

General Description

It combines super junction MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

Features

- Fast Recovery Body Diode Embedded
- Low $R_{DS(ON)}$ to Minimize Conductive Loss
- Low Gate Charge for Fast Switching
- Low Thermal Resistance

Application

- Motor Driver
- DC-DC
- Battery Chargers

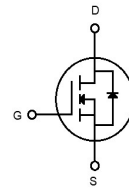
Ordering Information:

Part NO.	ZMJ30R022FB
Marking	ZMJ30R022F
Packing Information	REEL TAPE
Basic ordering unit (pcs)	800

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

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-Source Voltage	V_{DS}		-	300	V
Gate-Source Voltage ^①	V_{GS}		-20	20	V
Continuous Drain Current	I_D	$V_{GS}=10\text{V}, T_C=25^\circ\text{C}$	-	120	A
	I_D	$V_{GS}=10\text{V}, T_C=75^\circ\text{C}$	-	98	A
	I_D	$V_{GS}=10\text{V}, T_C=100^\circ\text{C}$	-	85	A
Pulsed Drain Current ^①	I_{DM}	Pulsed; $t_p \leq 10 \mu\text{s}; T_C = 25^\circ\text{C};$	-	480	A
Total Power Dissipation	P_D	$T_C=25^\circ\text{C}$	-	600	W
Total Power Dissipation	P_D	$T_A=25^\circ\text{C}$	-	4.2	W
Operating Junction Temperature	T_J		-55	175	$^\circ\text{C}$
Storage Temperature	T_{STG}		-55	175	$^\circ\text{C}$
Single Pulse Avalanche Energy	E_{AS}	$L=10\text{mH}, V_{GS}=10\text{V}, R_g=25\Omega,$	-	1280	mJ
ESD Level (HBM)	CLASS 2				

Product Summary



$V_{DS} = 300\text{V}$
 $R_{DS(ON)} = 13.5\text{m}\Omega$
 $I_D = 120\text{A}$



TO-263



•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	0.25	°C/W
Thermal resistance, junction-ambient	$R_{thJA}^{②}$	-	-	36	°C/W
Soldering temperature	T_{sold}	-	-	260	°C

•Electronic Characteristics (Tj=25°C,unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	300	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A, T_j=25^\circ C$	3	4	5	V
Drain-Source Leakage Current	I_{DSS}	$V_{GS}=0V, V_{DS}=300V, T_j=25^\circ C$	-	-	1	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=40A, T_j=25^\circ C$	-	13.5	16	m Ω
		$V_{GS}=10V, I_D=40A, T_j=175^\circ C$	-	34	-	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_{SD}=10A$	-	16	-	S
Diode Forward Voltage	V_{FSD}	$V_{GS}=0V, I_{SD}=40A$	-	-	1.3	V

•Dynamic characteristics (Tj=25°C,unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V, f=100KHz$	-	4505	-	pF
Output capacitance	C_{oss}		-	2716	-	
Reverse transfer capacitance	C_{rss}		-	6	-	
Gate Resistance	R_g	$f=1MHz$	-	4.8	-	Ω
Total gate charge	Q_g	$V_{DD}=150V, I_D=40A, V_{GS}=10V$	-	77	-	nC
Gate - Source charge	Q_{gs}		-	32	-	
Gate - Drain charge	Q_{gd}		-	27	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=150V, R_G=3.3\Omega, I_D=40A$	-	14	-	ns
Turn-ON Rise time	t_r		-	41	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	94	-	ns
Turn-Off Fall time	t_f		-	38	-	ns
Reverse Recovery Time	t_{rr}	$V_{DD}=100V, dI_S/dt=100A/\mu s, I_S=25A$	-	137	-	ns
Reverse Recovery Charge	Q_{rr}		-	400	-	nC

Fig.1 Gate-source voltage as a function of gate charge; Typical values; $T_j=25^\circ\text{C}$

