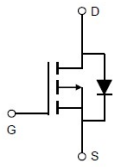
• General Description

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

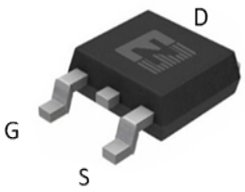
• Product Summary



V_{DS}= -500V
$R_{DS(ON)}$ = 3000mΩ
I_D= -4.7A

• Features

■AEC-Q101 Qualified
■Low $R_{DS(ON)}$ to minimize conductive loss
■High GOX reliability
■Low Thermal resistance



TO-252

•Application

■BLDC Motor driver
■DC-DC
■Load Switch

•Ordering Information:

Part NO.	ZMPA02P50D
Marking	ZMP02P50
Packing Information	REEL TAPE
Basic ordering unit (pcs)	2500

•Absolute Maximum Ratings (T_C=25°C,unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-Source Voltage	V_{DS}		-	-500	V
Gate-Source Voltage	V_{GS}		-20	20	V
Continuous Drain Current	I_D	VGS=-10V,T_C=25°C	-	-4.7	A
	I_D	VGS=-10V,T_C=75°C	-	-3.8	A
	I_D	VGS=-10V,T_C=100°C	-	-3.3	A
Pulsed Drain Current	I_{DM}	Pulsed; $t_p \leqslant 10$ μs; T_C = 25 °C;	-	-18.8	A
Total Power Dissipation	P_D	T_C=25°C	-	167	W
Total Power Dissipation	P_D	T_A=25°C	-	2.4	W
Operating Junction Temperature	T_J		-55	175	℃
Storage Temperature	T_{STG}		-55	175	℃
Single Pulse Avalanche Energy	E_{AS}	L=5mH, V_{GS}=-10V, Rg=25Ω,	-	160	mJ
ESD Level (HBM)	CLASS 2				

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction-case	R_{thJC}	-	-	0.9	°C/W
Thermal resistance, junction-ambient①	R_{thJA}	-	-	62	°C/W
Soldering temperature	Tsold	-	-	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 = -250uA	-500	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D=-250uA	-3	-4.3	-5	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}=-500V,T_j=25°C	-	-	-1.0	uA
		V_{GS}=0V, V_{DS}=-500V,T_j=175°C	-	-	-100	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=-2A,T_j=25°C	-	3000	3600	mΩ
		V_{GS}=-10V, I_D=-2A,T_j=175°C	-	7123	-	mΩ
Forward Transconductance	g_{FS}	V_{DS} =-20V, I_D = -2A	-	4.3	-	S
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = -2A	-	-	-1.3	V

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

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=-250V,V_{GS}=0V	-	848	-	pF
Output capacitance	Coss		-	30	-	
Reverse transfer capacitance	Crss		-	4	-	
Gate Risistance	Rg	f = 1MHz,V_{GS}=0V	-	10	-	Ω
Total gate charge	Qg	V_{DD} = -250V, I_D = -2A, V_{GS} = -10V	-	15.6	-	nC
Gate - Source charge	Qgs		-	4.8	-	
Gate - Drain charge	Qgd		-	5.0	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=-10V, V_{DS}=-250V, R_G =3.3Ω, I_D =-2A	-	16	-	ns
Turn-ON Rise time	t_r		-	73	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	46	-	ns
Turn-Off Fall time	t_f		-	59	-	ns
Reverse Recovery Time	t_{rr}	V_{DD}=-250V, dI_S/dt = 100A/us, I_S=-2A	-	351	-	ns
Reverse Recovery Charge	Q_{rr}		-	1950	-	nC

