

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.

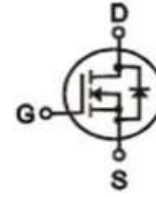
Features

- AEC-Q101 Qualified
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

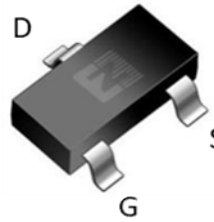
Application

- BLDC Motor driver
- DC-DC
- Load Switch

Product Summary



$V_{DS} = 60V$
 $R_{DS(ON)} = 165m\Omega$
 $I_D = 1.4A$



SOT-23-3



Ordering Information:

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

Absolute Maximum Ratings ($T_C=25^\circ C$)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		60	V
Gate-Source Voltage	V_{GS}		± 12	V
Continuous Drain Current	I_D	$T_C=25^\circ C$	1.4	A
	I_D	$T_C=75^\circ C$	1.2	A
	I_D	$T_C=100^\circ C$	1.0	A
Pulsed Drain Current ^①	I_{DM}	Pulsed; $t_p \leq 10 \mu s$; $T_{mb} = 25^\circ C$;	5.6	A
Total Power Dissipation	P_D	$T_C=25^\circ C$	1.4	W
Total Power Dissipation	P_D	$T_A=25^\circ C$	0.7	W
Operating Junction Temperature	T_J		-55 to +150	$^\circ C$
Storage Temperature	T_{STG}		-55 to +150	$^\circ C$
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, VGS=10V, Rg=25 Ω ,	3.2	mJ
		L=0.5mH, VGS=10V, Rg=25 Ω ,	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	$R_{thJA\oplus}$		-	180	°C/W
Soldering temperature (total time<10s)	T_{sold}		-	260	°C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	60			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	0.5	1	1.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{GS}=0V, V_{DS}=60V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 12V, V_{DS}=0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=2A$		165	215	m Ω
		$V_{GS}=2.5V, I_D=1A$		175	230	m Ω
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	C_{iss}	$f=1MHz, V_{DS}=25V$	-	587	-	pF
Output capacitance	C_{oss}		-	15	-	
Reverse transfer capacitance	C_{rss}		-	11	-	
Gate Resistance	R_g	$f=1MHz$	-	2.4		Ω
Total gate charge	Q_g	$V_{DD}=15V, I_D=2A, V_{GS}=10V$	-	12.8	-	nC
Total gate charge	$Q_{g(4.5V)}$		-	5.6	-	
Gate - Source charge	Q_{gs}		-	1	-	
Gate - Drain charge	Q_{gd}		-	1.4	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=2A$	-	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}	$V_{DD}=20V, dI_S/dt=100A/\mu s, I_S=2A$	-	13	-	ns
Reverse Recovery Charge	Q_{rr}		-	6	-	nC

