

30V N-Channel Power MOSFET

• General Description

It combines advanced 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
- Battery protection

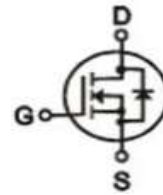
• Ordering Information:

Part NO.	ZM027N03D
Marking	ZM027N03
Packing Information	REEL TAPE
Basic ordering unit (pcs)	2500

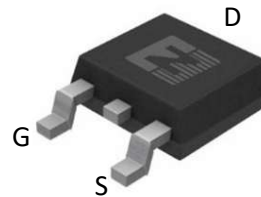
• Absolute Maximum Ratings ($T_C=25^\circ\text{C}$)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}	$25^\circ\text{C} \leq T_J \leq 175^\circ\text{C}$	30	V
Gate-Source Voltage ^①	V_{GS}		± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	120	A
	I_D	$T_C=75^\circ\text{C}$	97	A
	I_D	$T_C=100^\circ\text{C}$	84	A
Pulsed Drain Current	I_{DM}	Pulsed; $t_p \leq 10 \mu\text{s}$; $T_{mb} = 25^\circ\text{C}$;	360	A
Total Power Dissipation	P_D	$T_C=25^\circ\text{C}$	107	W
Total Power Dissipation	P_D	$T_A=25^\circ\text{C}$	2.7	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=0.1mH, VGS=10V, Rg=25 Ω ,	210	mJ
		L=0.5mH, VGS=10V, Rg=25 Ω ,	399	mJ
ESD Level (HBM)	CLASS 2			

• Product Summary



$V_{DS} = 30\text{V}$
 $R_{DS(ON)} = 2.7\text{m}\Omega$
 $I_D = 120\text{A}$



TO-252



•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	1.4	°C/W
Thermal resistance, junction-ambient ^②	R_{thJA}		-	55	°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}	$V_{GS} = 0V, I_D = 250\mu A$	30			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1.3	1.8	2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{GS} = 0V, V_{DS} = 30V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 40A$		2.7	3.6	m Ω
		$V_{GS} = 4.5V, I_D = 30A$		3.6	5.5	m Ω
Forward Transconductance	g_{FS}	$V_{GS} = 5V, I_{SD} = 10A$		30		S
Diode Forward Voltage	V_{FSD}	$V_{GS} = 0V, I_{SD} = 40A$			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	
Input capacitance	C_{iss}	$f = 1MHz, V_{DS} = 25V$	-	2800	-	pF	
Output capacitance	C_{oss}		-	420	-		
Reverse transfer capacitance	C_{rss}		-	280	-		
Gate Resistance	R_g	$f = 1MHz$	-	2.5		Ω	
Total gate charge	Q_g	$V_{DD} = 15V, I_D = 40A, V_{GS} = 10V$	-	26	-	nC	
	$Q_g (4.5v)$		-	14	-		
	Gate - Source charge		Q_{gs}	-	4.3		-
	Gate - Drain charge		Q_{gd}	-	6.9		-
Turn-ON Delay time	$t_{D(on)}$	$V_{GS} = 10V, V_{DS} = 15V, R_G = 3.3\Omega, I_D = 20A$	-	12	-	ns	
Turn-ON Rise time	t_r		-	44	-	ns	
Turn-Off Delay time	$t_{D(off)}$		-	50	-	ns	
Turn-Off Fall time	t_f		-	15	-	ns	
Reverse Recovery Time	t_{RR}	$V_{DD} = 20V, di_S/dt = 100A/s, I_S = 20A$	-	5.8	-	ns	
Reverse Recovery Charge	Q_{RR}		-	1.6	-	nC	