Fig.1 Gate-source voltage as a function of gate charge;Typical values;Tj=25°C

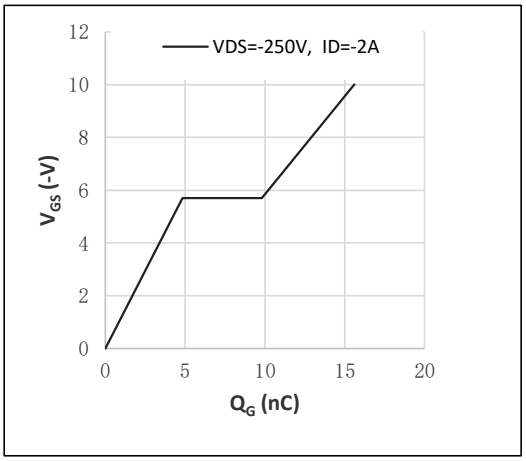


Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage;Typical values;Tj=25°C

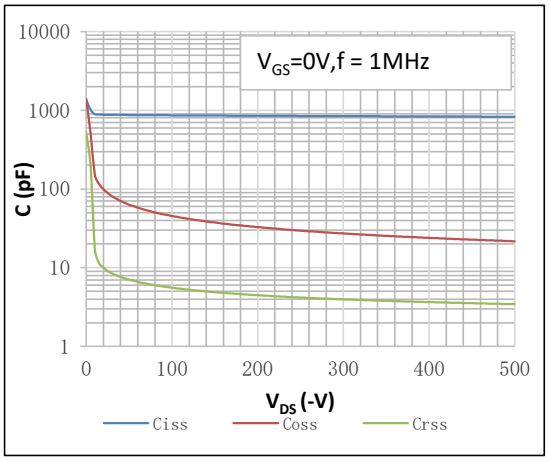


Fig.3 Output characteristics: drain current as a function of drain-source voltage;Typical values; Tj=25°C

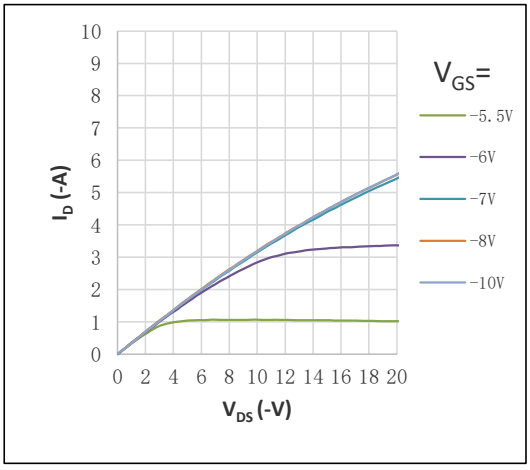


Fig.4 Output characteristics: drain current as a function of drain-source voltage;Typical values:Expanded curve;Tj=25°C

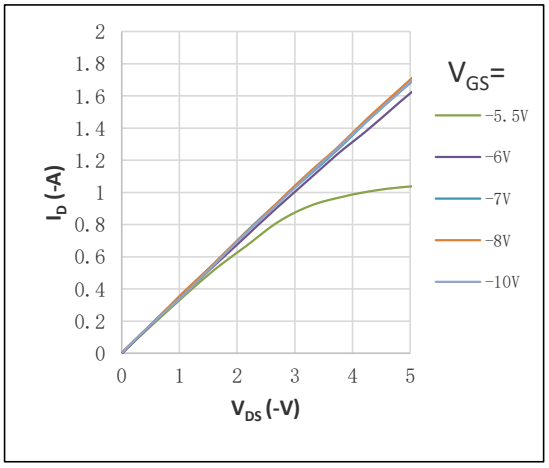


Fig.5 Gate-source threshold voltage as a function of junction temperature;Typical values

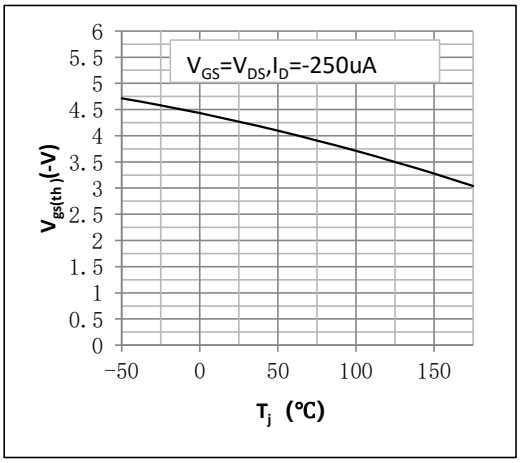


Fig.6 Drain-source on-state resistance as a function of drain current;Typical values;Tj=25°C

