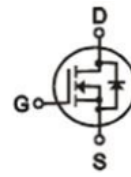## ● General Description

The ZM045N03M combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

● Features

■ Advance high cell density Trench technology

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

■ Low Gate Charge for fast switching
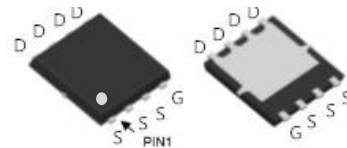
■ Low Thermal resistance

● Application

■ MB/VGA Vcore

■ Synchronous Rectifier

■ BLDC Motor driver

● Product Summary

$V_{DS} = 30V$

$R_{DS(ON)} = 4.5m\Omega$

$I_D = 60A$

DFN3 x 3

● Ordering Information:

Part NO.	ZM045N03M
Marking	045N03
Packing Information	REEL TAPE
Basic ordering unit (pcs)	5000

● Absolute Maximum Ratings ($T_C = 25℃$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	$I_D@T_C=25℃$	60	A
	$I_D@T_C=75℃$	45	A
	$I_D@T_C=100℃$	38	A
	$I_D@T_A=25℃$	19	A
	$I_D@T_A=75℃$	15.6	A
Pulsed Drain Current [①]	I_{DM}	150	A
Total Power Dissipation	$P_D@T_C=25℃$	43	W
Total Power Dissipation	$P_D@T_A=25℃$	2.3	W
Operating Junction Temperature	T_J	-55 to 150	℃
Storage Temperature	T_{STG}	-55 to 150	℃
Single Pulse Avalanche Energy (L=0.1mH)	E_{AS}	100	mJ

●**Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	2.9	° C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	54	° C/W
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	265	° C

●**Electronic Characteristics**

Parameter	Symbol	Condition		Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA		30			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =250uA		1.5	1.8	2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=30V, V_{GS} =0V				1.0	uA
			Tj=125℃			5.0	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=20A			4.5	6.0	mΩ
			Tj=125℃		6.3	8.1	mΩ
		V_{GS}=4.5V, I_D=10A			7.0	9.0	mΩ
Forward Trans conductance	g_{FS}	V_{DS} =25V, I_D=10A			16		s
Source-drain voltage	V_{SD}	Is=20A			0.8	1.28	V

●**Dynamic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	Ciss		-	1500	-	
Output capacitance	Coss	f = 1MHz	-	280	-	pF
Reverse transfer capacitance	Crss		-	140	-	
Total gate charge	Qg	V_{DD} =25V	-	31	-	
Gate - Source charge	Qgs	I_D = 8A	-	4.3	-	nC
Gate - Drain charge	Qgd	V_{GS} = 10V	-	8.7	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V		10.5		ns
Turn-ON Rise time	t_r	V_{DS}=15V		14		ns
Turn-Off Delay time	$t_{D(off)}$	R_G =3.3Ω		35		ns
Turn-Off Fall time	t_f	I_D =15A		10		ns

Body Diode Reverse Recovery Time	t_{rr}	IF=20A, dI/dt=100A/us		11.5		ns
Body Diode Reverse Recovery Charge	Q_{rr}	IF=20A, dI/dt=100A/us		13.3		nC

Note: ① Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2% ;
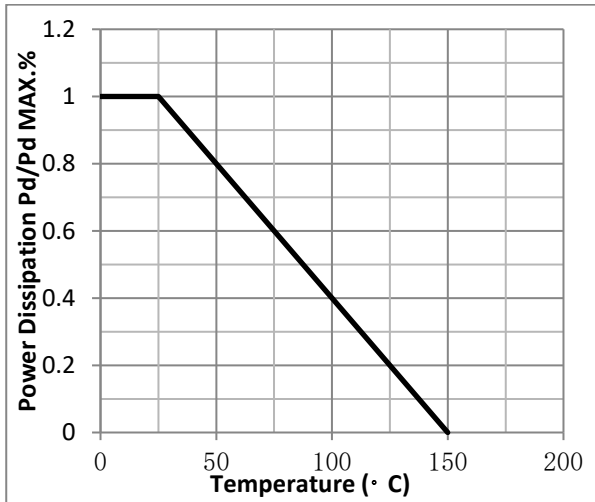
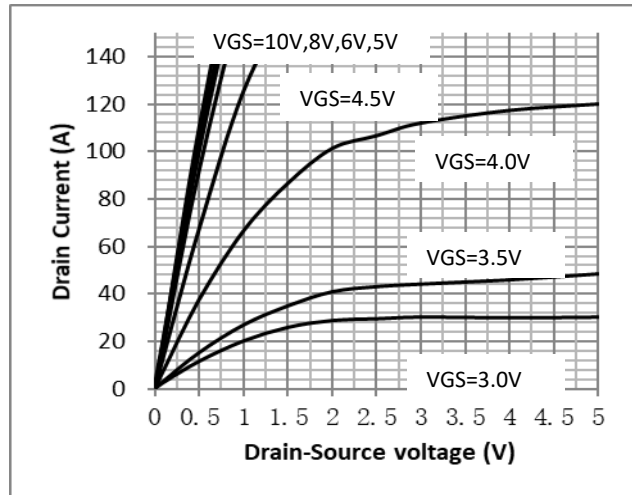Fig.1 Power Dissipation