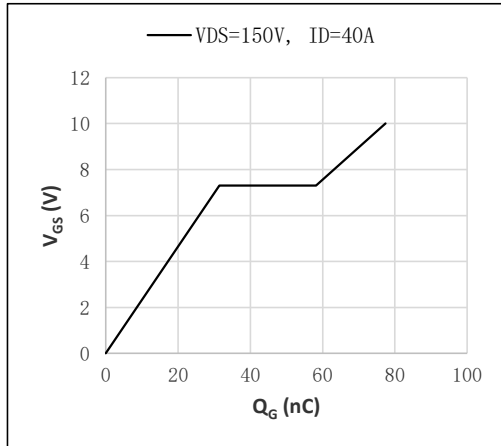


Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; $T_j=25^\circ\text{C}$

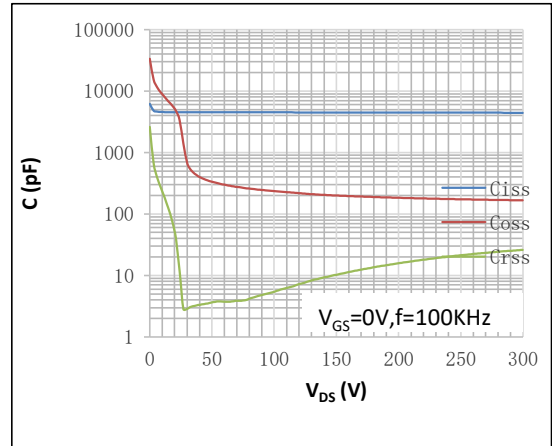


Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values; $T_j=25^\circ\text{C}$

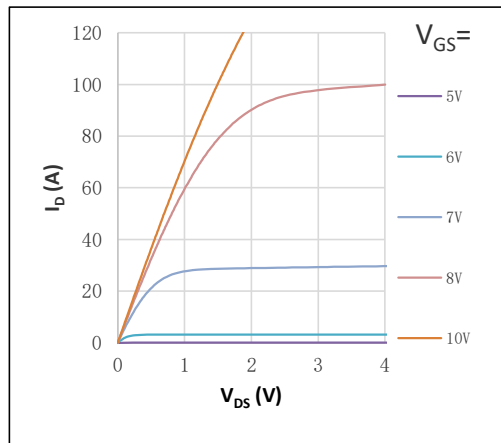


Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve; $T_j=25^\circ\text{C}$

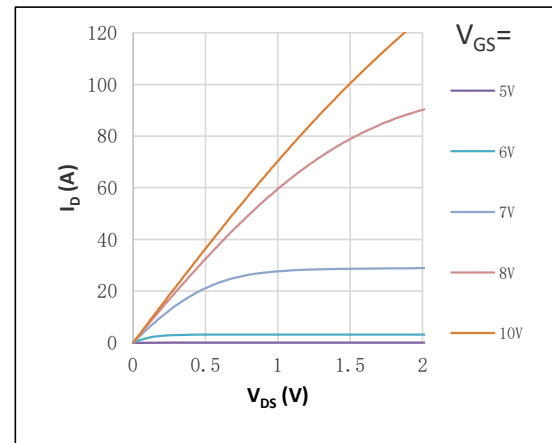


Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values

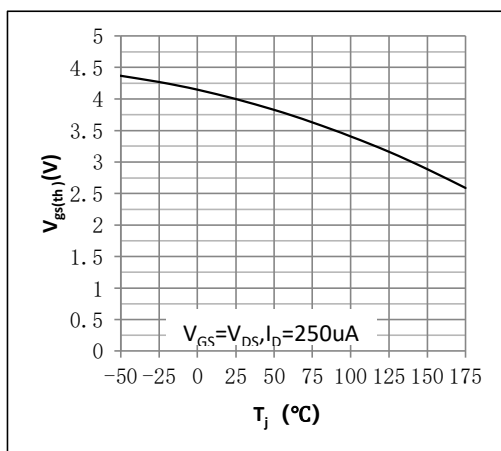


Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; $T_j=25^\circ\text{C}$

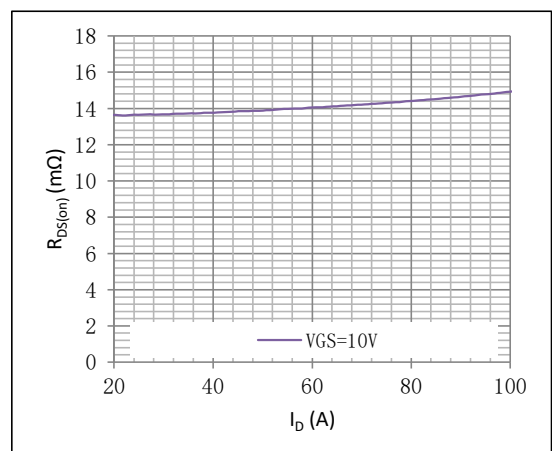


Fig.7 Drain-source on-state resistance as a function of gate-source voltage;Typical values