Fig.1 Gate-Charge Characteristics

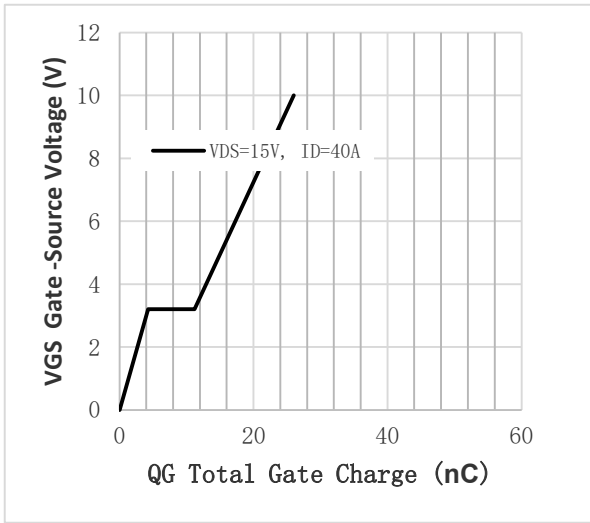


Fig.2 Capacitance Characteristics

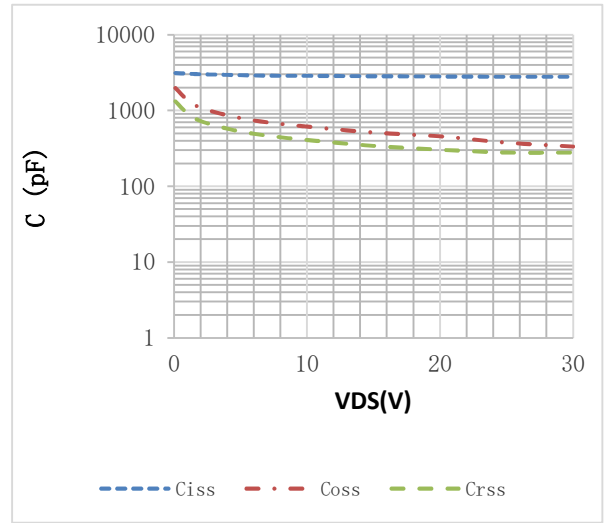


Fig.3 Power Dissipation

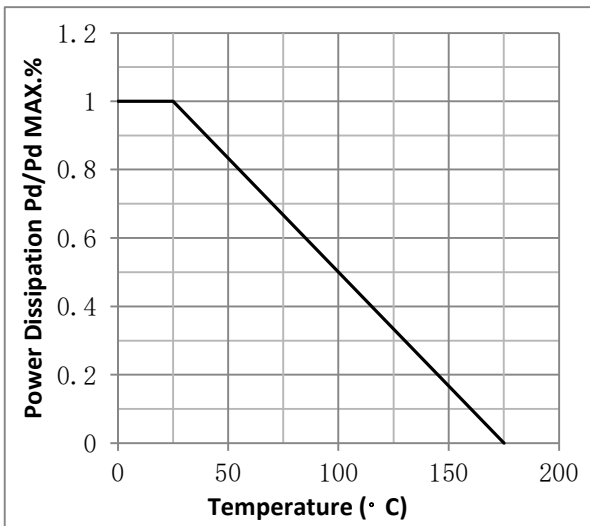


Fig.4 Typical output Characteristics

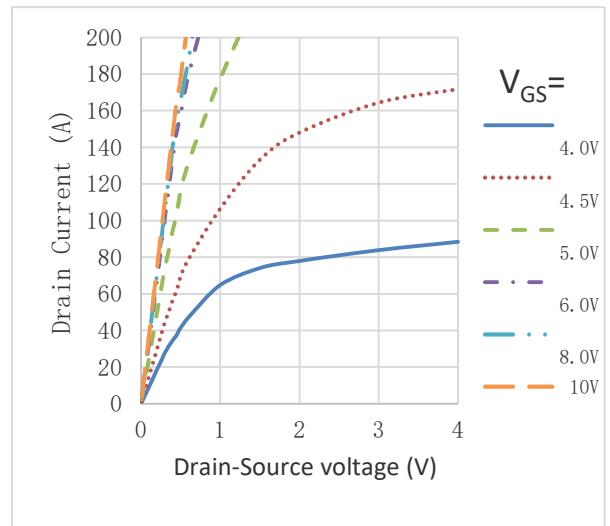


Fig.5 Threshold Voltage V.S Junction Temperature

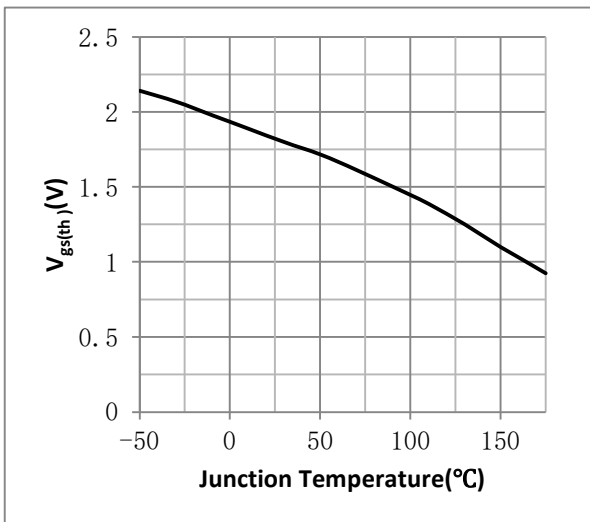


Fig.6 Resistance V.S Drain Current

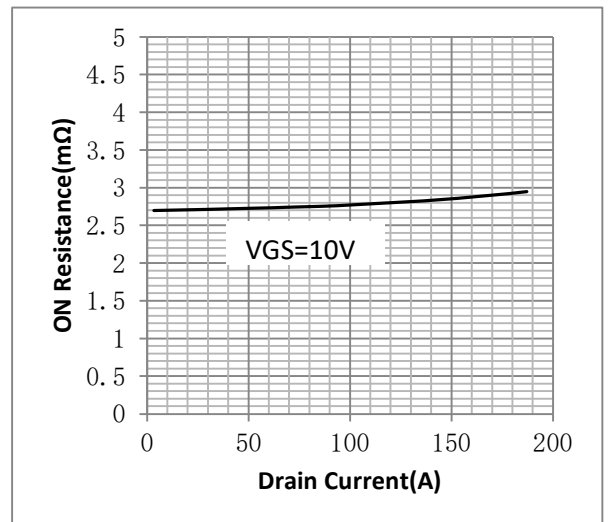


