

• General Description

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

• Features

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

• Application

- BLDC Motor driver
- DC-DC
- Battery protection

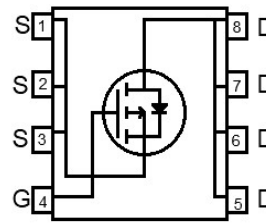
• Ordering Information:

Part NO.	ZMA260P04M
Marking	260P04
Packing Information	REEL TAPE
Basic ordering unit (pcs)	5000

• Absolute Maximum Ratings ($T_C=25^\circ\text{C}$)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		-40	V
Gate-Source Voltage	V_{GS}		± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	20	A
	I_D	$T_C=75^\circ\text{C}$	18	A
	I_D	$T_C=100^\circ\text{C}$	15	A
Pulsed Drain Current	I_{DM}	pulsed; $t_p \leq 10 \mu\text{s}$; $T_{mb} = 25^\circ\text{C}$;	71	A
Total Power Dissipation	P_D	$T_C=25^\circ\text{C}$	33	W
Total Power Dissipation	P_D	$T_A=25^\circ\text{C}$	2.5	W
Operating Junction Temperature	T_J		-55 to +175	$^\circ\text{C}$
Storage Temperature	T_{STG}		-55 to +175	$^\circ\text{C}$
Single Pulse Avalanche Energy	E_{AS}	$L=0.1\text{mH}$, $V_{GS}=-10\text{V}$, $R_g=25\Omega$,	24	mJ
		$L=0.5\text{mH}$, $V_{GS}=-10\text{V}$, $R_g=25\Omega$,	50.4	mJ
ESD Level (HBM)	CLASS 1C			

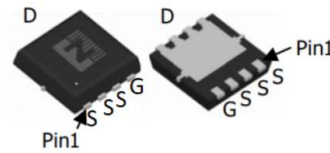
• Product Summary



$V_{DS} = -40\text{V}$

$R_{DS(ON)} = 26\text{m}\Omega$

$I_D = -20\text{A}$



DFN3*3



•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	4.5	$^{\circ}C/W$
Thermal resistance, junction-ambient ^②	R_{thJA}		-	60	$^{\circ}C/W$
Soldering temperature	T_{sold}		-	260	$^{\circ}C$

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D = -250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D = -250\mu A$	-1.3	-1.7	-2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{GS}=0V, V_{DS} = -40V$			1	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D = -10A$		26	34	m Ω
Diode Forward Voltage	V_{FSD}	$V_{GS}=0V, I_{SD} = -10A$			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f = 1MHz, V_{DS}=-25V$	-	1370		pF
Output capacitance	C_{oss}		-	101	-	
Reverse transfer capacitance	C_{rss}		-	67	-	
Gate Resistance	R_g	$f = 1MHz$	-	7.5		Ω
Total gate charge	Q_g	$V_{DD} = -15V, I_D = -20A$ $V_{GS} = -10V$	-	20.8	-	nC
Gate - Source charge	Q_{gs}		-	3.5	-	
Gate - Drain charge	Q_{gd}		-	3.6	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=-10V, V_{DS}=-15V,$ $R_G = 3.3\Omega, I_D = -20A$	-	21	-	ns
Turn-ON Rise time	t_r		-	53	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	46	-	ns
Turn-Off Fall time	t_f		-	42	-	ns
Reverse Recovery Time	t_{RR}	$V_{DD}=-20V, dI_S/dt =$ $100A/\mu s, I_S=-50A$	-	35	-	ns
Reverse Recovery Charge	Q_{RR}		-	42	-	nC

