60V N-Channel Power SpeedFET

• General Description

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

• Features

■Low $R_{DS(ON)}$ to minimize conductive loss

■Low Gate Charge for fast switching

■Low Thermal resistance

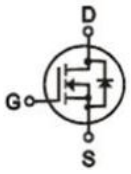
•Application

■BLDC Motor driver

■DC-DC

■Load switch

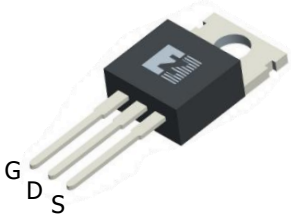
• Product Summary



V_{DS}= 60V

$R_{DS(ON)}$ = 2.6mΩ

I_D= 140A



TO-220

RoHS

REACH COMPLIANT

HF

•Ordering Information:

Part NO.	ZMS030N06P
Marking	ZMS030N06
Packing Information	Bulk Tube
Basic ordering unit (pcs)	1000

•Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}	25 °C ≤ T_j ≤ 175 °C	60	V
Gate-Source Voltage①	V_{GS}		±20	V
Continuous Drain Current	I_D	T_C=25℃	140	A
	I_D	T_C=75℃	114	A
	I_D	T_C=100℃	99	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	560	A
Total Power Dissipation	P_D	T_C=25℃	125	W
Total Power Dissipation	P_D	T_A=25℃	3.3	W
Operating Junction Temperature	T_J		-55 to +175	℃
Storage Temperature	T_{STG}		-55 to +175	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, VGS=10V, Rg=25Ω,	190	mJ
		L=0.5mH, VGS=10V, Rg=25Ω,	399	mJ
ESD Level (HBM)	CLASS 2			

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	1.2	°C/W
Thermal resistance, junction-ambient②	R_{thJA}		-	45	°C/W
Soldering temperature (total time<10s)	Tsold		-	260	°C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	60			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =250uA	1.4	1.7	2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}= 60V			1.0	uA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS} = 0V			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D= 30A		2.6	3.5	mΩ
		V_{GS}=4.5V, I_D= 20A		3.4	4.5	mΩ
Forward Transconductance	g_{FS}	V_{GS} =5V, I_{SD} = 10A		25		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 30A			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=25V	-	4090	-	pF
Output capacitance	Coss		-	1750	-	
Reverse transfer capacitance	Crss		-	80	-	
Gate Risistance	Rg	f = 1MHz	-	1.9		Ω
Total gate charge	Qg	V_{DD} = 15V, I_D = 20A, V_{GS} = 10V	-	67	-	nC
	Qg (4.5v)		-	32	-	
Gate - Source charge	Qgs		-	15	-	
Gate - Drain charge	Qgd		-	10	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=15V, R_G =3.3Ω, I_D =20A	-	4.7	-	ns
Turn-ON Rise time	t_r		-	26	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	1.3	-	ns
Turn-Off Fall time	t_f		-	10.5	-	ns
Reverse Recovery Time	t_{RR}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=20A	-	52	-	ns
Reverse Recovery Charge	Q_{RR}		-	49	-	nC

