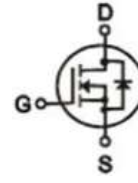## ● General Description

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

● Features

■ Advance high cell density Trench technology

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

■ Low Gate Charge for fast switching
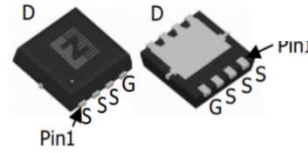
■ Low Thermal resistance

● Application

■ MB/VGA Vcore

■ SMPS 2nd Synchronous Rectifier

■ POL application

■ BLDC Motor driver

● Product Summary

$V_{DS} = 30V$

$R_{DS(ON)} = 2.8m\Omega$

$I_D = 50A$

DFN3 x 3

● Ordering Information:

Part NO.	ZMS028N03M
Marking	028N03
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 @TC=25℃	50	A
	I_D @TC=75℃	38	A
	I_D @TC=100℃	31	A
Pulsed Drain Current [①]	I_{DM}	150	A
Total Power Dissipation(TC=25℃)	P_D@TC=25℃	21	W
Total Power Dissipation(TA=25℃)	P_D@TA=25℃	1.8	W
Operating Junction Temperature	T_J	-55 to 150	℃
Storage Temperature	T_{STG}	-55 to 150	℃
Single Pulse Avalanche Energy	E_{AS}	40	mJ

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●**Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	6.0	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	70	°C/W
Soldering temperature, wave soldering 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	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250uA$	1.2	1.7	2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$			1.0	uA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm20V, V_{DS}=0V$			±100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$		2.8	3.7	mΩ
		$V_{GS}=4.5V, I_D=10A$		3.5	4.5	mΩ
Forward Transconductance	g_{FS}	$V_{DS}=25V, I_D=4A$		8		s
Source-drain voltage	V_{SD}	Is=20A			1.28	V

●**Electronic Characteristics**

Parameter	Symbol	Condition		Min.	Typ	Max.	Unit
Input capacitance	Ciss	VDS=25V		-	1350	-	
Output capacitance	Coss		f = 1MHz	-	372	-	pF
Reverse transfer capacitance	Crss			-	32	-	

●**Gate Charge characteristics**($T_a = 25℃$)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Qg	$V_{DD} = 15V$	-	24	-	
Gate - Source charge	Qgs	$I_D = 20A$	-	5.2	-	nC
Gate - Drain charge	Qgd	$V_{GS} = 10V$	-	2.8	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{DD} = 15V$		8.9		
Turn-ON Rise time	tr	$I_D = 20A$		7.5		
Turn-Off Delay time	$t_{D(off)}$	$V_{GS} = 4.5V$		13.4		ns
Turn-Off Fall time	tf	$R_{G,ext}=2\Omega$		6.7		

Body Diode Reverse Recovery Time	trr	IF=20A, dI/dt=100A/μs		14		ns
Body Diode Reverse Recovery Charge	Qrr	IF=20A, dI/dt=100A/μs		25		nC

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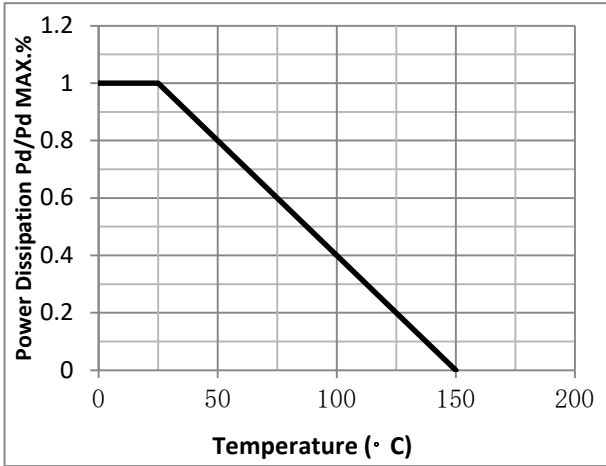
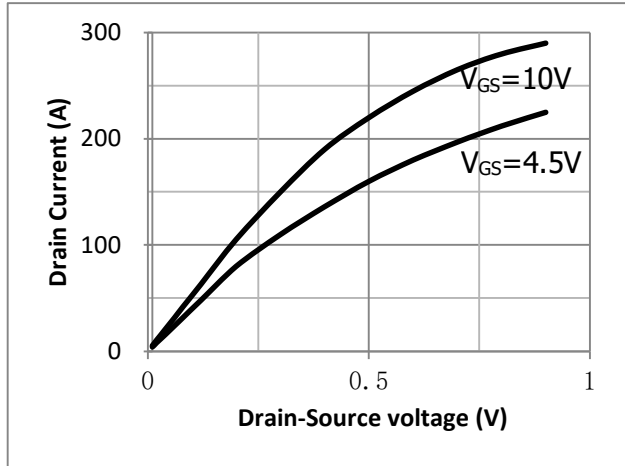Fig.1 Power Dissipation

