



Features

- Ultra-low $R_{DS(ON)}$
- Low Gate Charge

Product Summary

	Value	Unit
	100	V
	2.8	V
I_D (@ $V_{GS} = 10V$) ⁽¹⁾	284	A
$R_{DS(ON)}$ (@ $V_{GS} = 10V$)	2.2	m

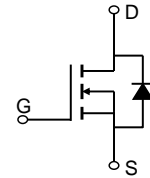
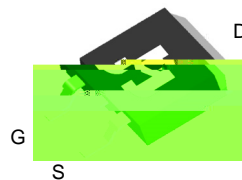
Applications

- 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

TO-220-3L Top View



TO-263-3L Top View



Ordering Information

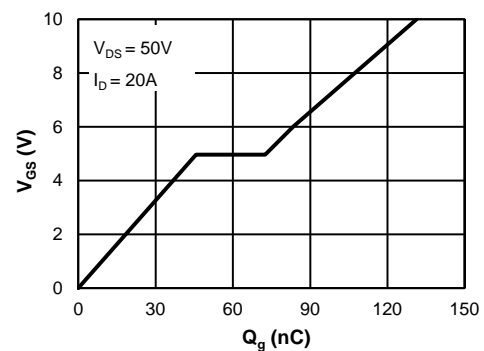
Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
JMSH1002NC-U	TO-220-3L	3	SH1002N	N/A	-55 to 150	Tube	50
	TO-263-3L	3	SH1002N	1	-55 to 150	13-inch Reel	800

	Symbol	Unit
Drain-to-Source Voltage	V_{DS}	1 d
	V_{GS}	V
Continuous Drain Current ⁽¹⁾	$T_C = 25^\circ C$	284
	$T_C = 100^\circ C$	179
Pulsed Drain Current ⁽²⁾	I_{DM}	1136
Avalanche Energy ⁽³⁾	E_{AS}	1350
Power Dissipation ⁽⁴⁾	$T_C = 25^\circ C$	416
	$T_C = 100^\circ C$	166
Junction & Storage Temperature Range	T_J, T_{STG}	-55 to 150

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

$I_D = 20A$

Gate Charge



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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\text{ A}, V_{GS} = 0\text{ V}$	100	106		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	A
Gate-Body Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ A}$	2.0	2.8	4.0	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$				
		TO-263-3L		2.2	2.8	m
		TO-220-3L		2.4	2.9	m
Forward Transconductance	g_{FS}	$V_{DS} = 50\text{ V}, I_D = 20\text{ A}$		67		S
Diode Forward Voltage	V_{SD}	$I_S = 1\text{ A}, V_{GS} = 0\text{ V}$		0.66	1.0	V
Diode Continuous Current	I_S	$T_C = 25^\circ\text{C}$			284	A
DYNAMIC PARAMETERS ⁽⁵⁾						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}, f = 1\text{ MHz}$		9256		pF
Output Capacitance	C_{oss}			1318		pF
Reverse Transfer Capacitance	C_{rss}			30		pF
Gate Resistance	R_g	$V_{GS} = 0\text{ V}, V_{DS} = 0\text{ V}, f = 1\text{ MHz}$		1.0		
SWITCHING PARAMETERS ⁽⁵⁾						
Total Gate Charge (@ $V_{GS} = 10\text{ V}$)	Q_g	$V_{GS} = 0\text{ to }10\text{ V}$ $V_{DS} = 50\text{ V}, I_D = 20\text{ A}$		131		nC
Total Gate Charge (@ $V_{GS} = 6.0\text{ V}$)	Q_g			83		nC
Gate Source Charge	Q_{gs}			46		nC
Gate Drain Charge	Q_{gd}			27		nC
Turn-On Delay Time	$t_{D(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 50\text{ V}$ $R_L = 2.5\ \Omega, R_{GEN} = 3\ \Omega$		33		ns
Turn-On Rise Time	t_r			33		ns
Turn-Off Delay Time	$t_{D(off)}$			63		ns
Turn-Off Fall Time	t_f			23		ns
Body Diode Reverse Recovery Time	t_{rr}		$I_F = 20\text{ A}, dI_F/dt = 100\text{ A}/\text{s}$		91	
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F = 20\text{ A}, dI_F/dt = 100\text{ A}/\text{s}$		250		nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	R_{JA}	45	55	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	R_{JC}	0.30	0.40	$^\circ\text{C}/\text{W}$

