• General Description

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

• Features

■AEC-Q101 Qualified

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

■Low Gate Charge for fast switching

■Low Thermal resistance

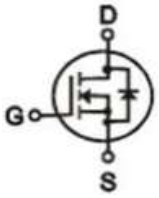
•Application

■BLDC Motor driver

■DC-DC

■Load Switch

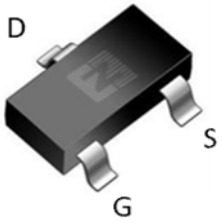
• Product Summary



V_{DS}= 60V

$R_{DS(ON)}$ = 165mΩ

I_D= 1.4A



SOT-23-3

RoHS

REACH COMPLIANT

HF

•Ordering Information:

Part NO.	ZMA012KN06T
Marking	012KN06
Packing Information	TAPE REEL
Basic ordering unit (pcs)	3000

•Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		60	V
Gate-Source Voltage	V_{GS}		±12	V
Continuous Drain Current	I_D	T_C=25℃	1.4	A
	I_D	T_C=75℃	1.2	A
	I_D	T_C=100℃	1.0	A
Pulsed Drain Current ①	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	5.6	A
Total Power Dissipation	P_D	T_C=25℃	1.4	W
Total Power Dissipation	P_D	T_A=25℃	0.7	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, VGS=10V, Rg=25Ω,	3.2	mJ
		L=0.5mH, VGS=10V, Rg=25Ω,	5.8	mJ
ESD Level (HBM)	CLASS 2			

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	90	°C/W
Thermal resistance, junction-ambient	$R_{thJA①}$		-	180	°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	0.5	1	1.5	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}= 60V			1.0	uA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=±12V, V_{DS} = 0V			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D= 2A		165	215	mΩ
		V_{GS}=2.5V, I_D= 1A		175	230	mΩ
Forward Transconductance	g_{FS}	V_{GS} =5V, I_{SD} = 1A		3		S
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 2A			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=25V	-	587	-	pF
Output capacitance	Coss		-	15	-	
Reverse transfer capacitance	Crss		-	11	-	
Gate Risistance	Rg	f = 1MHz	-	2.4		Ω
Total gate charge	Qg	V_{DD} = 15V, I_D = 2A, V_{GS} = 10V	-	12.8	-	nC
Total gate charge	Qg(4.5V)		-	5.6	-	
Gate - Source charge	Qgs		-	1	-	
Gate - Drain charge	Qgd		-	1.4	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=15V, R_G =3.3Ω, I_D =2A	-	6	-	ns
Turn-ON Rise time	t_r		-	8	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	14	-	ns
Turn-Off Fall time	t_f		-	3	-	ns
Reverse Recovery Time	t_{rr}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=2A	-	13	-	ns
Reverse Recovery Charge	Q_{rr}		-	6	-	nC