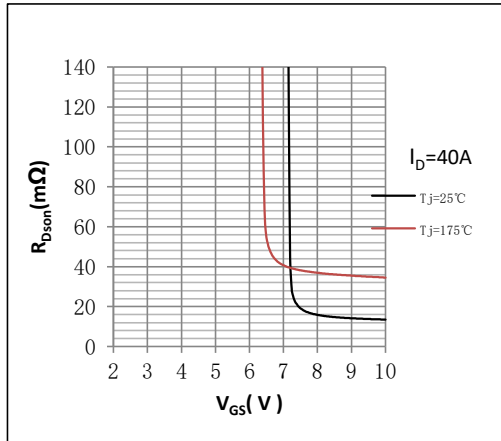


Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature;Typical values
Normalized On-Resistance= $R_{DS(on)}/R_{DS(on)}(25^{\circ}\text{C})$

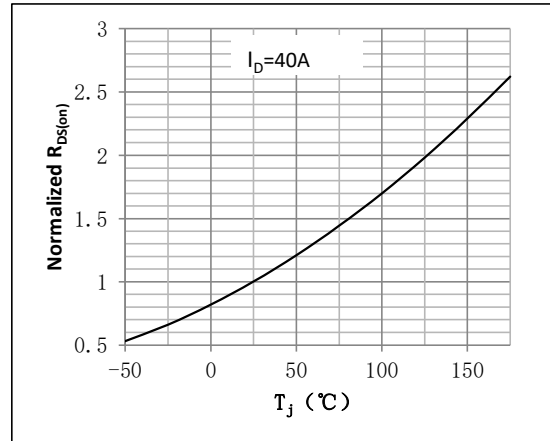


Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage ;Typical values

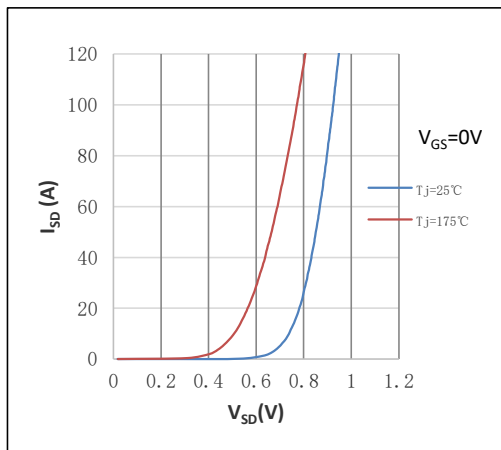


Figure 10. Transfer characteristics: drain current as a function of gate-source voltage;Typical values

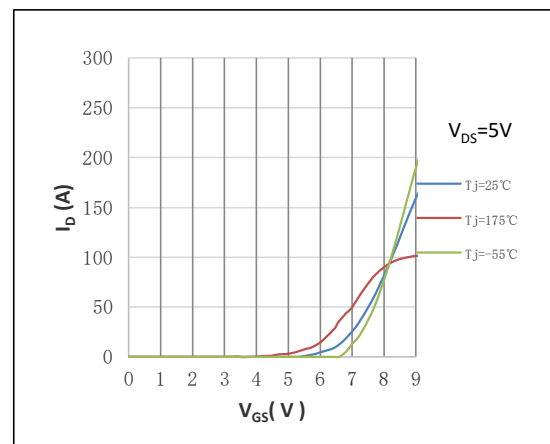


Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage;Calculative values

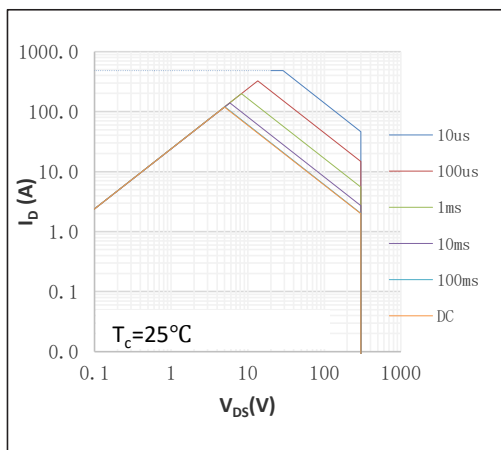


Fig.12 Continuous drain current as a function of case temperature[®];Calculative values