Fig.1 Gate-Charge Characteristics

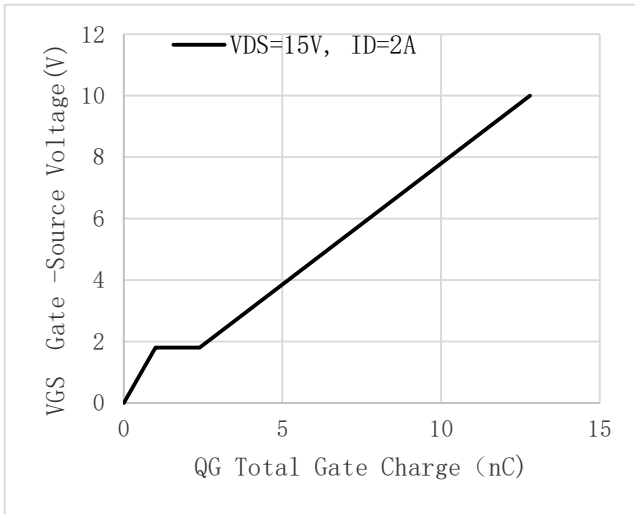


Fig.2 Capacitance Characteristics

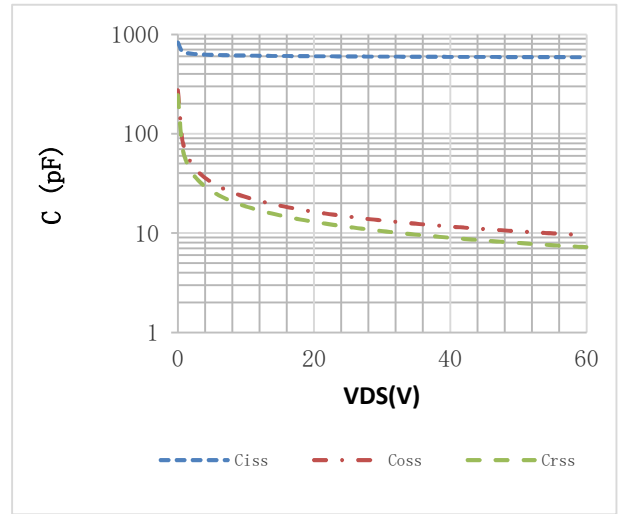


Fig.3 Power Dissipation

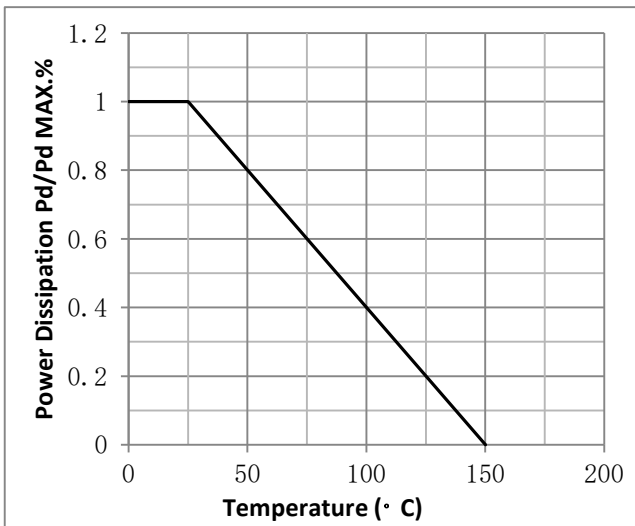


Fig.4 Typical output Characteristics

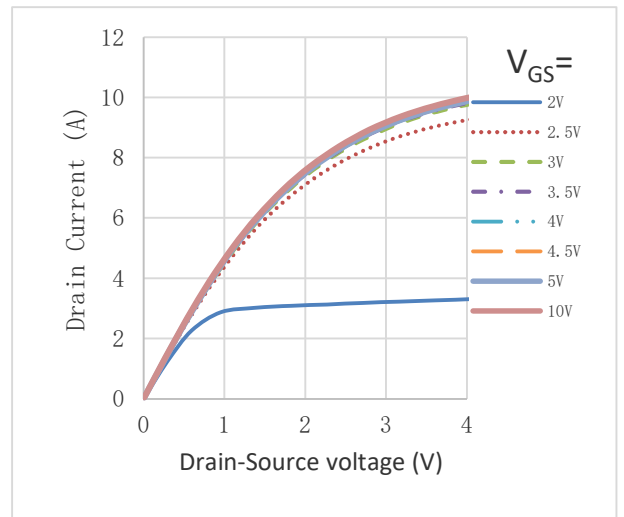