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 1350 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 3.0\text{ mH}$, $I_{AS} = 30\text{ A}$, $V_{GS} = 10\text{ V}$, $V_{DD} = 50\text{ V}$; 100% test at $L = 0.3\text{ mH}$, $I_{AS} = 62\text{ A}$.
 $T_{J_Max} = 150^\circ\text{C}$.
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

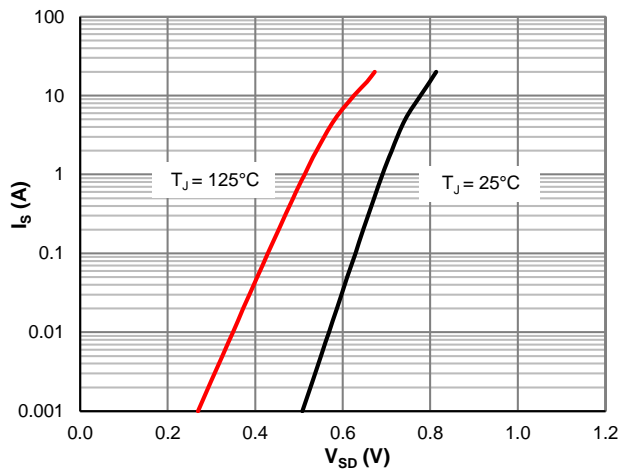


Figure 7: Body-Diode Characteristics

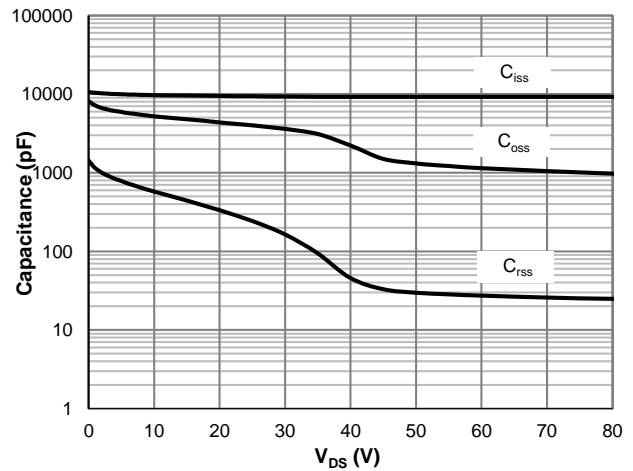


Figure 8: Capacitance Characteristics

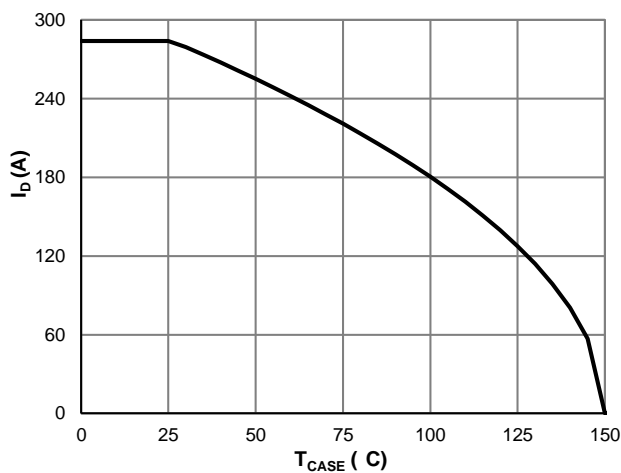