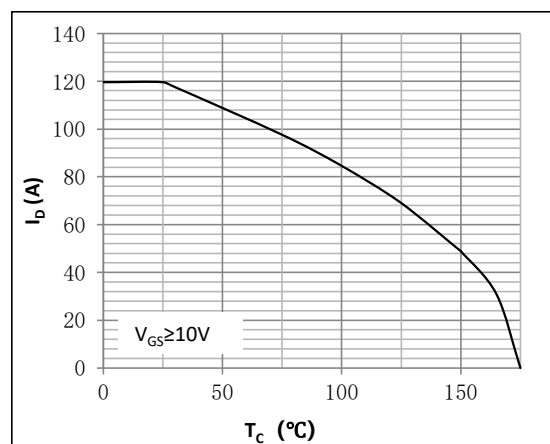


Fig.13 Drain-source breakdown voltage as a function of junction temperature; Typical values
Normalized BVDSS=BVDSS/BVDSS(25°C)

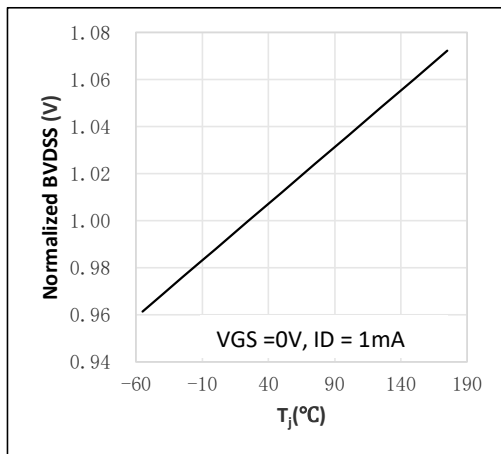


Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values
Normalized Power Dissipation= $P_d/P_d(25^\circ C)$