Fig.1 Gate-Charge Characteristics

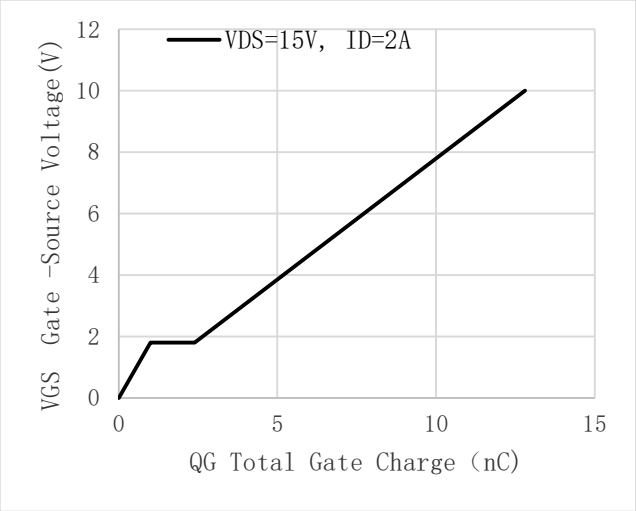


Fig.2 Capacitance Characteristics

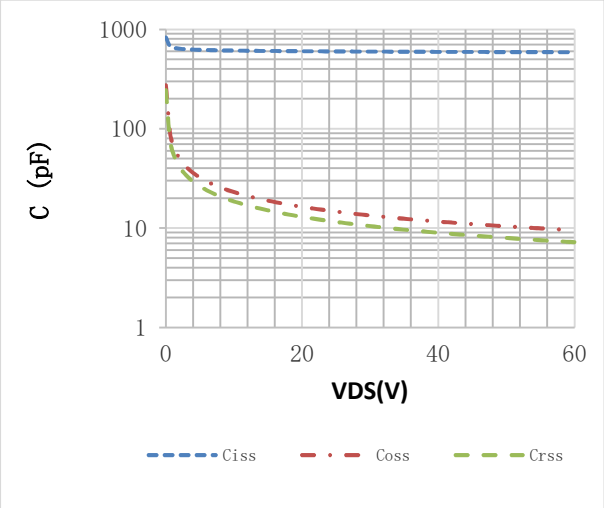


Fig.3 Power Dissipation

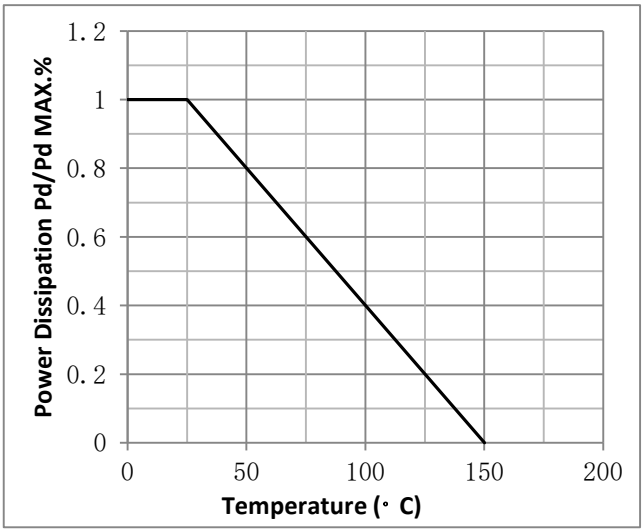


Fig.4 Typical output Characteristics

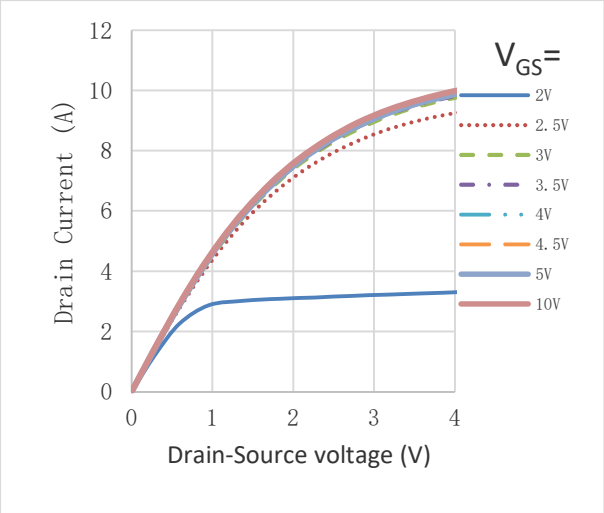


Fig.5 Threshold Voltage V.S Junction Temperature

