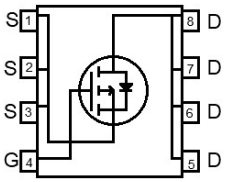
-30V P-Channel Power MOSFET

• General Description

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

• Product Summary



V_{DS}= -30V

$R_{DS(ON)}$ = 24mΩ

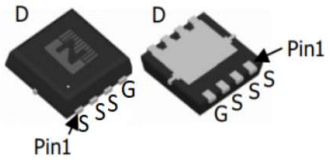
I_D= -15A

• Features

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

■High GOX reliability

■Low Thermal resistance



DFN3*3

•Application

■BLDC Motor driver

■DC-DC

■Load switch

•Ordering Information:

Part NO.	ZM240P03M
Marking	240P03
Packing Information	REEL TAPE
Basic ordering unit (pcs)	5000

•Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		-30	V
Gate-Source Voltage	V_{GS}		±20	V
Continuous Drain Current	I_D	T_C=25℃	-15	A
	I_D	T_C=75℃	-13	A
	I_D	T_C=100℃	-10	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	-60	A
Total Power Dissipation	P_D	T_C=25℃	18	W
Total Power Dissipation	P_D	T_A=25℃	0.9	W
Operating Junction Temperature	T_J		-55 to +150	℃
Storage Temperature	T_{STG}		-55 to +150	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, V_{GS}=-10V, Rg=25Ω,	45	mJ
		L=0.5mH, V_{GS}=-10V, Rg=25Ω,	95	mJ
ESD Level (HBM)	CLASS 2			

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	7.1	°C/W
Thermal resistance, junction-ambient①	R_{thJA}		-	140	°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	-30			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =-250uA	-1.2	-1.7	-2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}= -30V			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= -12A		24	32	mΩ
		V_{GS}=-4.5V, I_D= -8A		37	55	mΩ
Forward Transconductance	g_{FS}	V_{DS} =-5V, I_{SD} = -5A		18		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = -12A			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=-25V	-	960	-	pF
Output capacitance	Coss		-	106	-	
Reverse transfer capacitance	Crss		-	63	-	
Gate Risistance	Rg	f = 1MHz	-	1.9		Ω
Total gate charge	Qg	V_{DD} = -15V, I_D = -12A, V_{GS} = -10V	-	12	-	nC
	Qg (4.5v)		-	6.5	-	
Gate - Source charge	Qgs		-	2.4	-	
Gate - Drain charge	Qgd		-	2.8	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=-10V,V_{DS}=-15V, R_G =3.3Ω, I_D =-20A	-	10	-	ns
Turn-ON Rise time	t_r		-	15	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	12	-	ns
Turn-Off Fall time	t_f		-	8	-	ns
Reverse Recovery Time	t_{RR}	V_{DD}=-20V, dI_S/dt = 100A/us, I_S=-20A	-	30	-	ns
Reverse Recovery Charge	Q_{RR}		-	12	-	nC