Fig.2 Typical output Characteristics

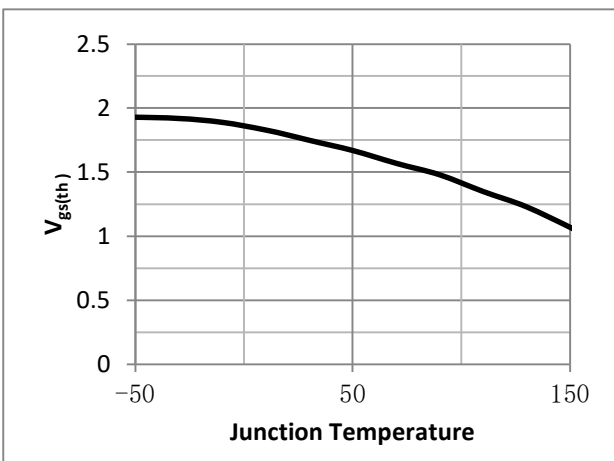Fig.3 Threshold Voltage V.S Junction Temperature
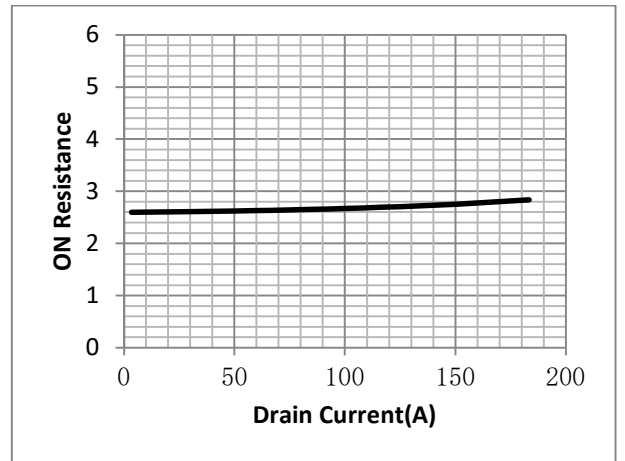
Fig.4 Resistance V.S Drain Current
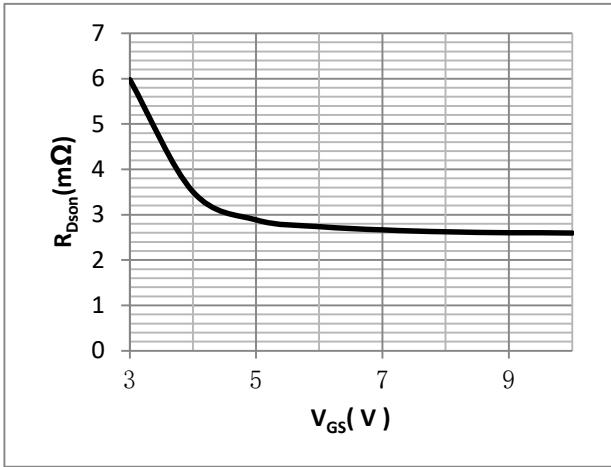
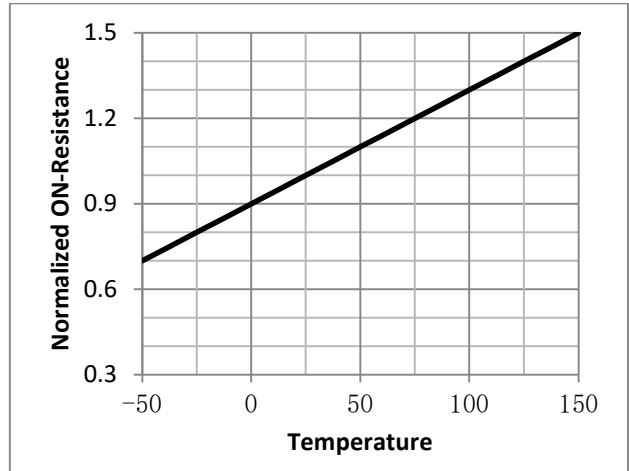Fig.5 On-Resistance VS Gate Source Voltage