Fig.5 Threshold Voltage V.S Junction Temperature

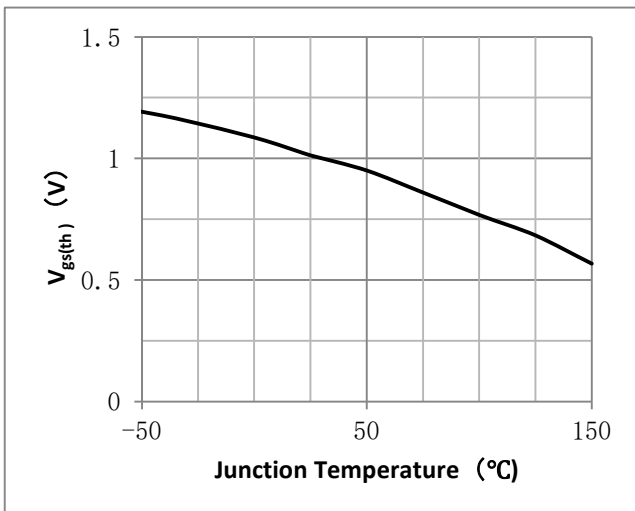


Fig.6 Resistance V.S Drain Current

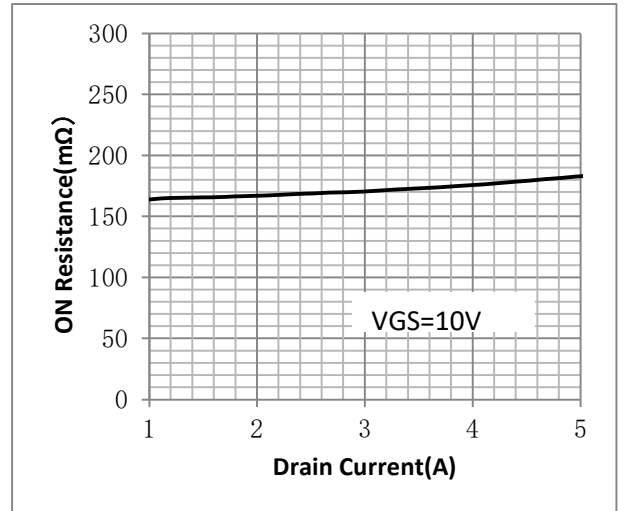


Fig.7 On-Resistance VS Gate Source Voltage

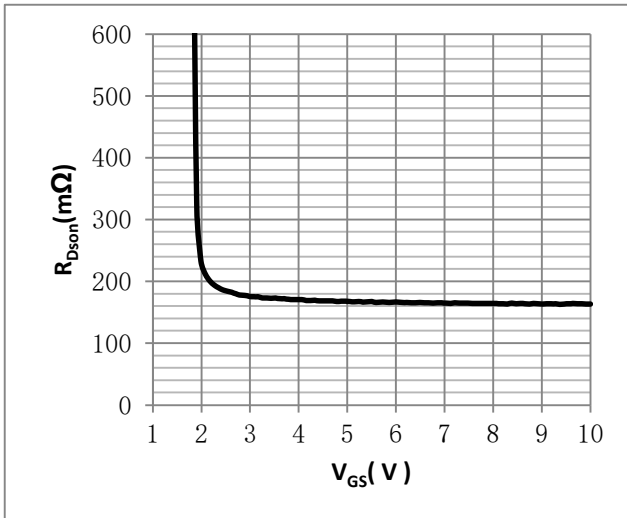