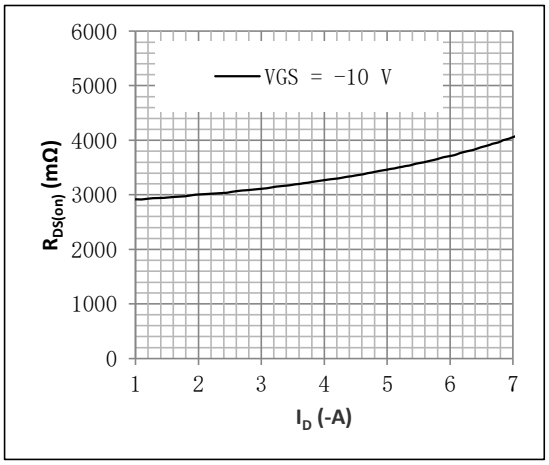


Fig.7 Drain-source on-state resistance as a function of gate-source voltage;Typical values

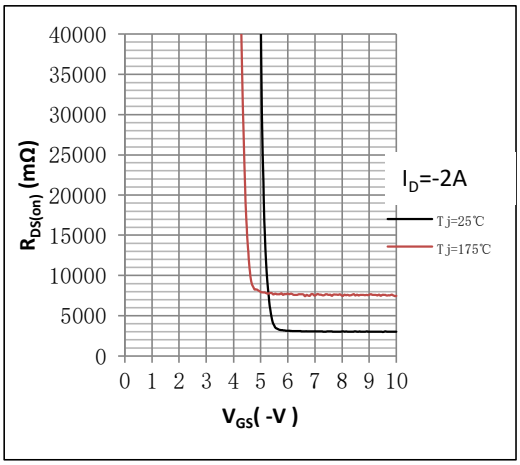


Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature;Typical values
Normalized On-Resistance=RDSon/RDSon(25 ℃)

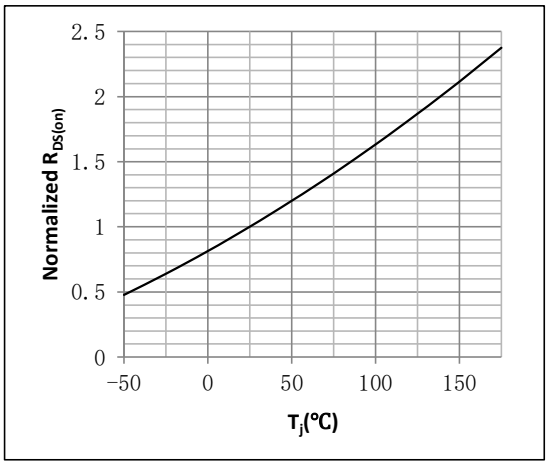


Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage ;Typical values

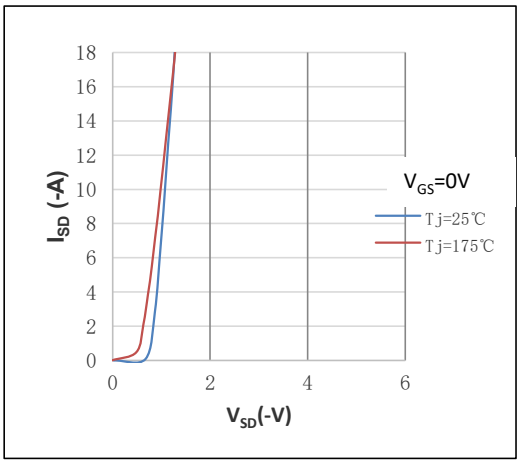


Figure 10. Transfer characteristics: drain current as a function of gate-source voltage;Typical values