Fig.6 On-Resistance V.S Junction Temperature

Fig.7 Gate Charge Characteristics

Fig.8 Capacitance vs Vds

Fig.9 SOA Maximum Safe Operating Area
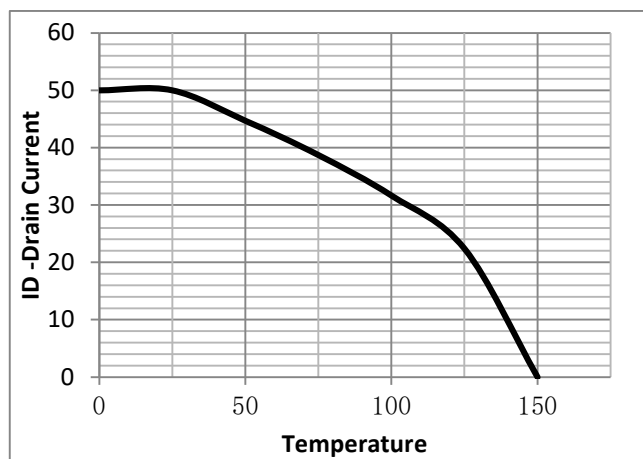
Fig.10 ID-Junction Temperature
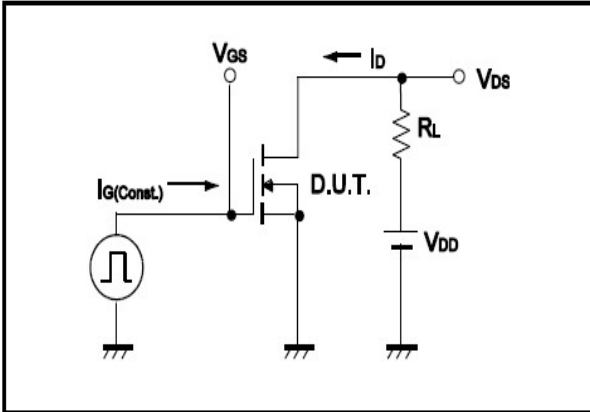
Fig.11 Gate Charge Measurement Circuit
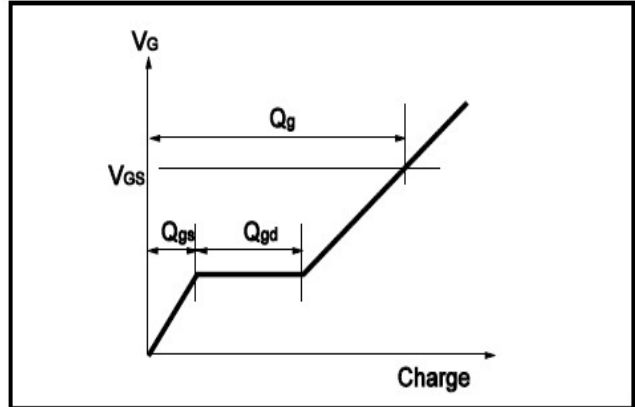
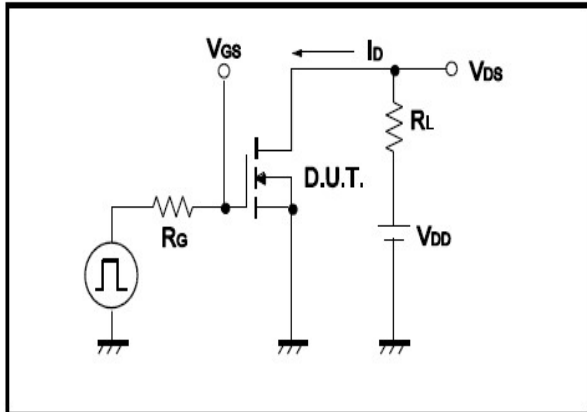Fig.12 Gate Charge Waveform