Fig.1 Gate-Charge Characteristics

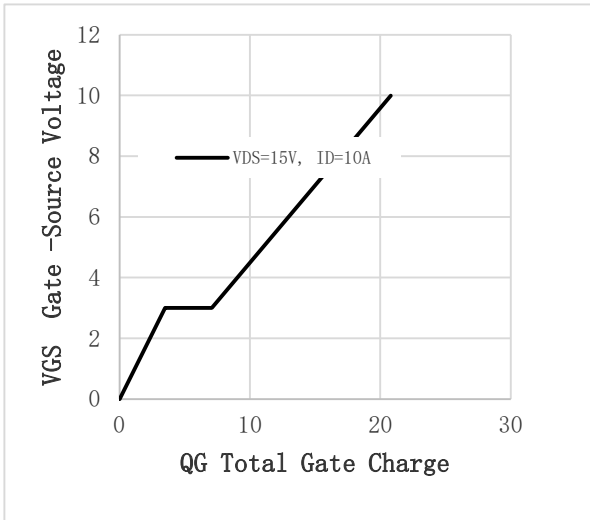


Fig.2 Capacitance Characteristics

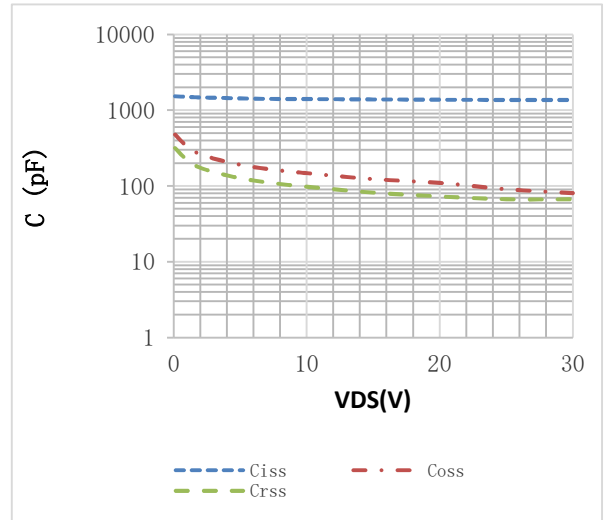


Fig.3 Power Dissipation

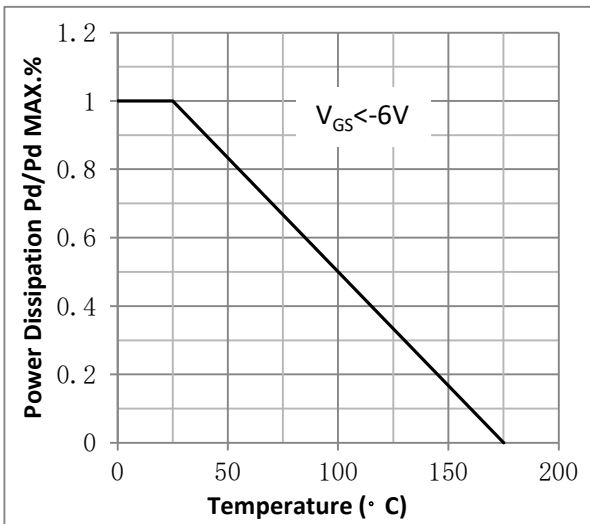


Fig.4 Typical output Characteristics

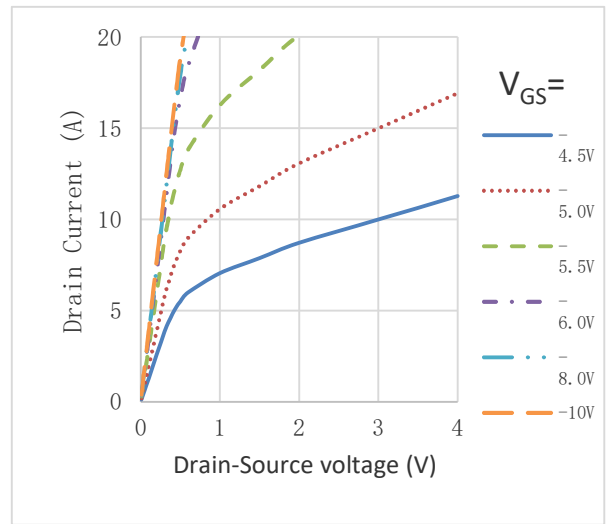


Fig.5 Threshold Voltage V.S Junction Temperature

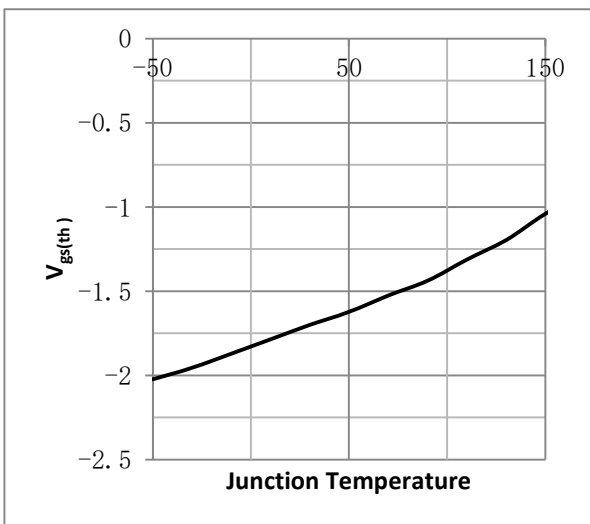


Fig.6 Resistance V.S Drain Current

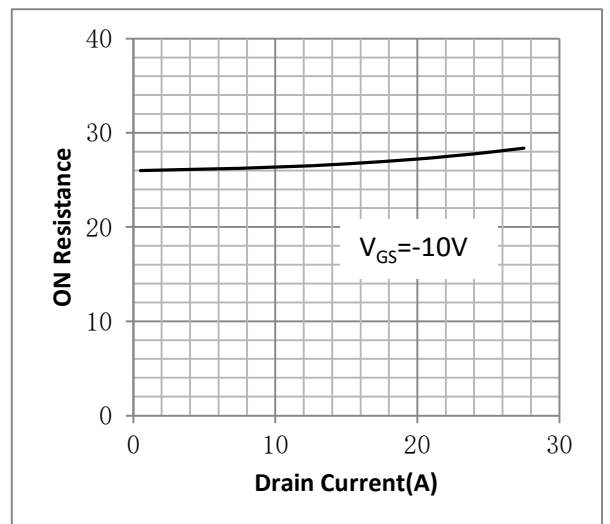


Fig.7 On-Resistance VS Gate Source Voltage