Fig.1 Gate-Charge Characteristics

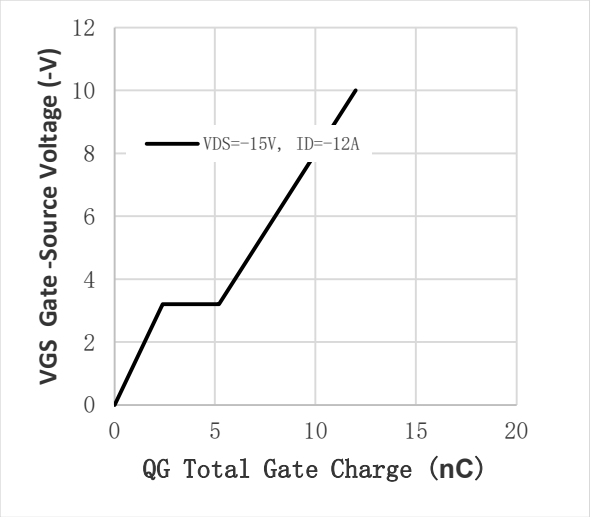


Fig.2 Capacitance Characteristics

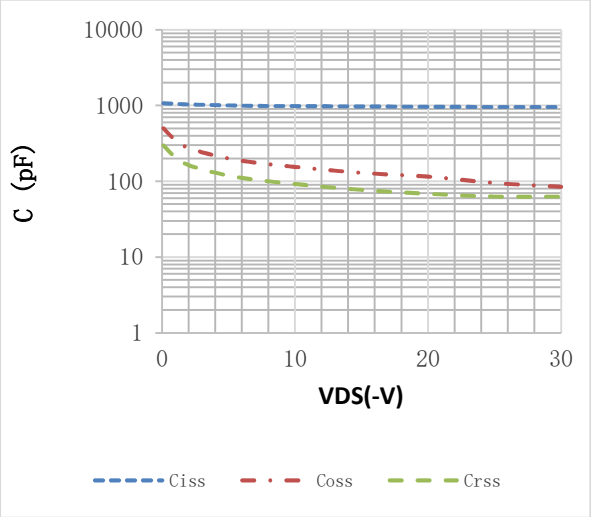


Fig.3 Power Dissipation

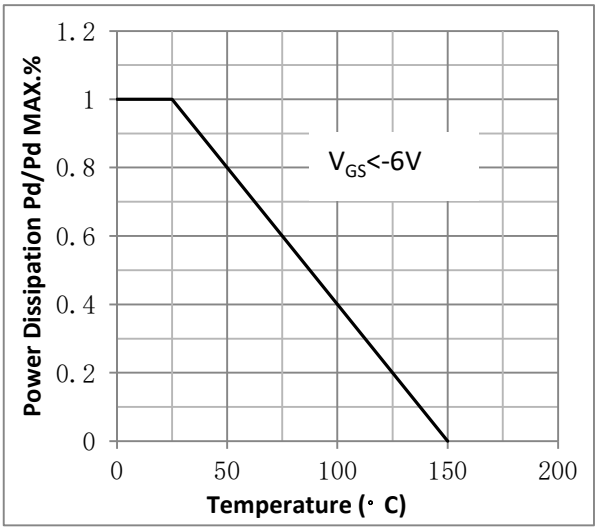


Fig.4 Typical output Characteristics

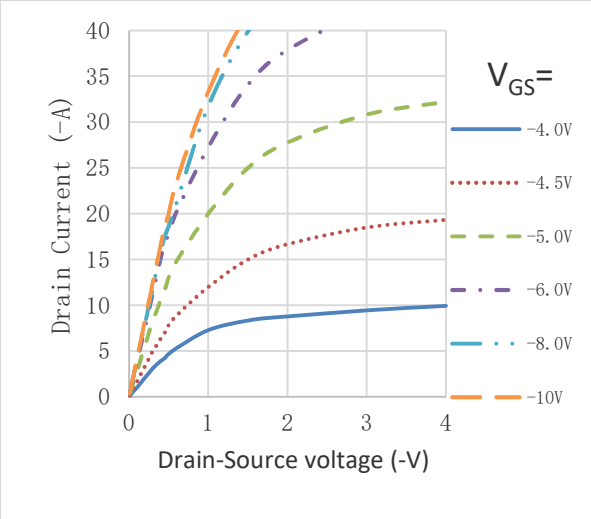


Fig.5 Threshold Voltage V.S Junction Temperature

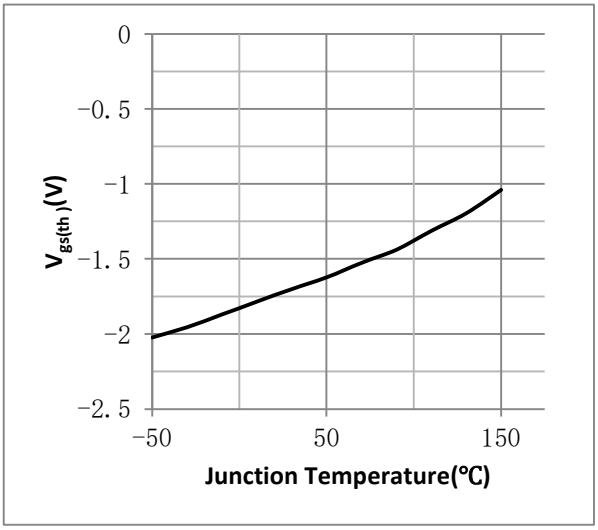


Fig.6 Resistance V.S Drain Current

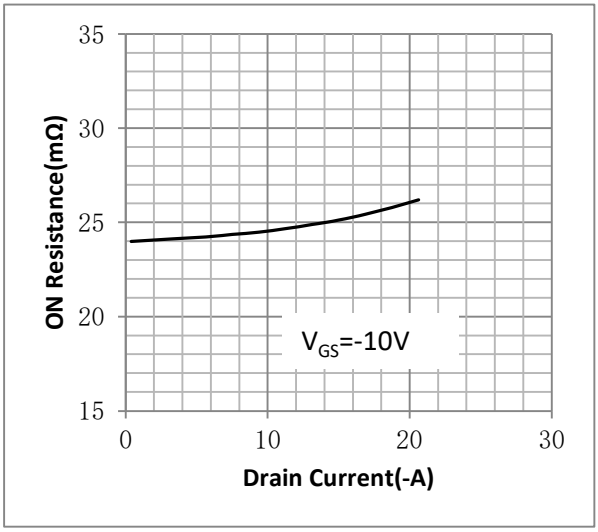


Fig.7 On-Resistance VS Gate Source Voltage

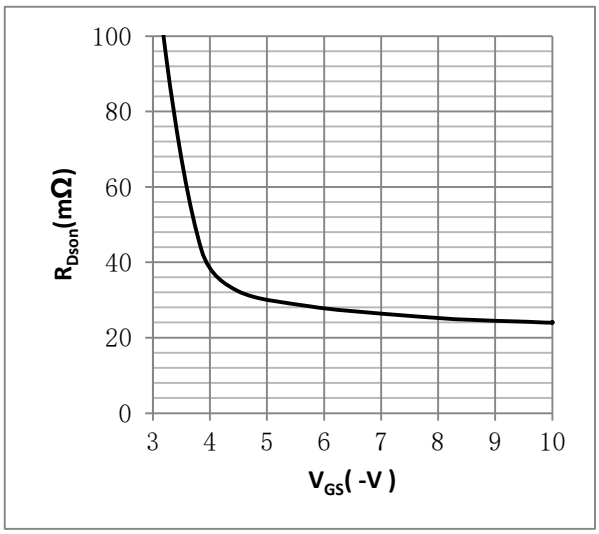