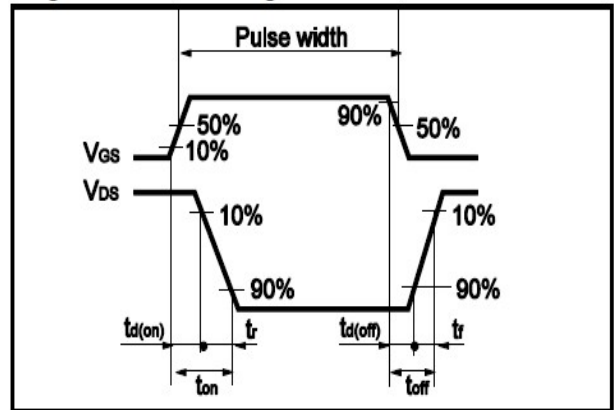Fig.13 Resistive Switching Test Circuit

Fig.14 Resistive Switching Test Waveform

Fig.15 Avalanche Measurement Circuit

Fig.16 Avalanche Waveform
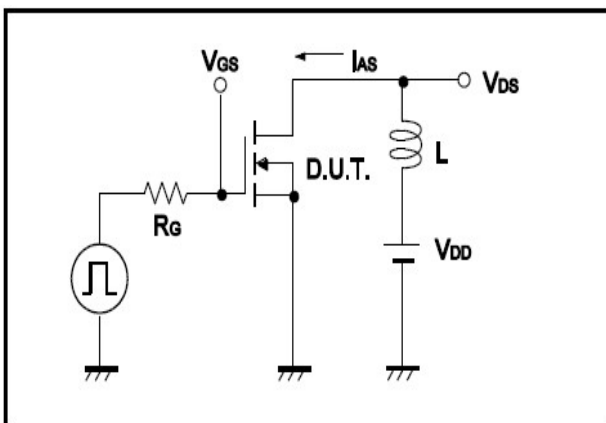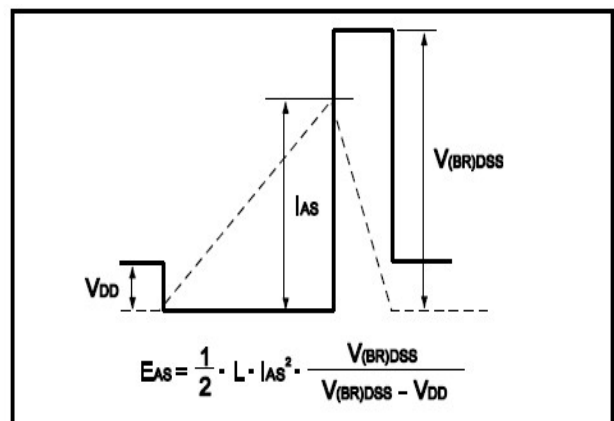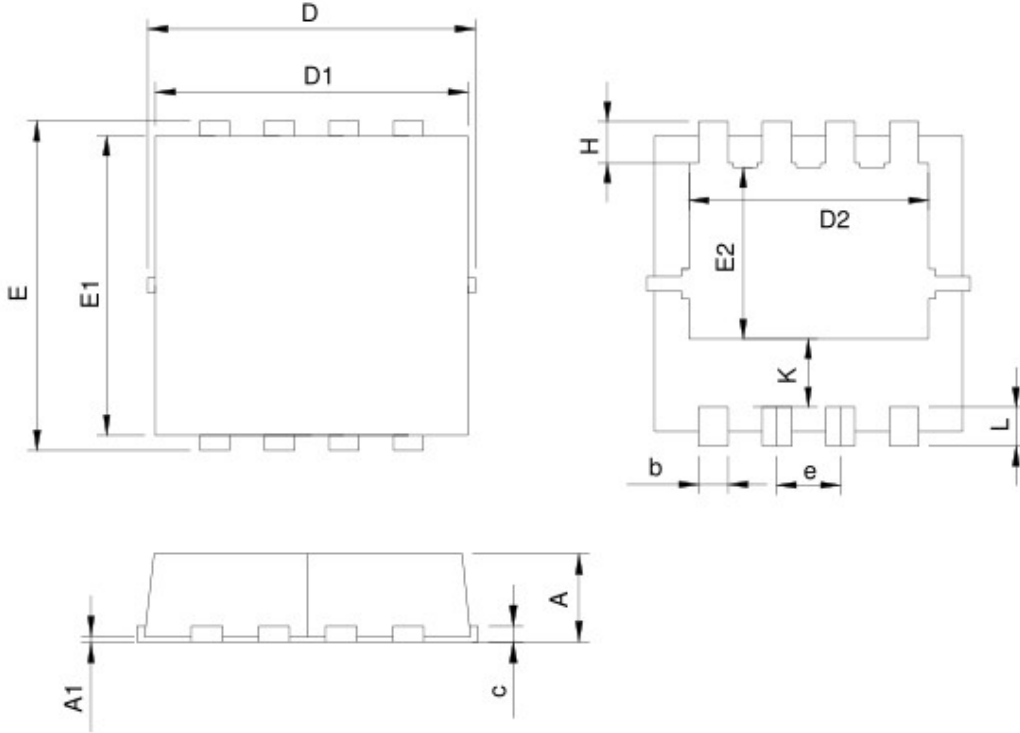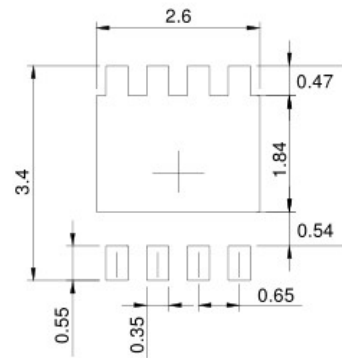
$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AS}^2 \cdot \frac{V_{(BR)DSS}}{V_{(BR)DSS} - V_{DD}}$$

●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