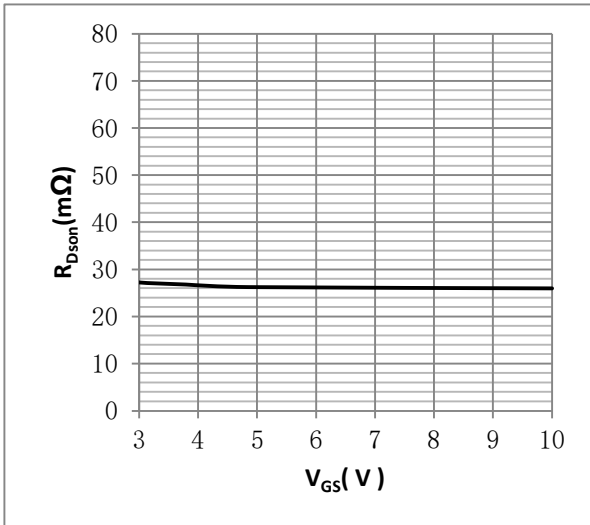


Fig.8 On-Resistance V.S Junction Temperature

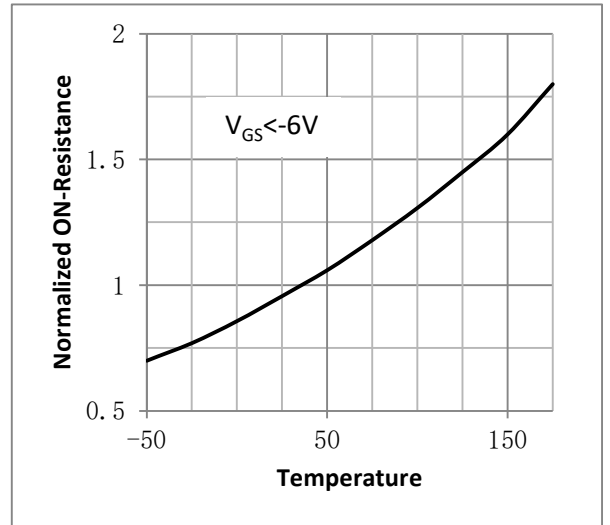


Figure 9. Diode Forward Voltage vs. Current

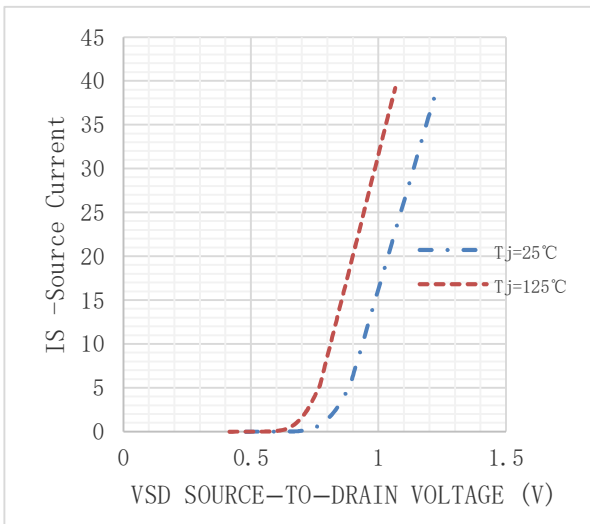


Figure 10. Transfer Characteristics

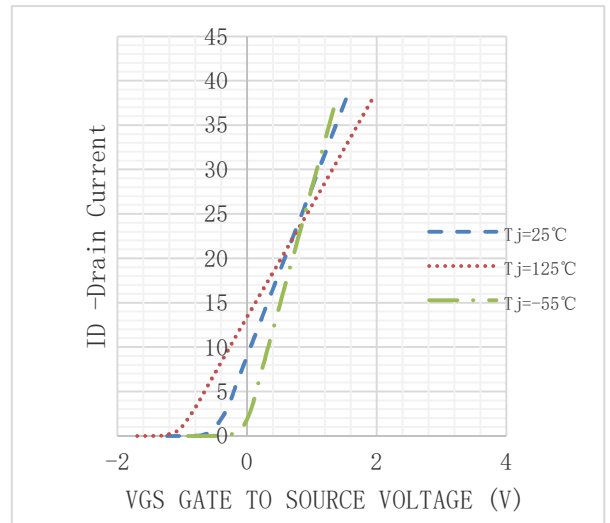


Fig.11 Safe Operating Area

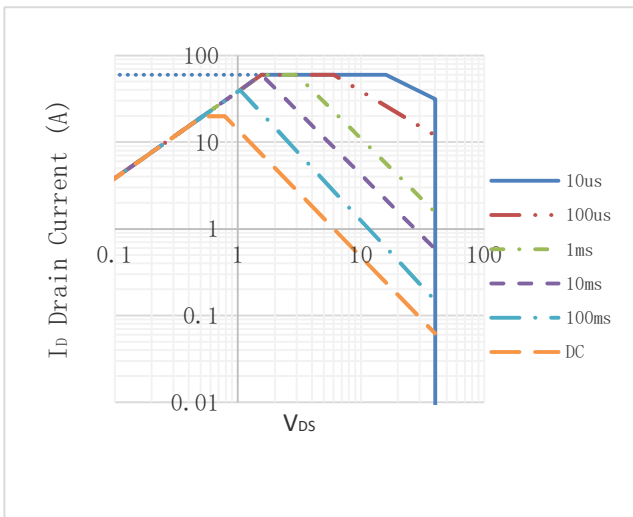
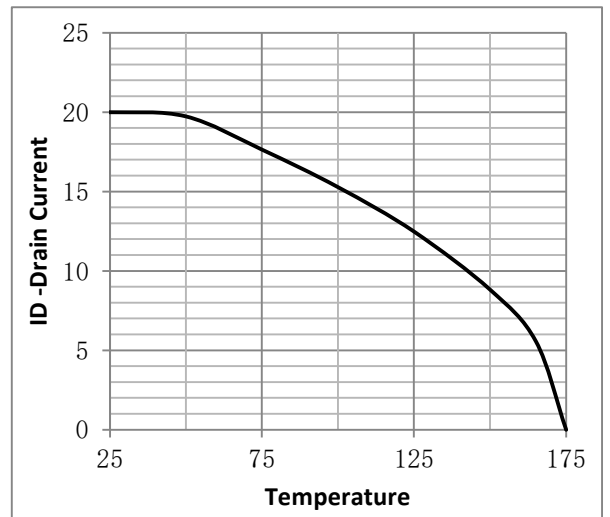
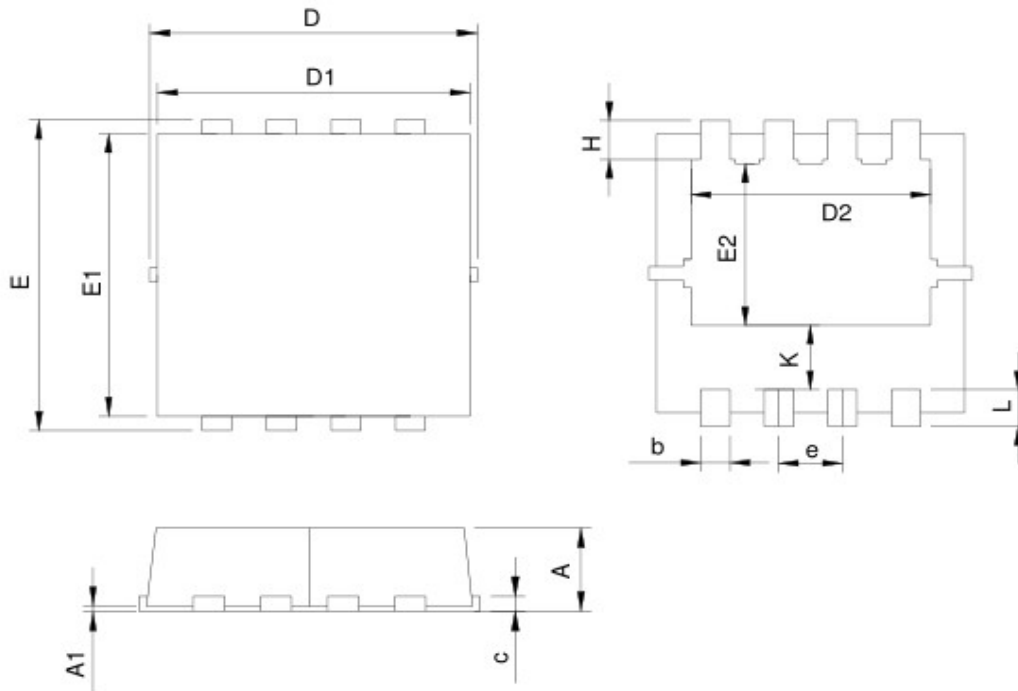


Fig.12 ID vs. Junction Temperature