Fig.1 Gate-Charge Characteristics

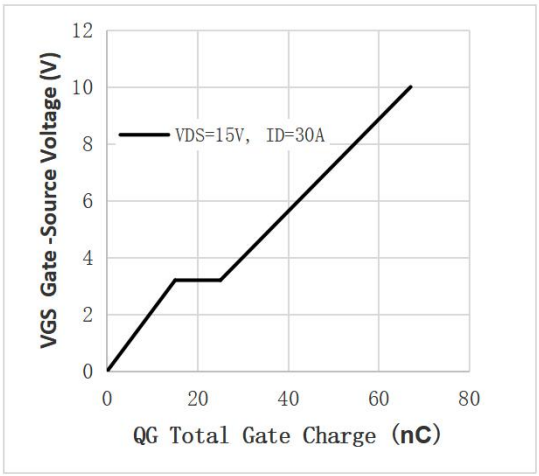


Fig.2 Capacitance Characteristics

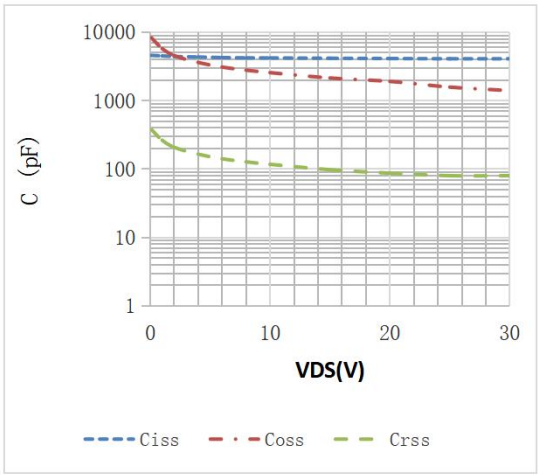


Fig.3 Power Dissipation

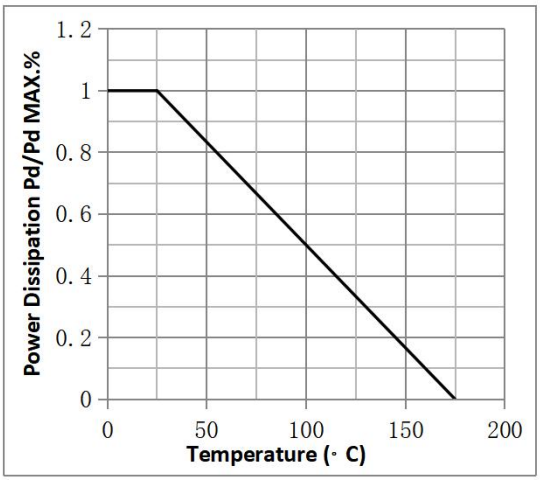


Fig.4 Typical output Characteristics

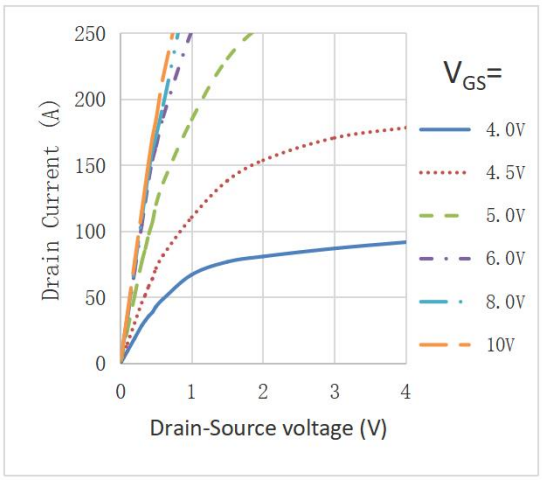


Fig.5 Threshold Voltage V.S Junction Temperature

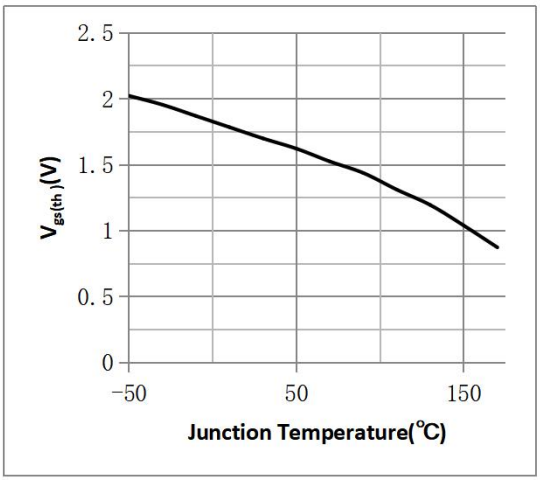


Fig.6 Resistance V.S Drain Current

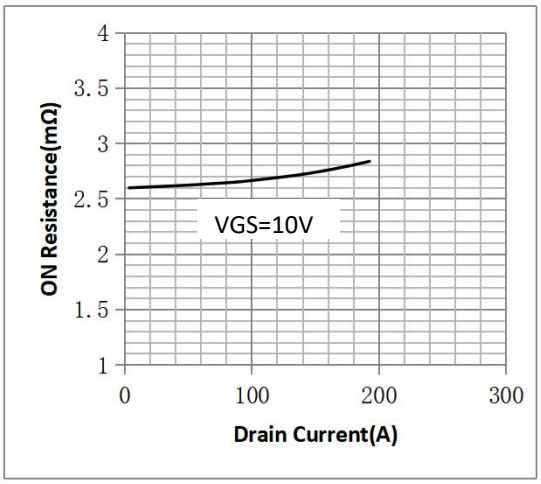


Fig.7 On-Resistance VS Gate Source Voltage

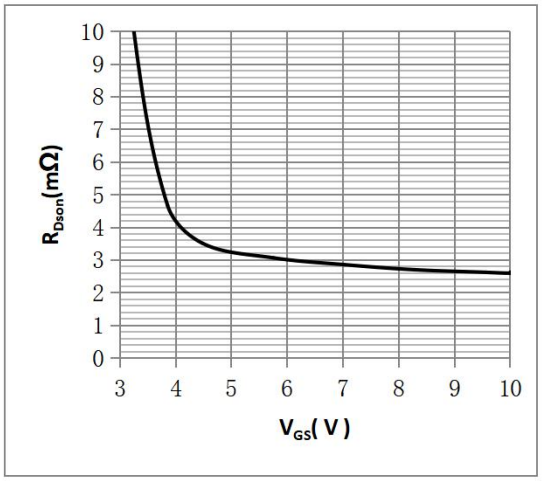


Fig.8 On-Resistance V.S Junction Temperature