Fig.2 Typical output Characteristics
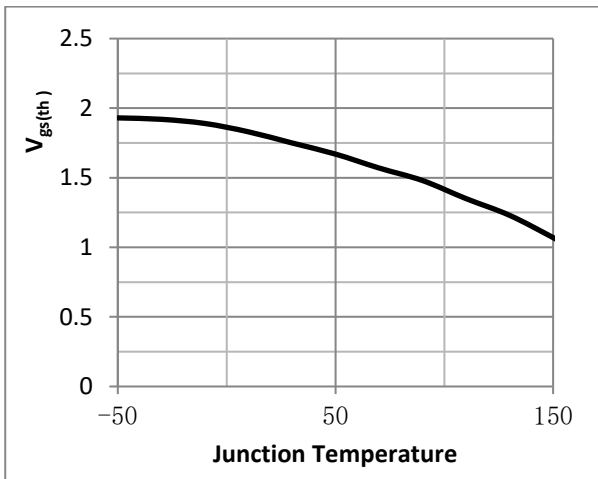

Fig.3 Threshold Voltage V.S Junction Temperature
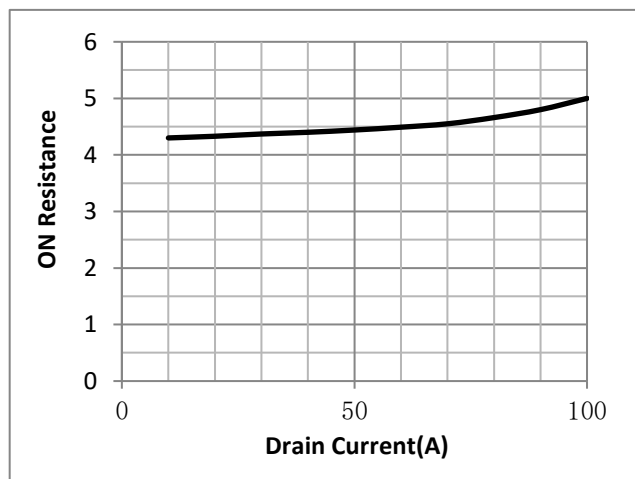
Fig.4 Resistance V.S Drain Current
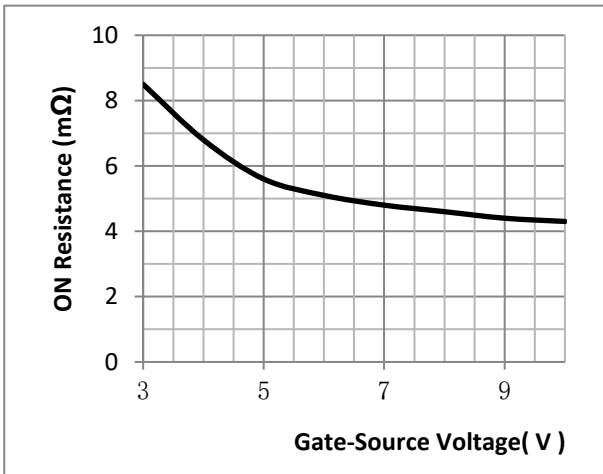
Fig.5 On-Resistance VS Gate Source Voltage