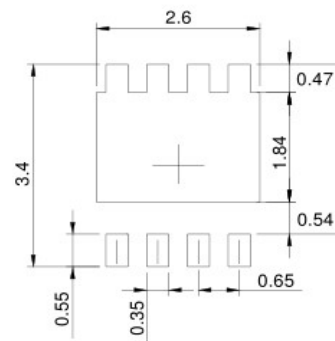


•DFN3*3 Package Outline



SYMBOL	DFN3.3x3.3-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.00	0.028	0.039
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
c	0.14	0.20	0.006	0.008
D	3.10	3.50	0.122	0.138
D1	3.05	3.25	0.120	0.128
D2	2.35	2.55	0.093	0.100
E	3.10	3.50	0.122	0.138
E1	2.90	3.10	0.114	0.122
E2	1.64	1.84	0.065	0.072
e	0.65 BSC		0.026 BSC	
H	0.32	0.52	0.013	0.020
K	0.59	0.79	0.023	0.031
L	0.25	0.55	0.010	0.022

RECOMMENDED LAND PATTERN



UNIT: mm

Note:

- ① Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$, Accumulation time ≤ 50 hours; For DC , the following test conditions can be passed: $V_{GS}=-20V/+5V$, $T_j=175^\circ\text{C}$, $t=1000$ hours ;
- ② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

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Revision History

Version	Date	Change
A	2021.2.3	NEW
B	2021.11.7	1.Modified Typical output Characteristics curve
C	2022.5.6	1.Add Reach,HF figure 2.Modified ID curve