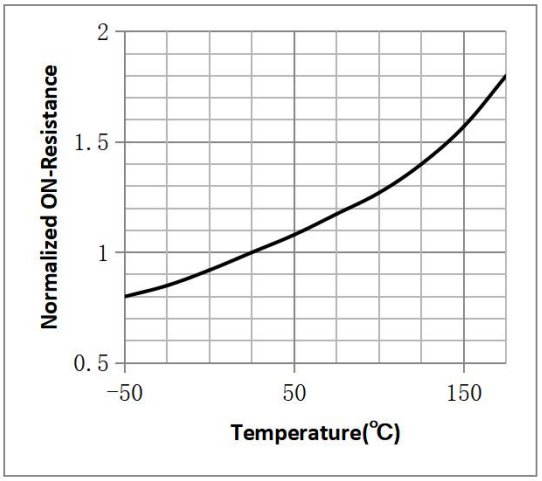


Figure 9. Diode Forward Voltage vs. Current

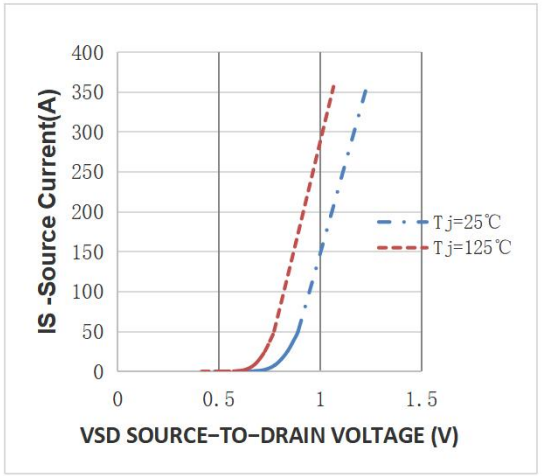


Figure 10. Transfer Characteristics

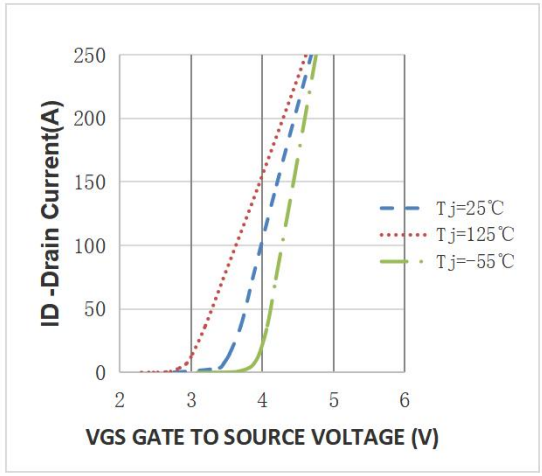


Fig.11 SOA Maximum Safe Operating Area

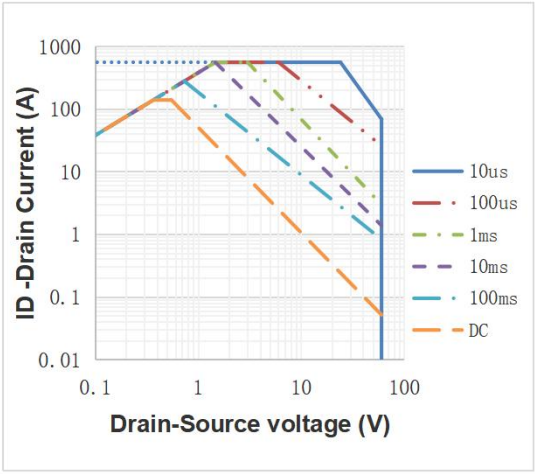
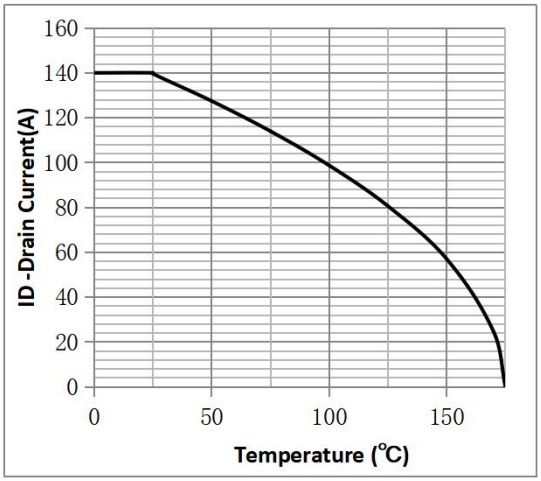
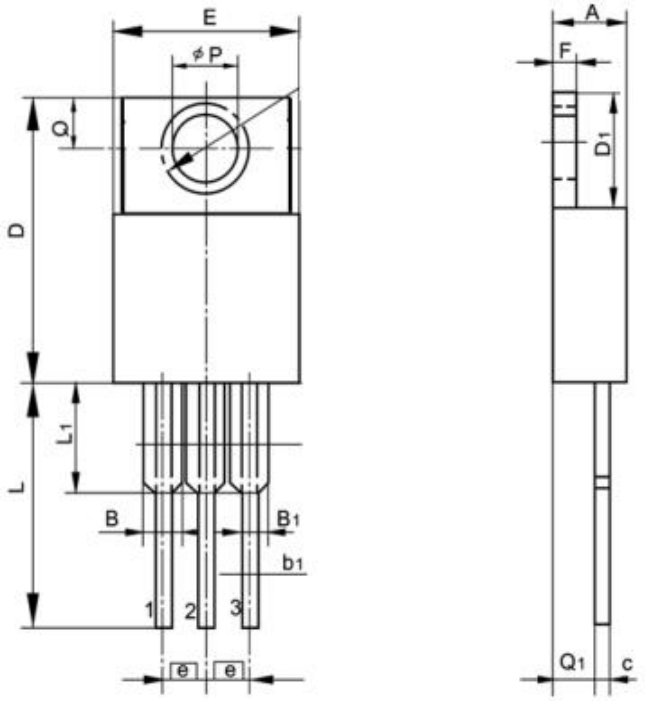


Fig.12 ID vs. Case Temperature③



●TO-220 Package Outline

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	4.00		4.80	E	9.90		10.70
B	1.20		1.50	e		2.54	
B1	1.00		1.40	F	1.10		1.45
b1	0.65		1.00	L	12.50		14.50
c	0.35		0.75	L1	3.00	3.50	4.00
D	15.00		16.50	Q	2.50		3.00
D1	5.90		6.90	Q1	2.00		3.00
				ΦP	3.60		3.90



Note:

① Pulse : VGS=+20V/-20V, Duty cycle=50%,Tj=175℃, t=1000 hours; For DC， the following test conditions can be passed: VGS=+20V/-10V, Tj=175℃, t=1000 hours；

② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate；

③Practically the current will be limited by PCB, thermal design and operating temperature. VGS=10V.

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Revision History

Version	Date	Change
A	2021.11.10	NEW
B	2022.9.3	1.Add Dynamic characteristics 2.Modify id curve