Fig.6 On-Resistance V.S Junction Temperature

Figure 7. Gate−to−Source and

Drain−to−Source Voltage vs. Total Charge

Fig.8 Capacitance Variation

Figure 9. Diode Forward Voltage vs. Current
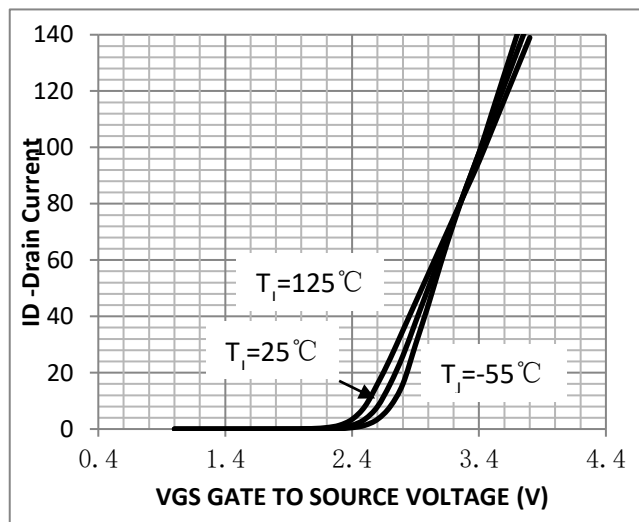
Figure 10. Transfer Characteristics
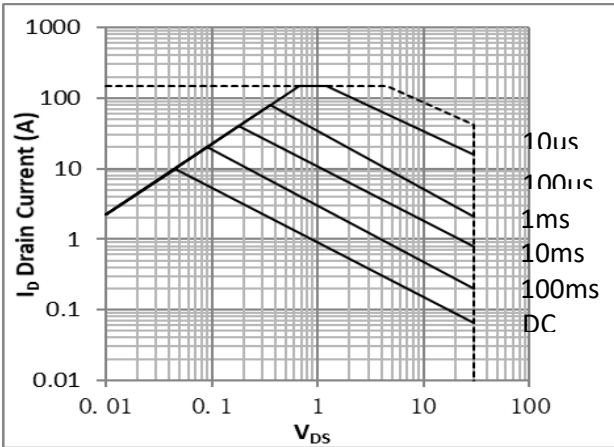
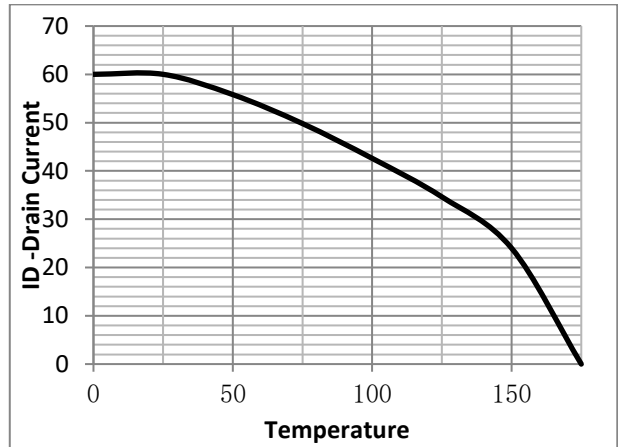Fig.11 SOA Maximum Safe Operating Area