Fig.7 On-Resistance VS Gate Source Voltage

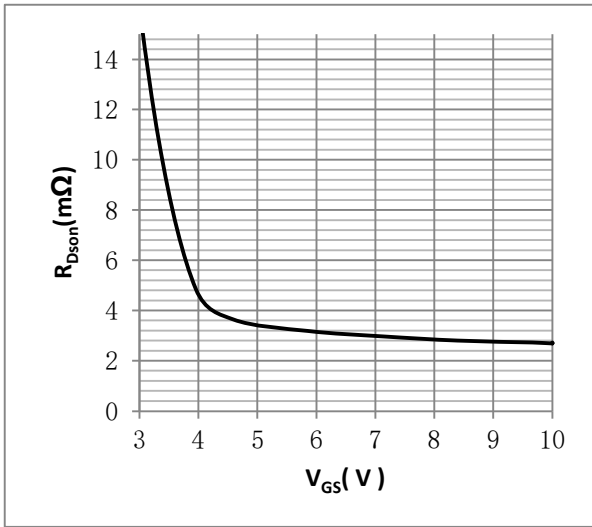


Fig.8 On-Resistance V.S Junction Temperature

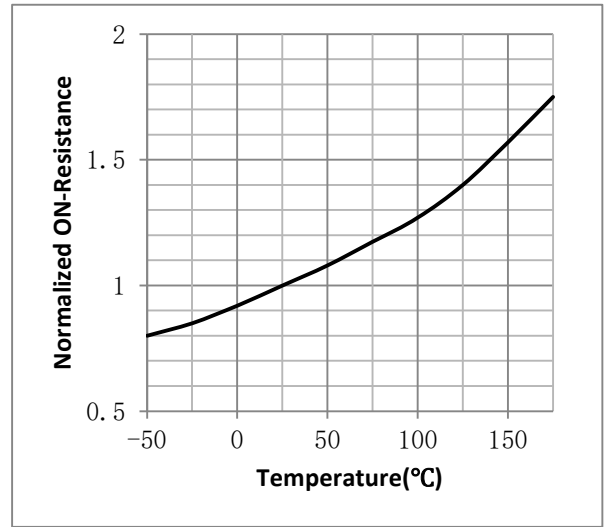


Figure 9. Diode Forward Voltage vs. Current

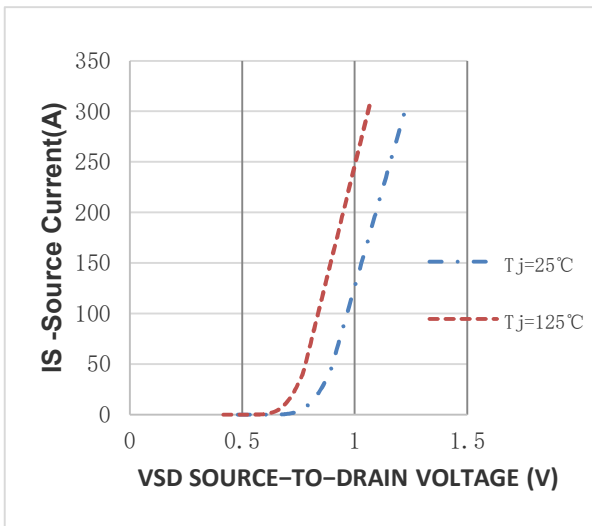


Figure 10. Transfer Characteristics

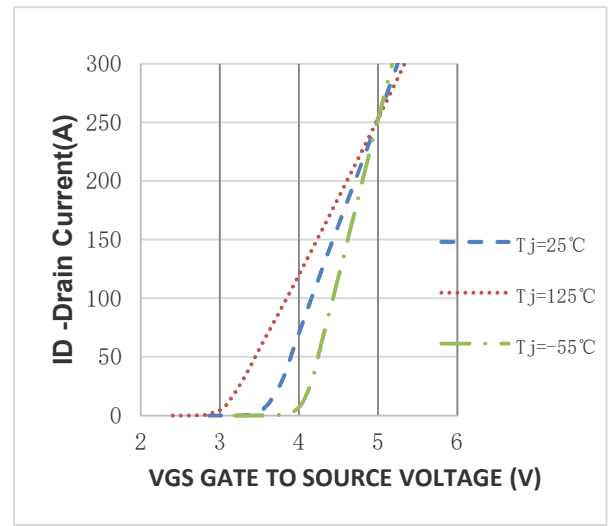


Fig.11 SOA Maximum Safe Operating Area

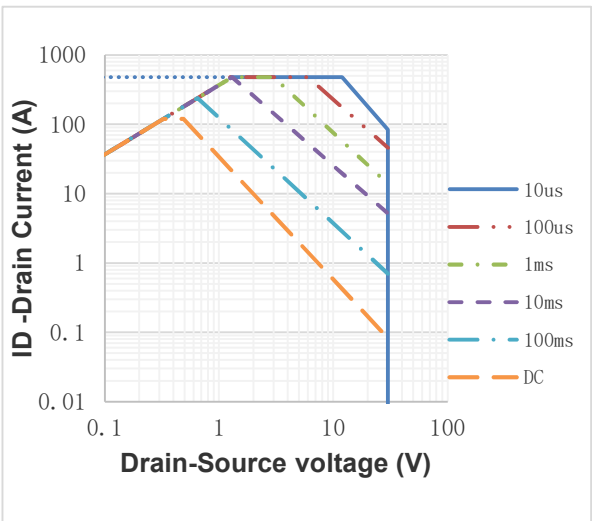
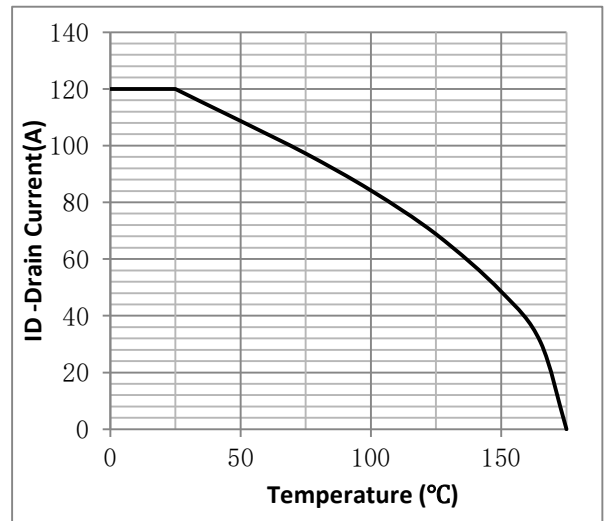
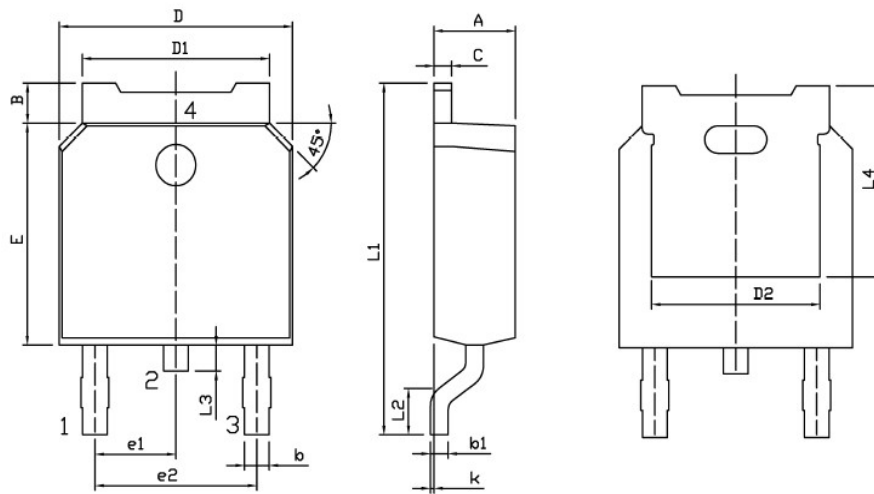