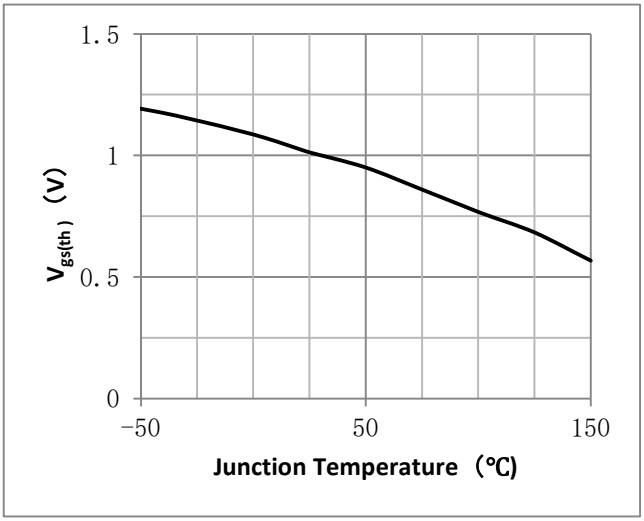


Fig.6 Resistance V.S Drain Current

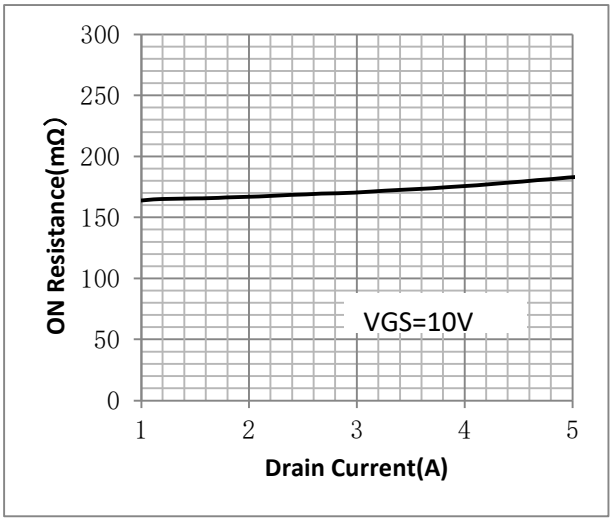


Fig.7 On-Resistance VS Gate Source Voltage

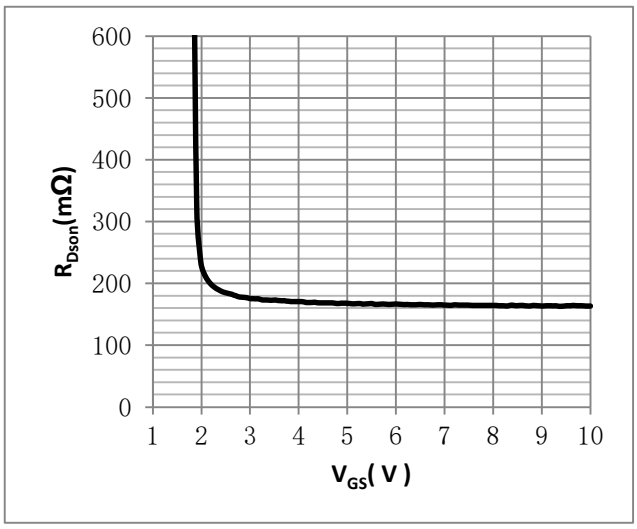


Fig.8 On-Resistance V.S Junction Temperature

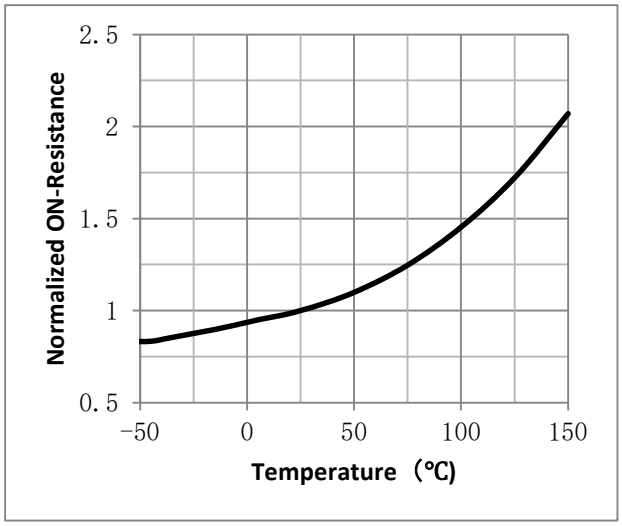


Figure 9. Diode Forward Voltage vs. Current