Fig.8 On-Resistance V.S Junction Temperature

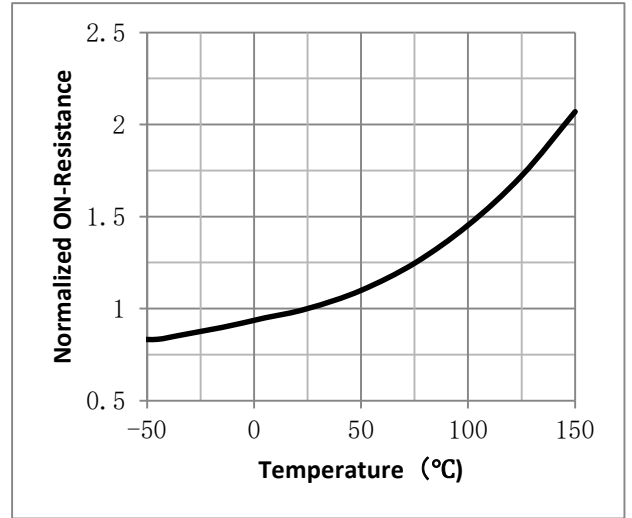


Figure 9. Diode Forward Voltage vs. Current

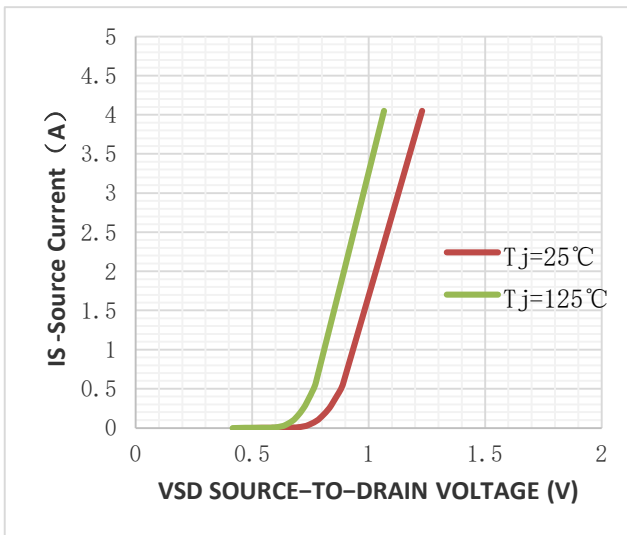


Figure 10. Transfer Characteristics

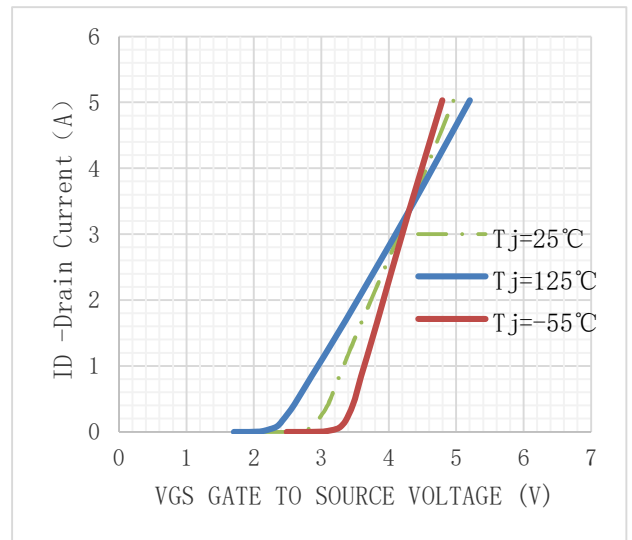


Fig.11 SOA Maximum Safe Operating Area