Fig.8 On-Resistance V.S Junction Temperature

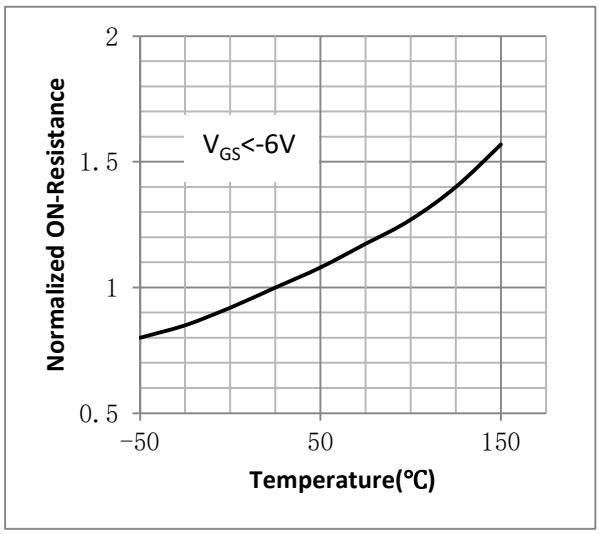


Figure 9. Diode Forward Voltage vs. Current

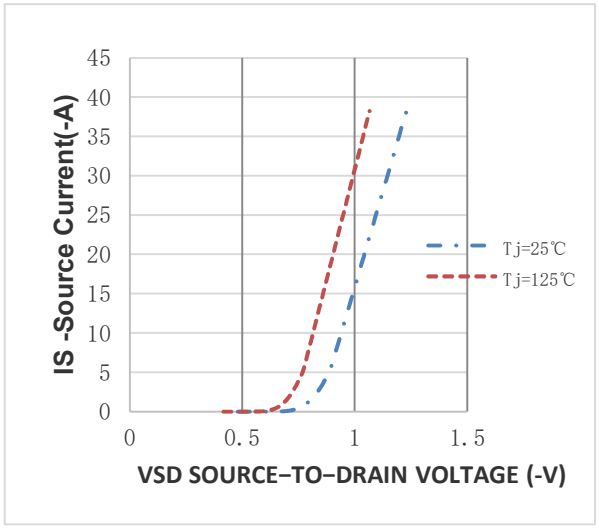


Figure 10. Transfer Characteristics

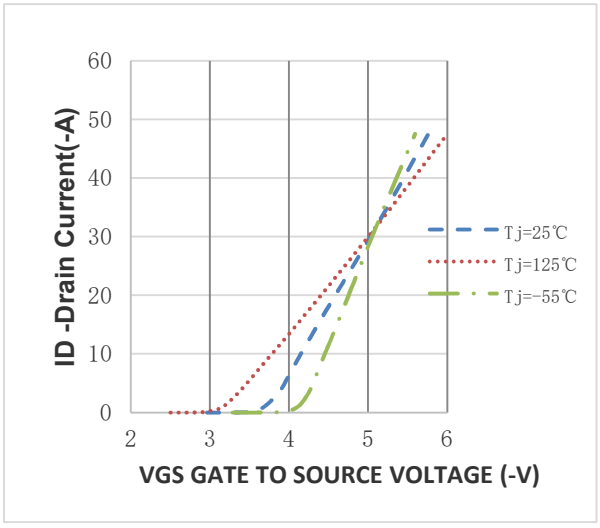


Fig.11 Safe Operating Area

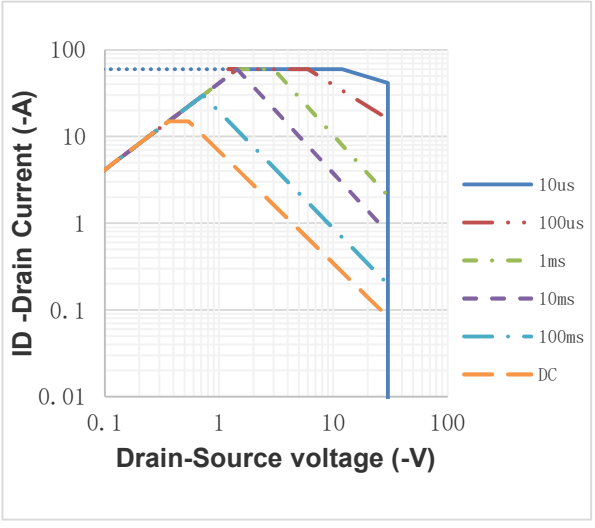
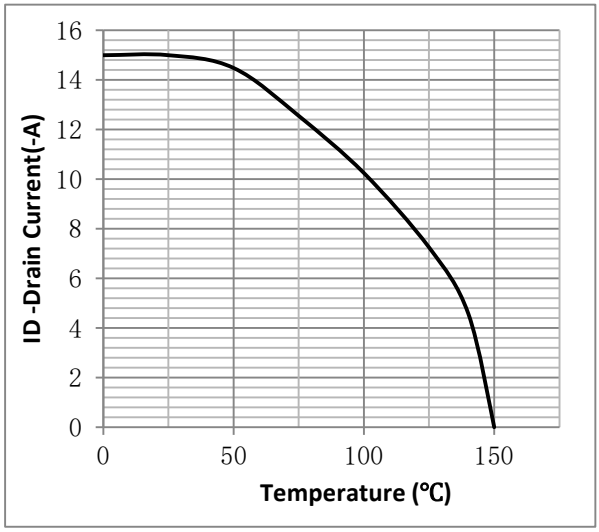
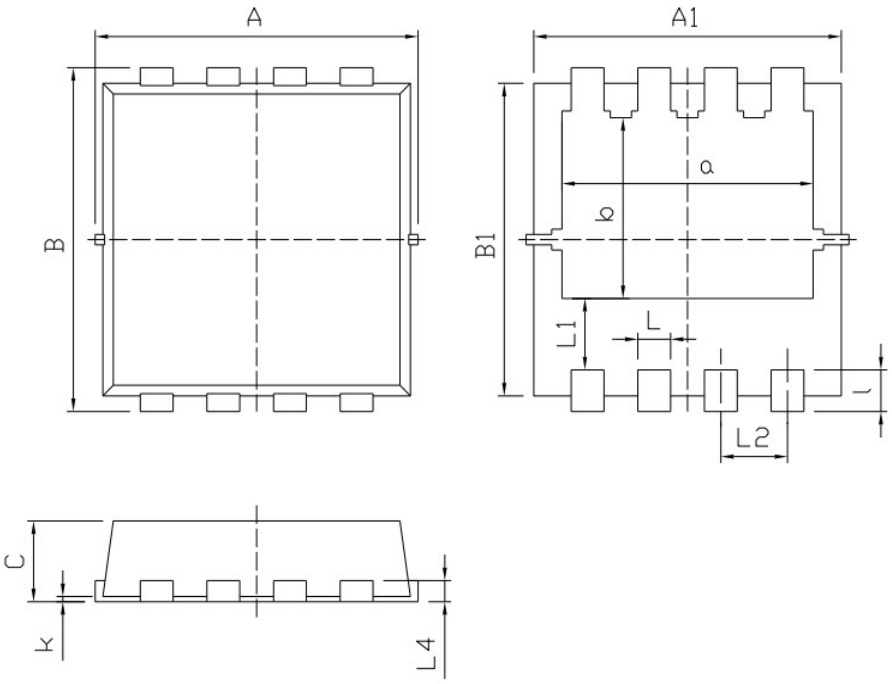


Fig.12 ID vs. Case Temperature②



●DFN3*3 Package Outline



Dimensions In Millimeterer			
Symbol	MIN	TYP	MAX
A	3.20	3.30	3.40
A1	3.10	3.15	3.20
B	3.20	3.30	3.40
B1	2.95	3.00	3.05
C	0.75	0.80	0.85
L	0.25	0.30	0.35
L1	-	-	0.75
L2	0.55	0.65	0.75
L4	0.14	0.15	0.20
a	2.35	2.45	2.55
b	1.635	1.735	1.835
k	0.00	-	0.05
l	0.30	0.40	0.50

Note:

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

②Practically the current will be limited by PCB, thermal design and operating temperature. VGS=-10V.

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Revision History

Version	Date	Change
A	2020.3.10	NEW
B	2022.10.30	Add ESD level
C	2023.12.28	1.Add dynamic characteristics 2.Fig1~12 modify
D	2024.5.14	Correct Cxss and Qg value
E	2025.4.29	Correct POD