Fig.12 ID-Junction Temperature

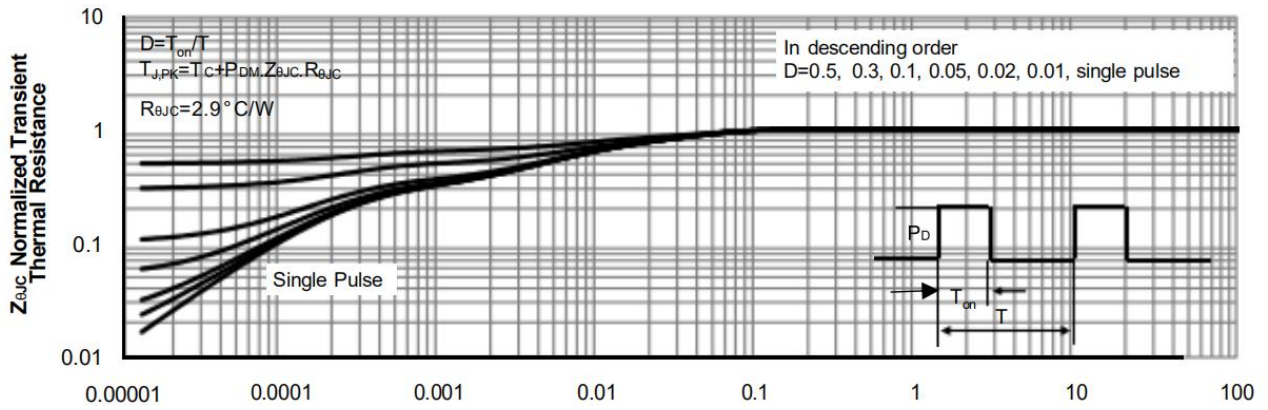Fig.13 Normalized Maximum Transient Thermal Impedance
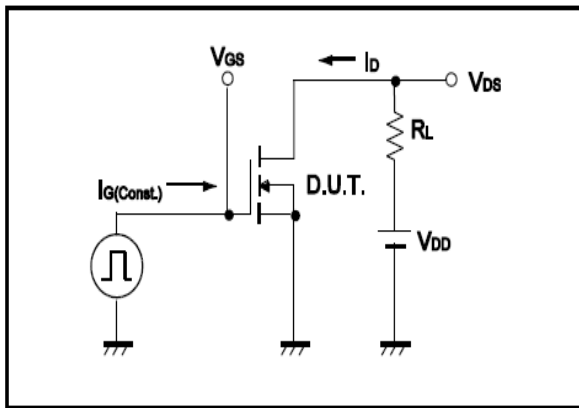

Fig.14 Switching Time Measurement Circuit
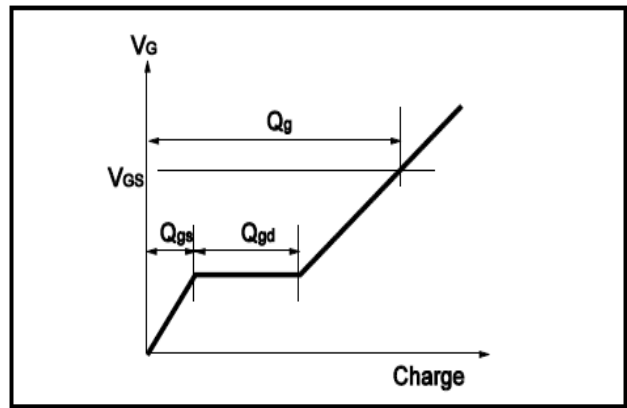

Fig.15 Gate Charge Waveform
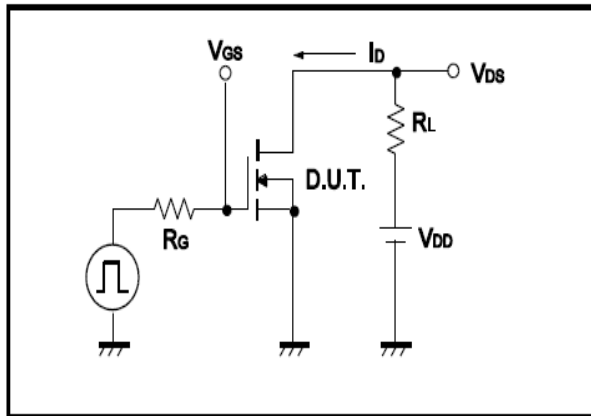
Fig.16 Switching Time Measurement Circuit
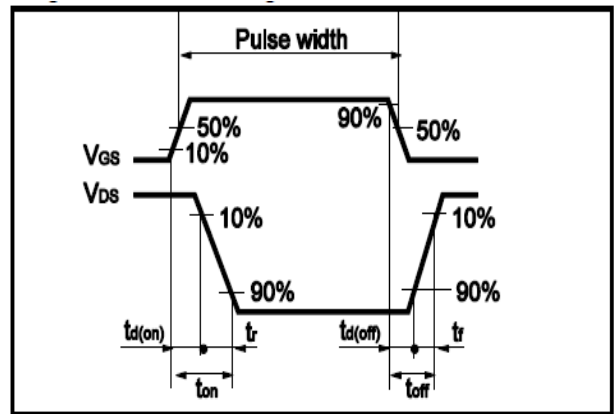

