.5	4.2	$\text{m}\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{V}, I_D = 20\text{A}$		70		S
Diode Forward Voltage	$V_{SD}$	$I_S = 1\text{A}, V_{GS} = 0\text{V}$		0.7	1	V
Diode Continuous Current	$I_S$	$T_C = 25^\circ\text{C}$			188	A

**DYNAMIC PARAMETERS**

Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{V}, V_{DS} = 50\text{V}, f = 1\text{MHz}$		3433		pF
Output Capacitance	$C_{oss}$			905		pF
Reverse Transfer Capacitance	$C_{rss}$			13		pF
Gate Resistance	$R_g$	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$		2.2		$\Omega$

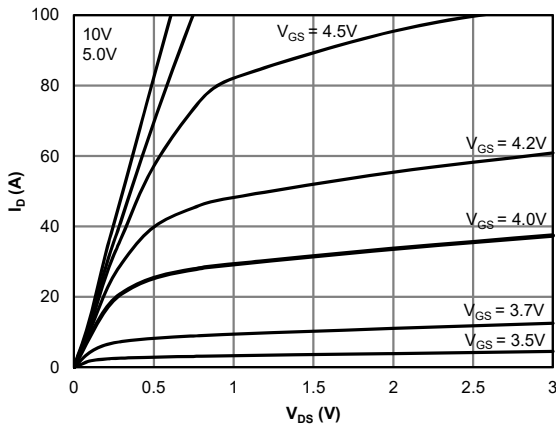
**SWITCHING PARAMETERS**

Total Gate Charge (@ $V_{GS} = 10\text{V}$ )	$Q_g$	$V_{GS} = 10\text{V}, V_{DS} = 50\text{V}, I_D = 20\text{A}$		57.2		nC
Total Gate Charge (@ $V_{GS} = 6\text{V}$ )	$Q_g$			38.1		nC
Gate Source Charge	$Q_{gs}$			11		nC
Gate Drain Charge	$Q_{gd}$			16.1		nC
Turn-On DelayTime	$t_{D(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 50\text{V}$ $R_L = 2.5\Omega, R_{GEN} = 6\Omega$		14.1		ns
Turn-On Rise Time	$t_r$			34.4		ns
Turn-Off DelayTime	$t_{D(off)}$			60.3		ns
Turn-Off Fall Time	$t_f$			50.1		ns
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 20\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$		77.8		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F = 20\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$		179.8		nC

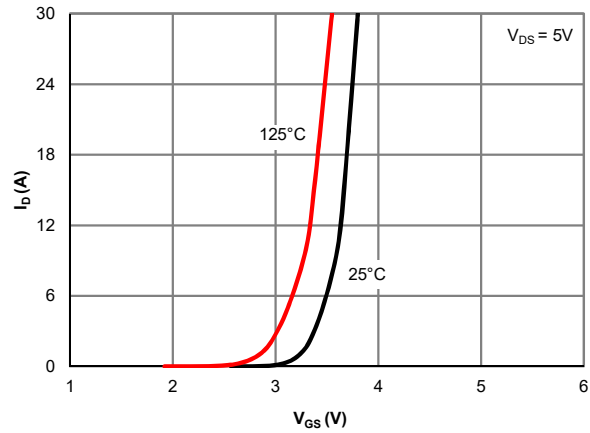
**Thermal Performance**

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	45	55	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.65	0.8	$^\circ\text{C}/\text{W}$

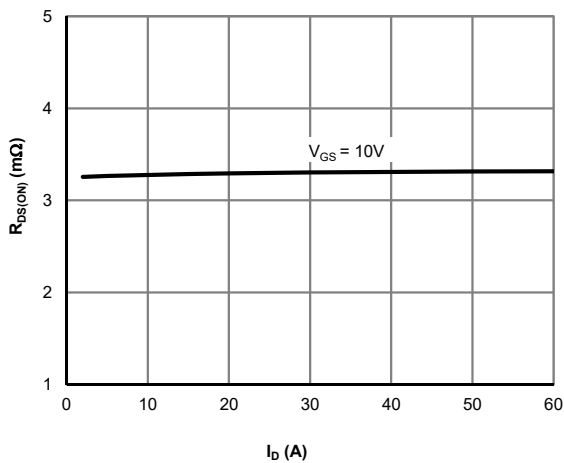
**Typical Electrical & Thermal Characteristics**



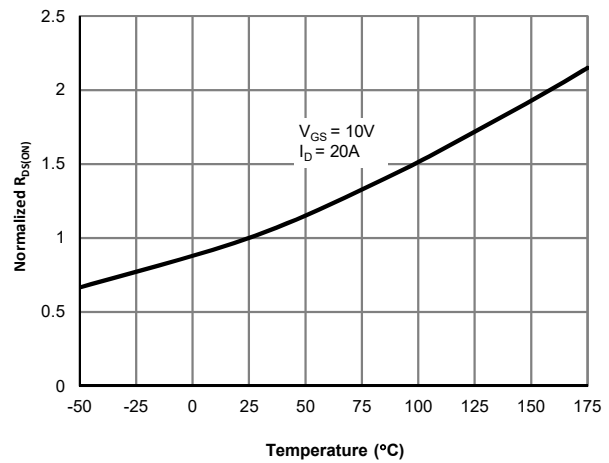
**Figure 1: Saturation Characteristics**