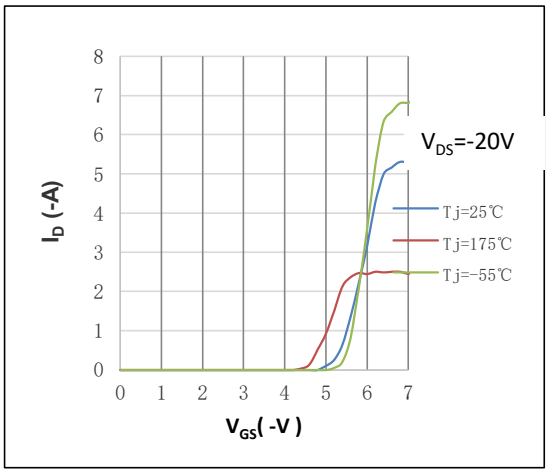


Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage;Calculative values

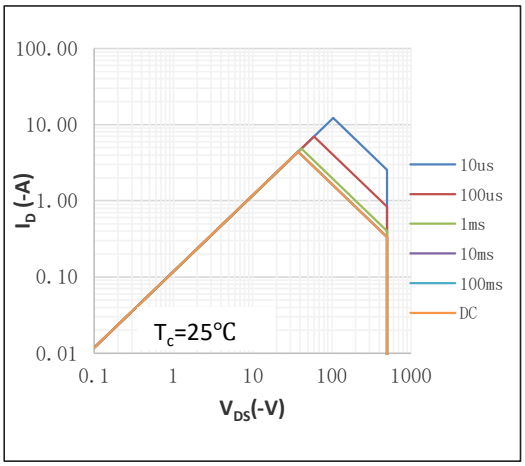


Fig.12 Continuous drain current as a function of case temperaturease[3] ;Calculative values

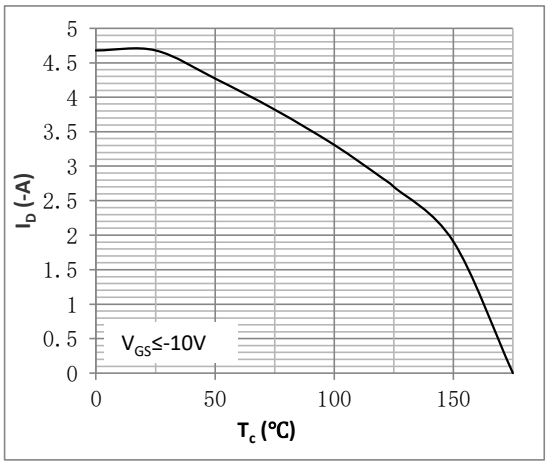


Fig.13 Drain-source breakdown voltage as a function of junction temperature;Typical values
Normalized BVDSS=BVDSS/BVDSS(25°C)

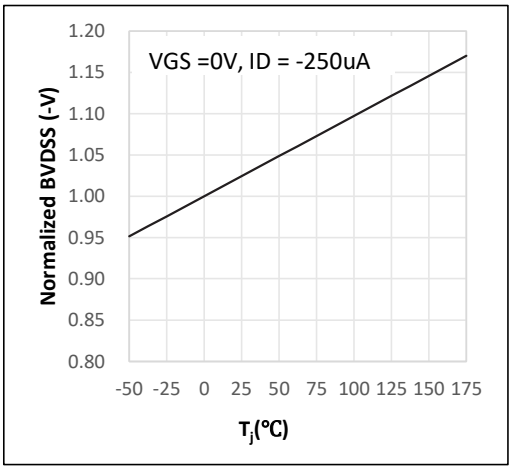


Fig.14 Normalized total power dissipation as a function of case temperature;Calculative values
Normalized Power Dissipation= Pd/Pd(25°C)