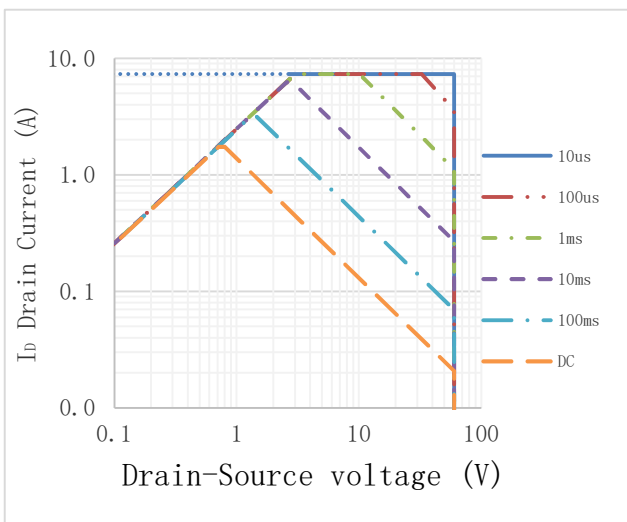
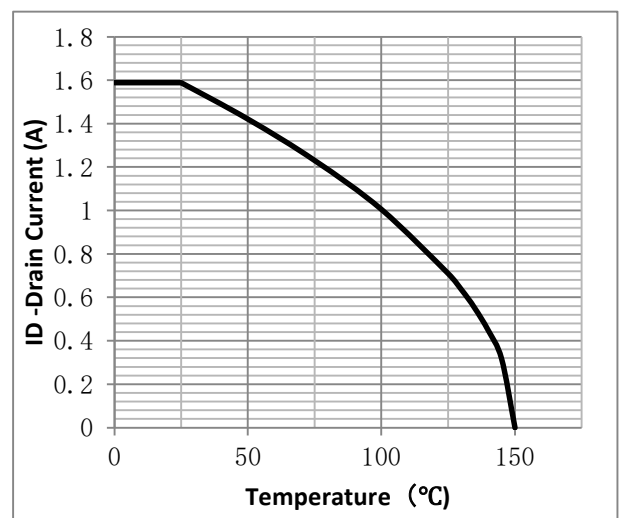
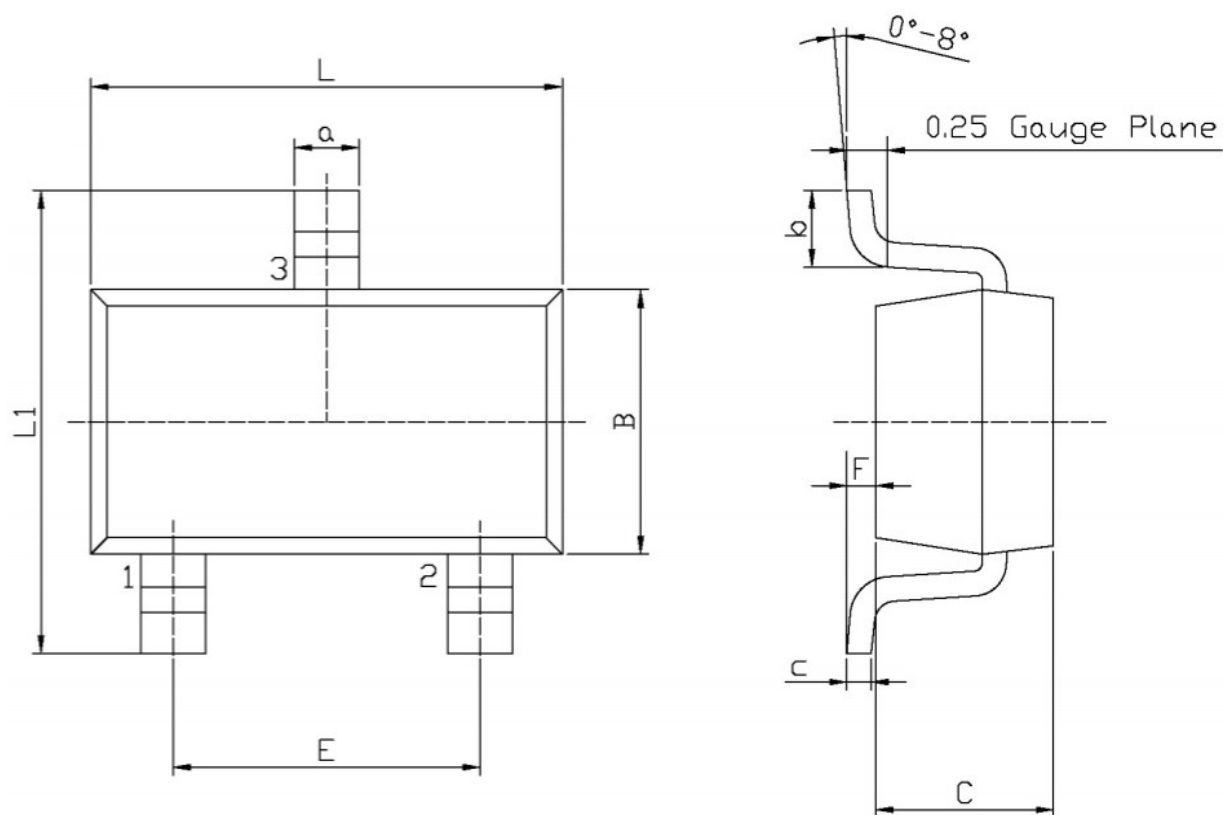


Fig.12 I_D vs. Junction Temperature



•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;
- ② Practically 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