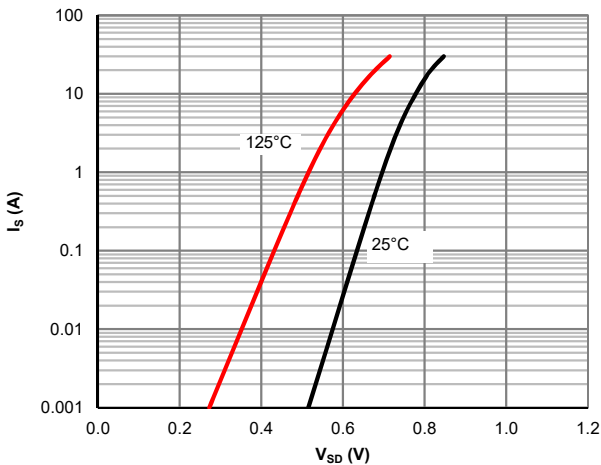
**Figure 2: Transfer Characteristics**



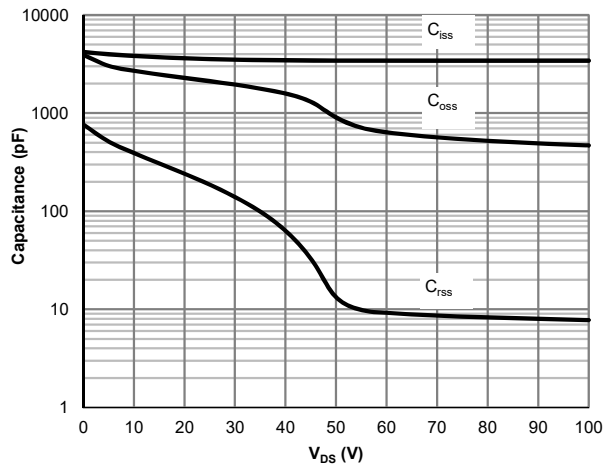
**Figure 3:  $R_{DS(ON)}$  vs. Drain Current**