Fig.12 I_D vs. Case Temperature^③

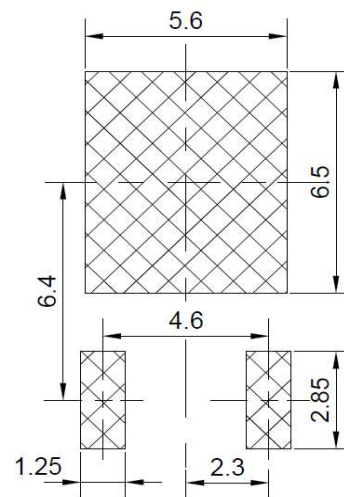


•TO-252 Package Outline



Dimensions In Millimeters					
Symbol	MIN	MAX	Symbol	MIN	MAX
A	2.20	2.40	E	5.95	6.25
B	0.95	1.25	e1	2.24	2.34
b	0.70	0.90	e2	4.43	4.73
b1	0.45	0.55	L1	9.85	10.35
C	0.45	0.55	L2	1.70	2.00
D	6.45	6.75	L3	0.60	0.90
D1	5.10	5.50	L4	5.05	
D2	4.85		k	0.00	0.10

Land Pattern
(Only for Reference)



Note:

- ① Pulse : $V_{GS}=+20V/-20V$, Duty cycle=50%, $T_j=175^{\circ}C$, $t=1000$ hours; For DC , the following test conditions can be passed: $V_{GS}=+20V/-10V$, $T_j=175^{\circ}C$, $t=1000$ hours;
- ② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;
- ③ 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	2018. 8. 10	
B	2022. 10. 20	1. Add Reach, HF figure, 2. Fig1~12 modify 3. Add It is suitable for automotive application. 4. Add Dynamic characteristics
C	2024. 5. 17	Correct marking, Qg current, Qg@4. 5V
D	2025. 11. 13	Update POD.