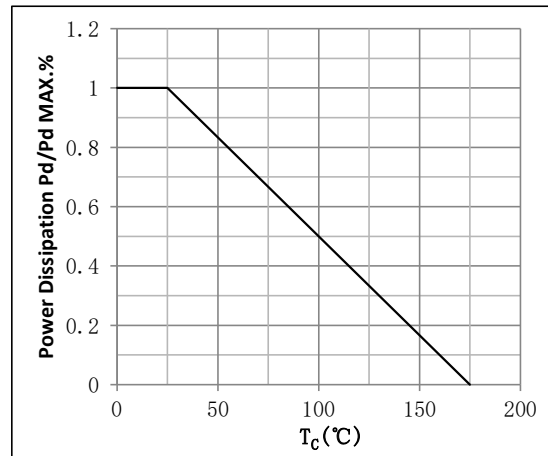
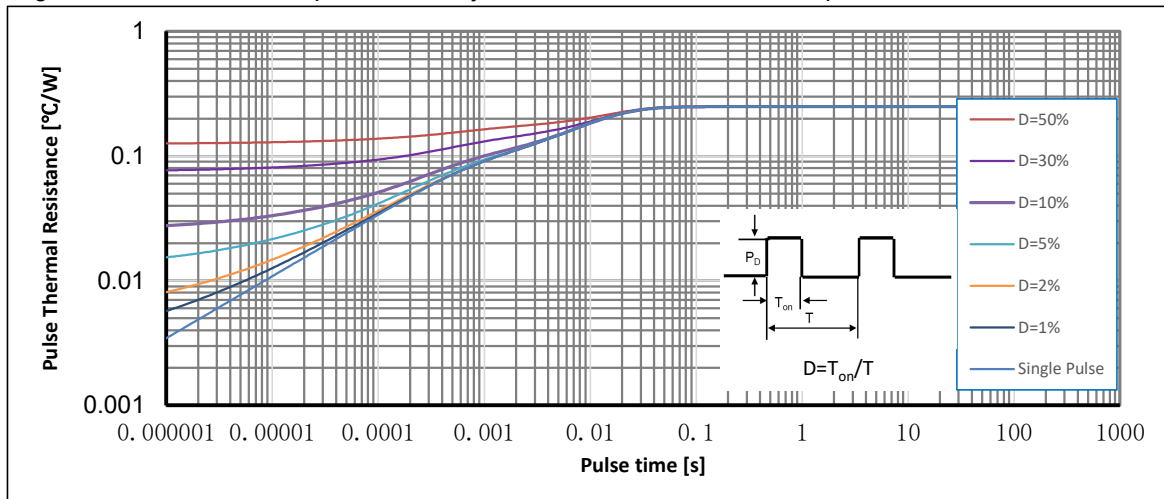
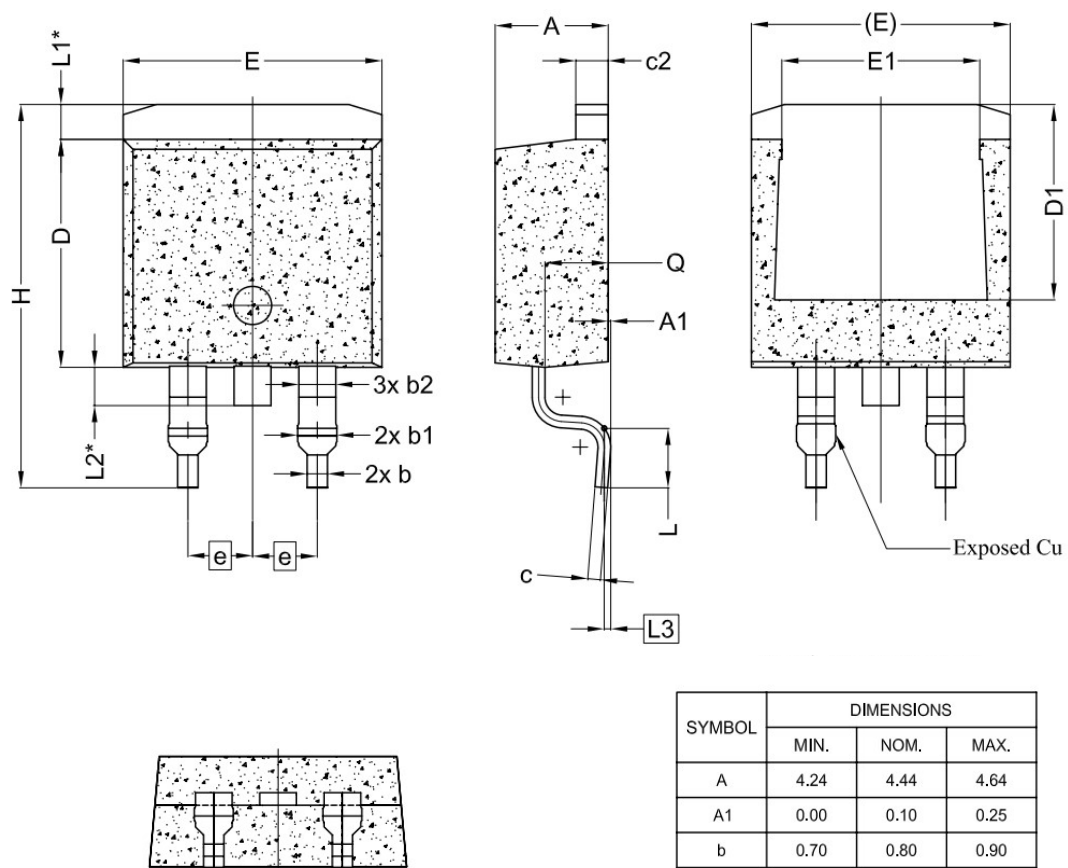


Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values



•TO-263 Package Outline



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	4.24	4.44	4.64
A1	0.00	0.10	0.25
b	0.70	0.80	0.90
b1	1.20	1.55	1.75
b2	1.20	1.45	1.70
c	0.40	0.50	0.60
c2	1.15	1.27	1.40
D	8.82	8.92	9.02
D1	6.86	7.65	—
E	9.96	10.16	10.36
E1	6.89	7.77	7.89
e	2.54 BSC		
H	14.61	15.00	15.88
L	1.78	2.32	2.79
L1	1.36 REF.		
L2	1.50 REF.		
L3	0.25 BSC		
Q	2.30	2.48	2.70

Note:

- ① Pulse : $V_{GS}=+20V/-20V$, Duty cycle=50%, $T_j=175^{\circ}C$, $t=1000$ hours; For DC , the following test conditions can be passed: $V_{GS}=+20V/-10V$, $T_j=175^{\circ}C$, $t=1000$ hours;
- ② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;
- ③ Practically the current will be limited by PCB, thermal design and operating temperature. $V_{GS}=10V$.

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Version	Date	Change
A	2025/3/25	New