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



**Figure 5: Body-Diode Characteristics**



**Figure 6: Capacitance Characteristics**



Typical Electrical & Thermal Characteristics

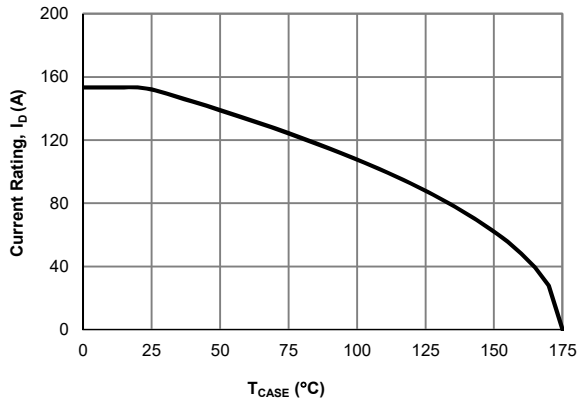


Figure 7: Current De-rating

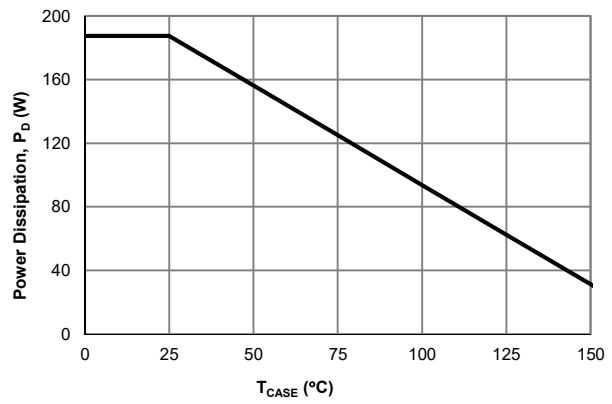


Figure 8: Power De-rating

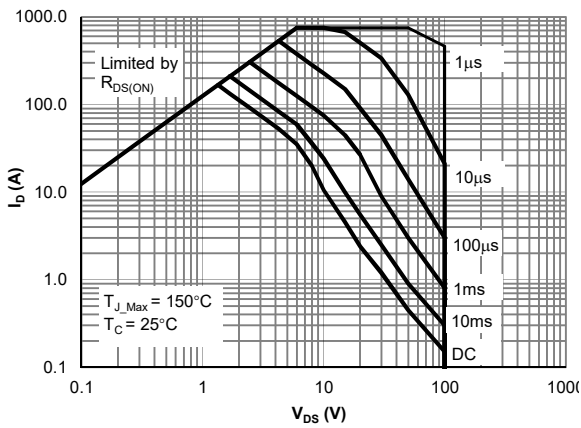


Figure 9: Maximum Safe Operating Area

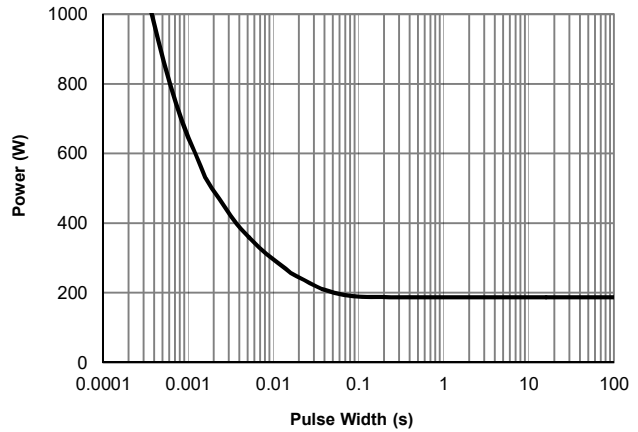


Figure 10: Single Pulse Power Rating, Junction-to-Case

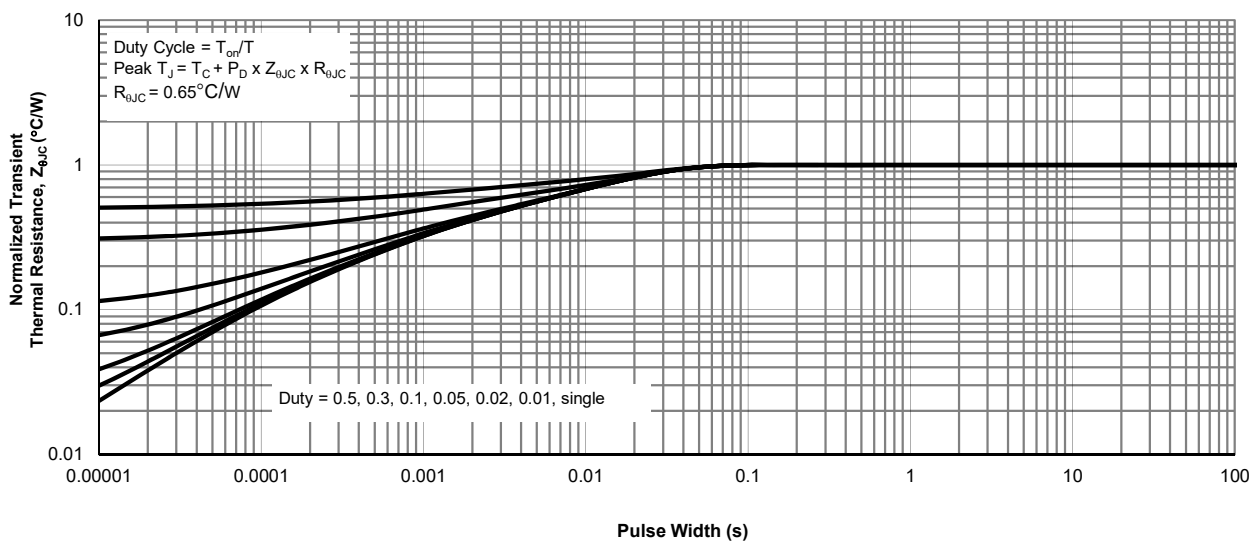
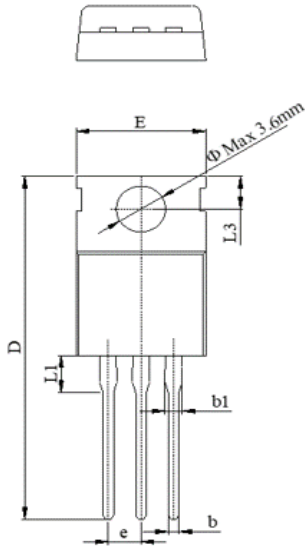


Figure 11: Normalized Maximum Transient Thermal Impedance

**TO220-3L Package Information** (All units in mm)

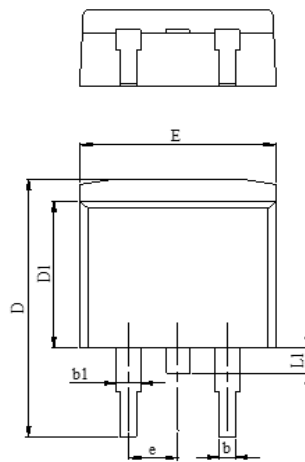
**Package Outline**



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.37		4.70
A1	2.20		3.00
b	0.70		0.95
b1	1.14		1.70
C	0.45		0.60
C1	1.23		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	

**TO263-3L Package Information** (All units in mm)

**Package Outline**



DIM	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.37		4.77
A1	2.30		2.89
A2	0.00	0.10	0.25
b	0.70		0.96
b1	1.17		1.47
C	0.30		0.55
C1	1.22		1.42
D	14.10		15.80
D1	8.50		9.60
E	9.86		10.36
L	2.00		2.60
L1			1.75
e		2.54	

**Recommended Footprint**