Figure 9: Current De-rating

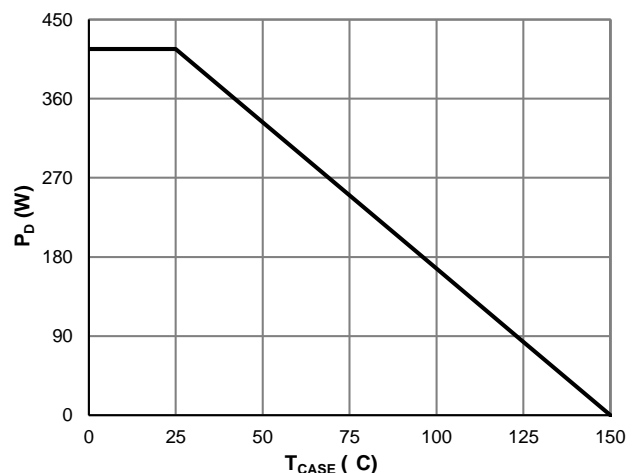


Figure 10: Power De-rating

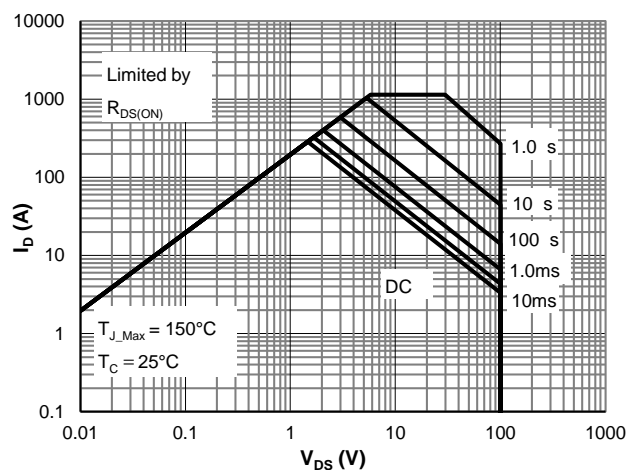


Figure 11: Maximum Safe Operating Area

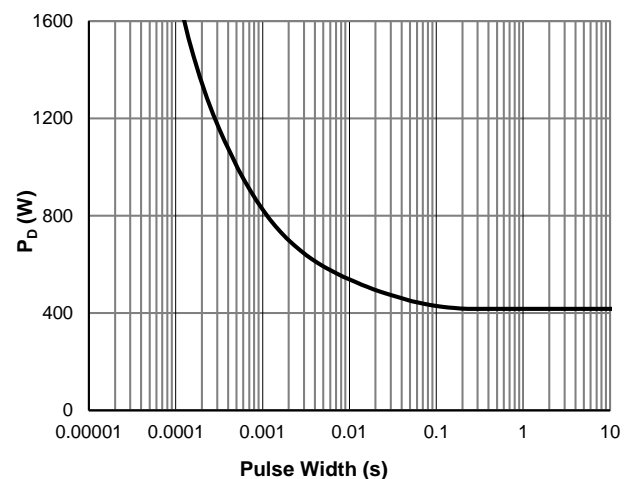
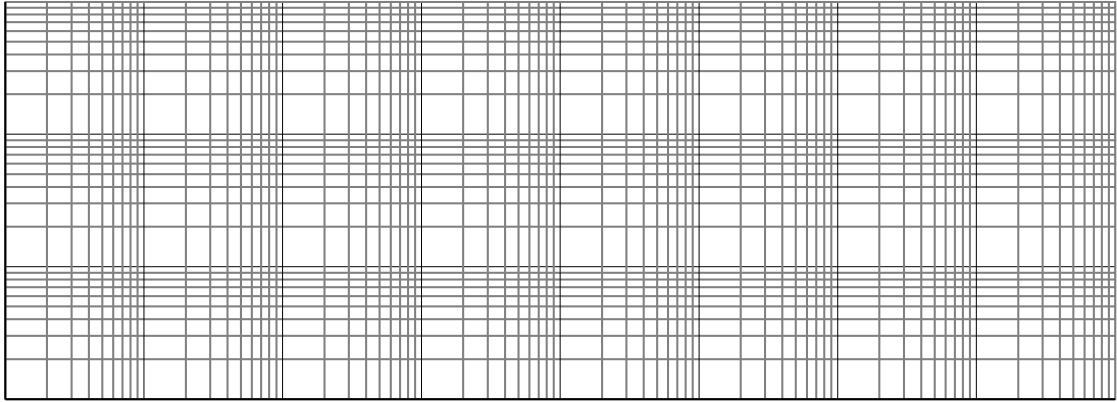


Figure 12: Single Pulse Power Rating, Junction-to-Case



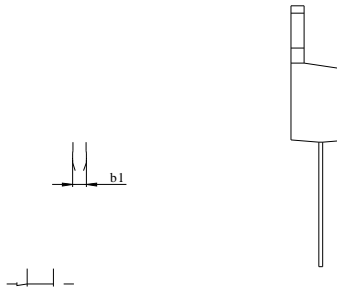
Typical Electrical & Thermal Characteristics





JMSH1002NC
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TO-220-3L Package Information



TO-263-3L Package Information