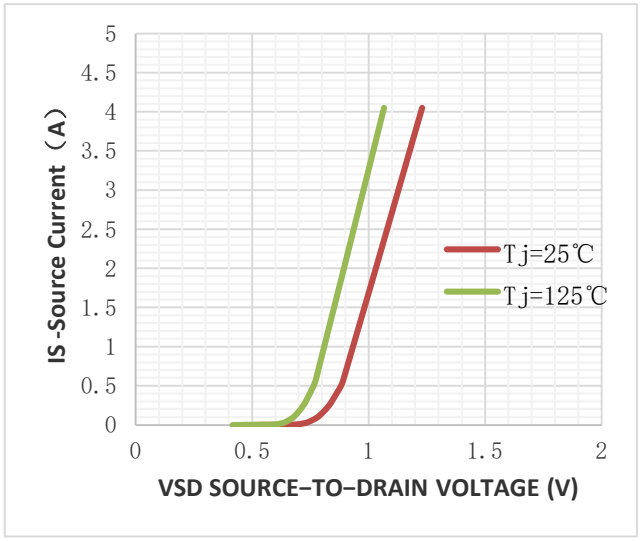


Figure 10. Transfer Characteristics

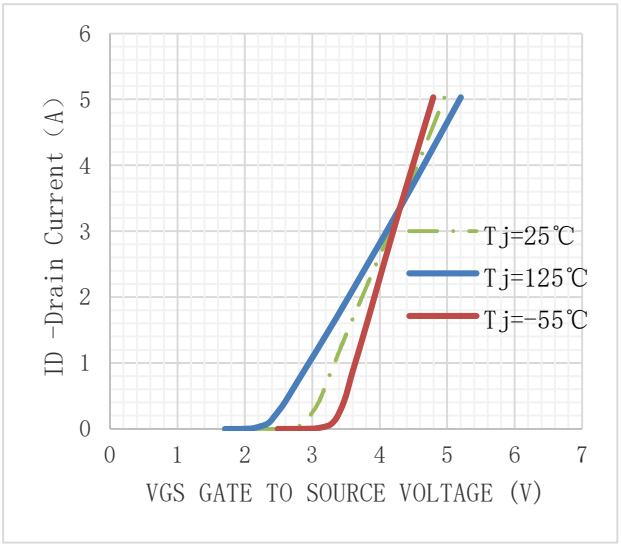


Fig.11 SOA Maximum Safe Operating Area

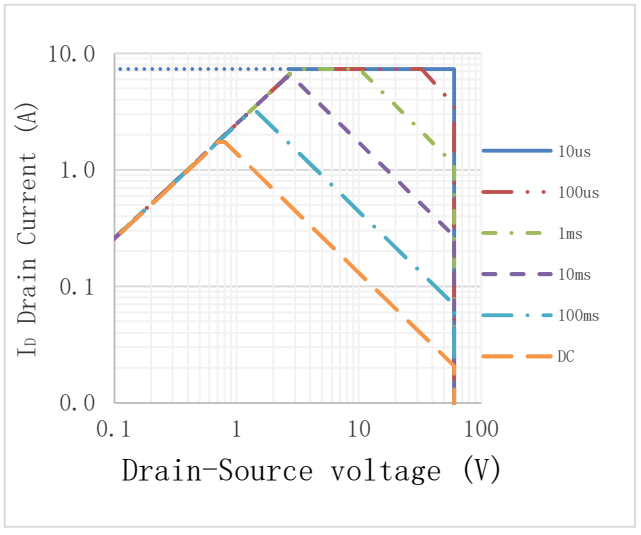
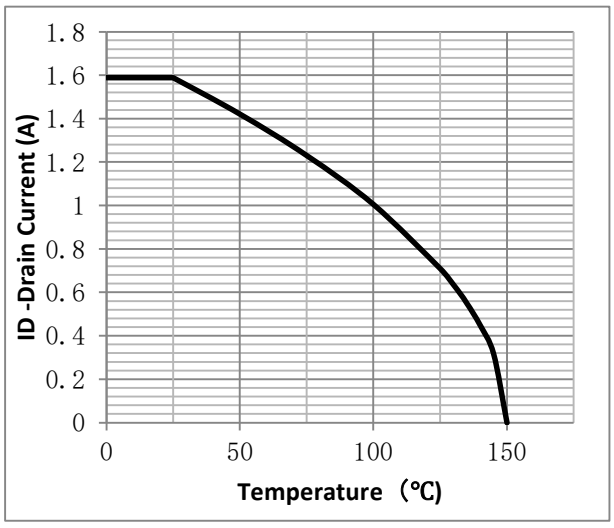
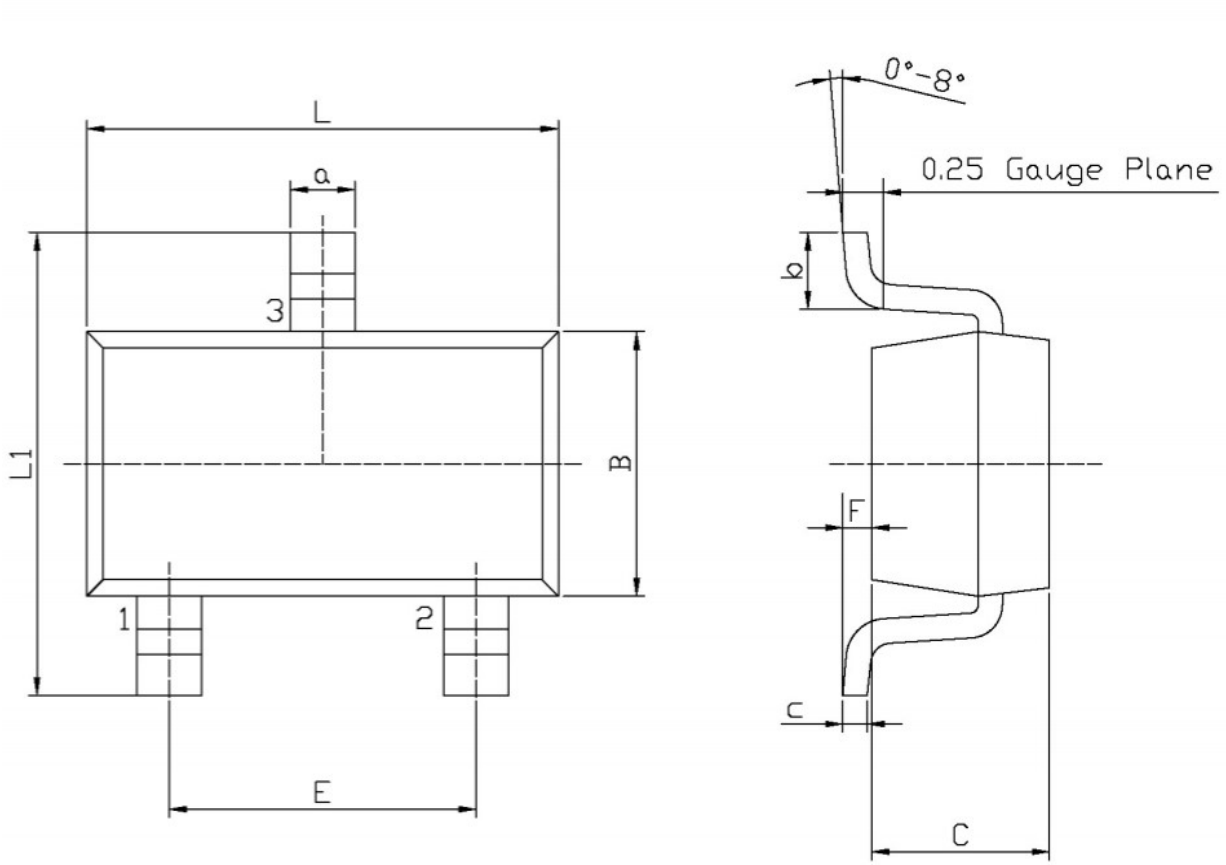


Fig.12 ID vs. Junction Temperature②



●SOT-23-3 Package Outline



Unit: mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
L	2.82	3.02	a	0.35	0.50
B	1.50	1.70	c	0.10	0.20
C	0.90	1.30	b	0.35	0.55
L1	2.60	3.00	F	0	0.15
E	1.80	2.00			

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. V_{GS}=10V.

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Revision History

Version	Date	Change
A	2024/8/16	New