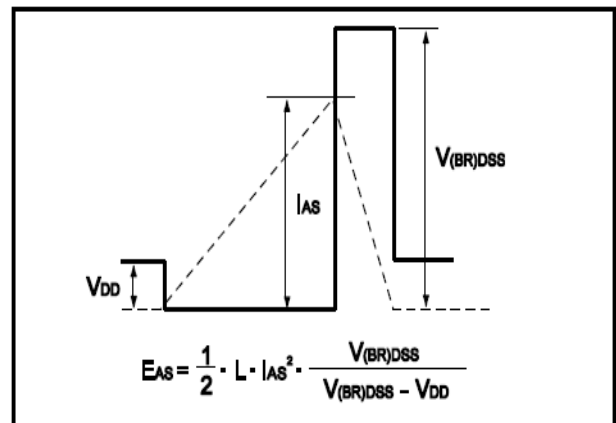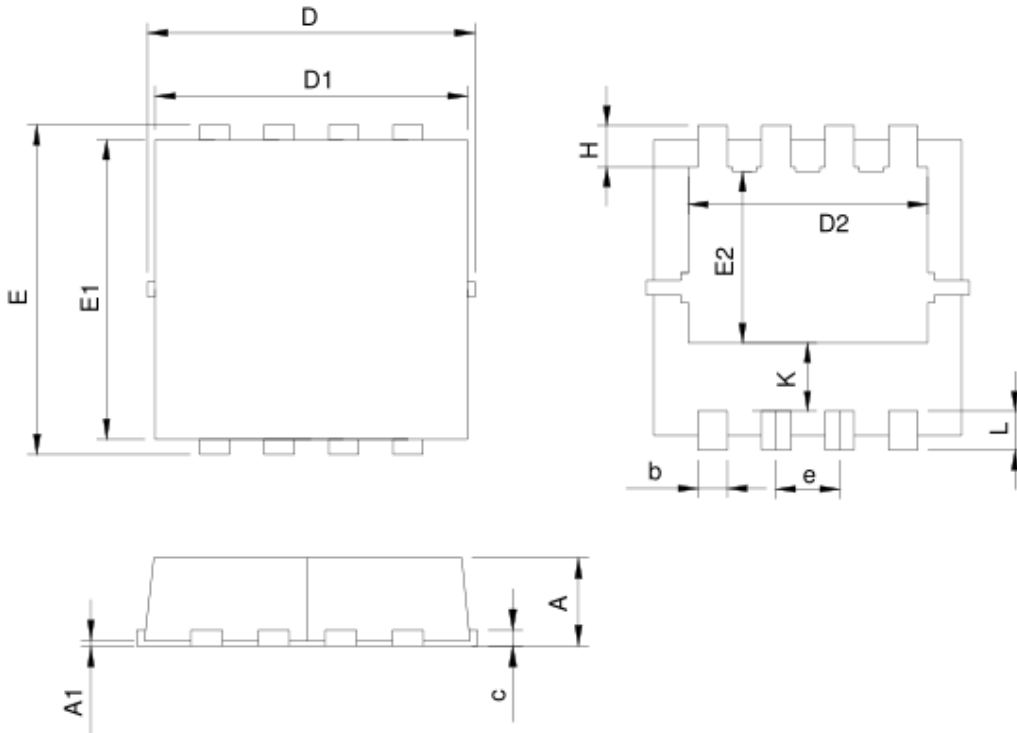Fig.17 Gate Charge Waveform

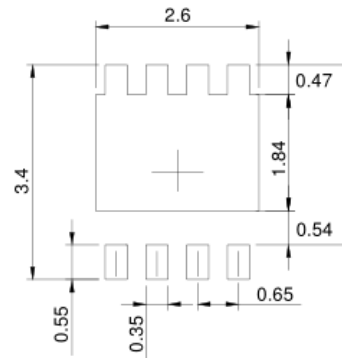Fig.18 Avalanche Measurement Circuit

Fig.19 Avalanche Waveform

$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AS}^2 \cdot \frac{V_{(BR)DSS}}{V_{(BR)DSS} - V_{DD}}$$

●Dimensions(DFN3×3)

Unit：mm

S Y M B O L	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