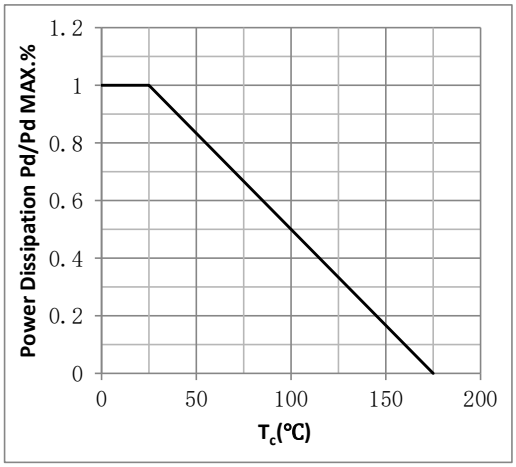
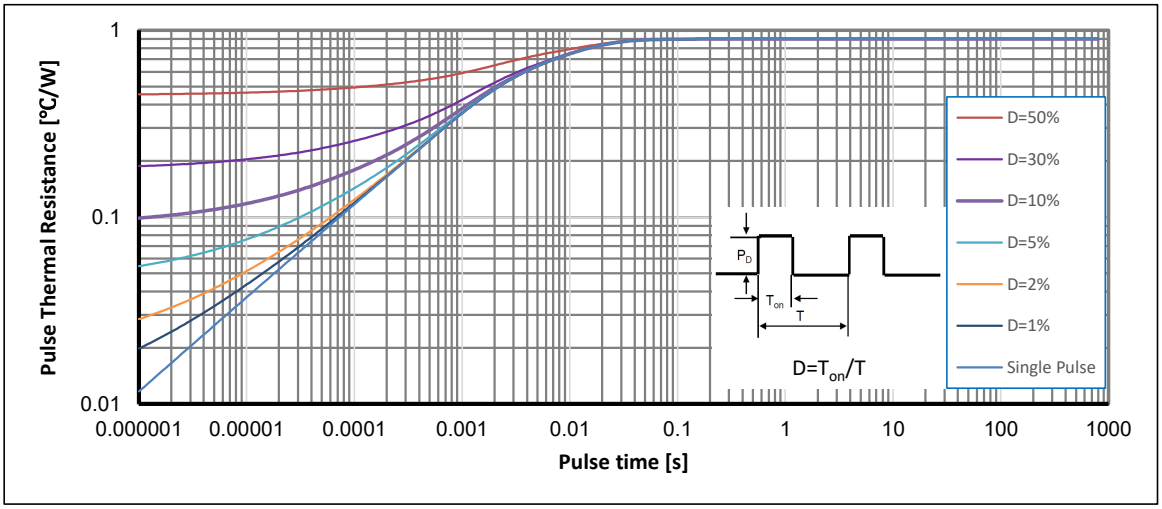
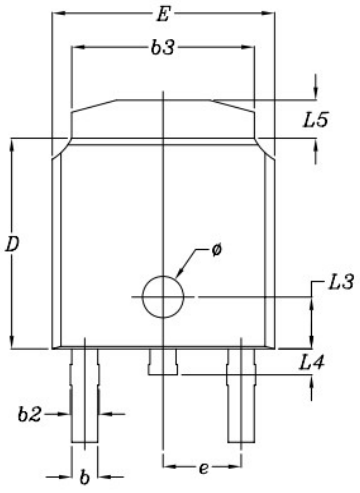
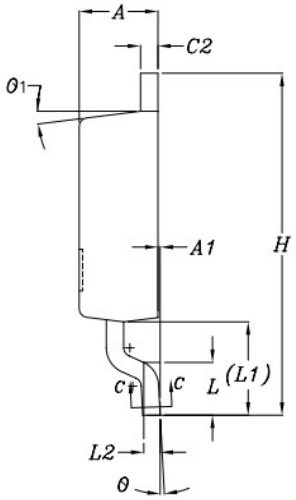


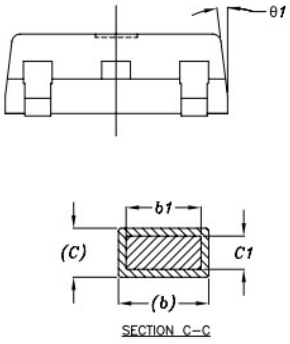
Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values

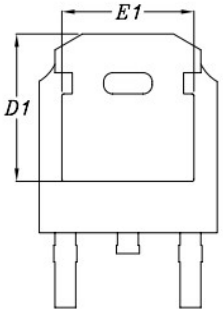


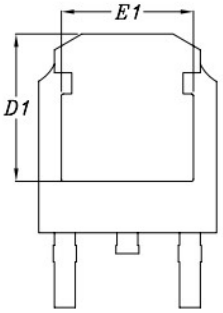
●TO-252 Package Outline











ITEM	DIMENSIONS			
	MILLMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.18	2.39	0.086	0.094
A1	——	0.13	——	0.005
b	0.70	0.89	0.028	0.035
b1	0.70	0.86	0.028	0.034
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c1	0.41	0.56	0.016	0.022
c2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	——	0.205	——
E	6.35	6.73	0.250	0.265
E1	4.32	——	0.170	——
e	2.29 BSC		0.090 BSC	
H	9.40	10.41	0.370	0.410
L	1.40	1.78	0.055	0.070
L1	2.60	2.90	0.102	0.114
L2	0.51 BSC		0.020 BSC	
3 L3	1.65	1.95	0.065	0.077
L4	0.60	0.90	0.024	0.035
3 L5	0.89	1.27	0.035	0.050
θ	1°	5°	1°	5°
θ1	7° REF		7° REF	
ø	1.20 REF		1.20 REF	

Note:

① Device 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	2025/6/21	New